Important Instructions to examiners:

1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
3) The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills.
4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
7) For programming language papers, credit may be given to any other program based on equivalent concept.

1. A) Attempt any THREE of the following: 12M

i) State commonly used file formats for video signals.

Ans: Commonly used file formats for video signals are as follows:- (any four) 1 M each

TIFF:

A TIFF file, or TIF file, stands for tagged Image File Format. TIF files are a common file format for images, especially those used on graphic design. The file extension for a TIFF file is either .tiff or .tiff.

BMP:

The BMP file format, also known as bitmap image file or independent bitmap(DIB) file format or simply a bitmap, is a raster graphics image file format used to store bitmap digital images, independently of the device(such as a graphic adapter), especially on Microsoft Windows and OS/2 operating systems.

GIF:

GIF files are a format commonly used for graphics presented on websites. GIFs can contain a maximum of 256 colors, and are therefore best images that contain simple shapes, a limited color palette, text and other elements as opposed to photos.GIF stands for Graphic Interchange Format.

PNG:

The PNG (Portable Network Graphics) file format was created as the free, open-source successor to GIF. The PNG file format supports 8bit palette images (with optional transparency for all palette colors) and 24 bit true color (16 million colors) or 48 bit true color with and without alpha channel-while GIF supports only 256 colors and a single transparent color.

JPEG/JFIF:

JPEG (Joint photographic Experts Group) is a lossy compression method; JPEG/JFIF filename extension is JPG or JPEG. Nearly every digital camera can save images in the JPEG/JFIF format, which supports 8-bit gray scale images and 24 –bit color images (8 bits each for red, green, and blue).

ii) State any eight applications of CATV.

Ans:-

Applications of CATV: **½ M each**

1. As Television broadcast system
2. Cable internet modem.
3. Education
4. FM Radio broadcasting.
5. Program on demand broadcasting from cable operator.
6. Video-Tex
7. Cable phone
8. E-business
9. Local advertising

iii) List four components of basic servo system used in CD player.

Ans:

Components of Basic Servo system:- (any four) **1 M each**

1)Sensing element/photo diodes

2)DC offset control

3)Amplifier stages

4)Element being controlled

iv) Compare DVD and BD.(Any four points).

Ans:-

iii) Comparison:-.(Any four points) **1 M each**

Sr.no	Item	DVD	BD
1.	Developed by	DVD forum in 1995	BD association in 2002
2.	Sensor	Red laser(650 nm)	Blue-violet
3.	Numerical aperture	0.6	0.85

4.	Compression	MPEG-2	MPEG-2 and MPEG-4/H.264
5.	Capacity per layer	4.7 GB	25GB
6.	Disk size	12 cm	12 cm
7.	Track pitch	0.32 micrometer	0.74 micrometer
8.	Single side dual layer	8.5 GB	50 GB
9.	DSDL	17GB	100GB
10.	Thickness of cover	0.6 mm	0.1 mm
11.	Resolution	480/576	1080/720/576/480
12.	SDTV movies	8 hours	23 hours
13.	HD movies	Not Possible	8 hours

b) Attempt any one of the following:- 6M

i) Describe the function of conditional access built in scrambling system in CATV.

Ans: Explanation

- **Scrambling system: 2 M**

The cable companies offer several local TV program for a minimum charge. in addition premium services on separate channels are offered which include cine-films, special sport events and many more .

However, these premium channels require a fee to be paid that is added to the basic charge. For this the incoming signal is scrambled i.e. picture is an intelligible on the receiver screen unless de-scrambled i.e. restored to its normal form with a signal supplied by the cable operator at the subscriber request with additional payment.

- **Sync separation scrambler: 2M**

The most common method of scrambling signal is known as sync separation . in this sync is only compressed in the RF modulation envelope of the video carrier in the cable channel . then the receiver cannot lock in with the sync suppressed signal and the picture continuously rolls with horz tearing of its details .

The descrambler unit reverses the effect of scrambling at the head end of the cable system by restoring sync to the RF signal.

- **Traps: 2M**

One method of blocking the serial is by inserting an interfering carrier in the pay channel and notching it out by a suitable sharp filter at the subscribers end. Such a method is easy to tamper and hence scrambling is more commonly employed for conditional access to a channel.

ii) With the help of suitable diagram show how optical arrangement in three beam linear tracking pick-up assembly is used in CD player.

Ans:

Diagram:- **3M**

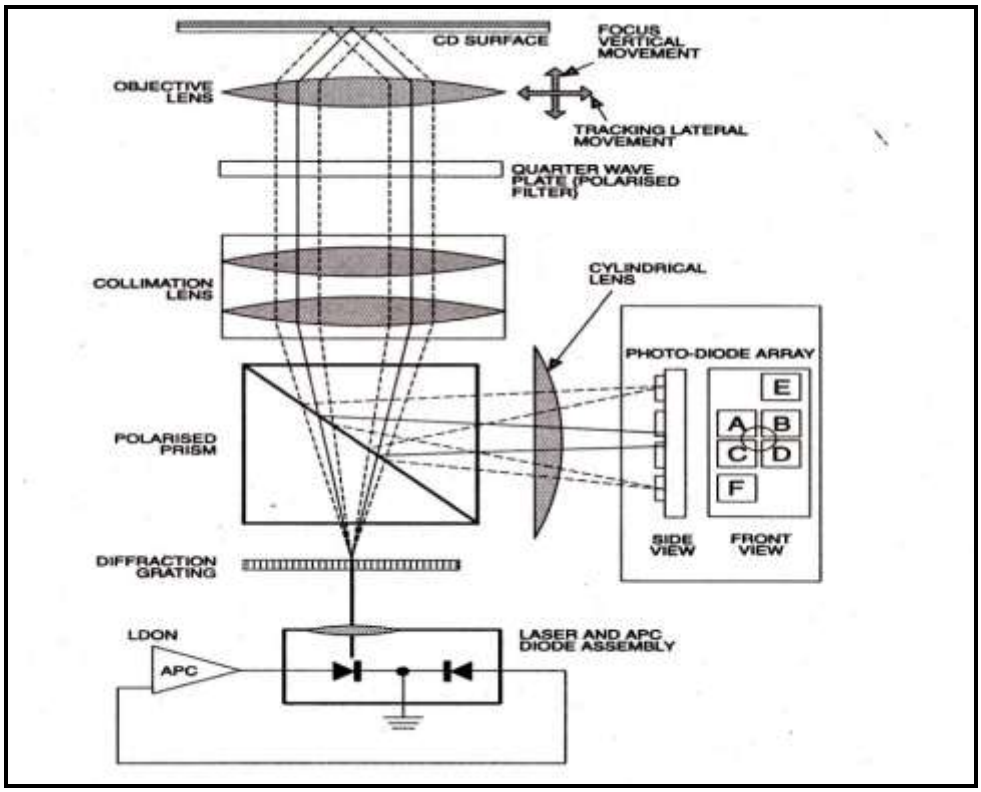


Figure:- Three beam linear tracking pick-up assembly is used in CD player.

Explanation: **3M**

This type of optical assembly is used in the most of the current VCD players. in these units ,three laser beam s are generated from a main laser beam ,the main or center beam provides data retrieval as well as focus error information and two side beams provide tracking error signal.

In this assembly the objective lens can move vertically to achieve focus, and laterally (horizontally) for tracking, i.e. to move to the center of track.

In this assembly, the laser diode produces only one laser beam ,other two beams are obtained from this single beam by using a diffraction grating.

As the lens has limited amount of lateral movement, the complete assembly is moved gradually across the surface of the disc to read the signal on the VCD surface.

Q. 2 Attempt any TWO of the following. 16M

a) List different equipment's used in production studio and state function of each.

Ans: *Note:* (listing -2marks, brief function of any6 equipment -1mark each)

Listing of different equipment :- 2M

- Cameras
- Spot lights
- microphones
- video recorders
- monitors
- special effects generator
- Switcher

Functions: (1M each)

1. **Cameras:**

camera control room or the main equipment room is located in the studio complex, generally close to the PCR. Its management is looked after by a TV engineer. Plumbicon cameras using charge coupled devices may be found in future when digital TV is fully inducted.

a. Generator Lock(or Gen -Lock)

The master sync generator circuits are in the form of integrated circuits .they are built into the camera . with the help of a switch, the internal sync generator can follow H-sync and V-sync pulses and colour burst signal of any other video source. Such a technique is called gen-lock. For gen-lock either the sync or colour burst pulses without video information or complete composite video signal of another source may be fed. When only sync and colour burst pulses are fed, the signal is called black burst.

b. View Finder

TV camera tubes use a small black and white monitor, called the view finder .it is under scanned so that the picture does not fill the whole screen.in this way all the edges of a picture can be seen by the camera operator. The view finder is driven from the video output of the camera tube. This enables the operator to observe the field of view of the camera and to adjust the focus.

c. Lenses for Cameras

Lenses are optical devices which focus the incident light on the target plate of the camera tube. Convex lenses are used .the two features of a lens for forming a well-focused image are focal length and f-stop number. The focal length results

in wide or of narrow angle. Short focal length results in wide angle shots. Long focal length gives a narrow angle and such a lens is called a telephoto lens. A telephoto lens makes distant objects appear closer.

d. Zoom lens

Zoom lens has a continuous variable focal length .a switch can allow zooming –in for close-up telephoto shot or zooming –out for wide angle view. The ratio of maximum to minimum focal length of a lens is called zoom range.

2. Special Effects Generator(SEG):

Special effects generator (SEG) produces special effects in a picture .it provide an electronic gate for special effects. SEG stores picture frames into the memory and it can reduce the size for superimposing a small picture over another scene through a switcher.

Some of the special effects which are produced and superimposed in scenes are mentioned below:

- Movement of curtains when a scene changes.
- A person can be superimposed on another picture, for example, the person giving the weather forecast is superimposed over the weather map.
- Rain/hail storm.
- Train/aeroplane.
- Earthquake, flood and natural or man-made calamities.
- Sound of wild animals.

There may be several other types of special effects depending on the situation in the scene.

3. Switcher:

The function of a switcher is to switch is to switch signals from different sources .it typically selects 10 inputs sources and 6 output lines with the help of a 10 x 6 matrix . the input sources are various cameras, tape recorders and test signal generators. Signal of various cameras is done by an electronic switch which is fast and is without spurious or transient pulse (called glitch).

Switching facilities editing and insertion of captions .editing includes facilities like take, cut, fade-in, fade-out and mixing to give special effects in addition to the effects obtained from memory of the SEG.

4. Studio lights:-

The art form of the reproduced picture depends on the lighting arrangement which needs to be very elaborate and should therefore be planned carefully. Light sources used are incandescent lamps and quartz iodine lamps. The latter are more stable in operation and in maintaining the right colour temperature. The effect of ageing is minimum in quartz iodine lamps.

5. Microphones:-

Microphones converts sound pressure variations into electrical variations ,called audio signals. There are several types of microphones like moving coil type, ribbon type, special noise cancelling microphones, etc.

Microphones used in program involving public interviews, speeches, musical concerts may be kept to the viewers, but in drama serials, they are kept out of the view. Hidden microphones and boom mounted microphones are frequently used for such programs.

6. Tele-cine Equipment:

A cinema film is a reel of photographic films, usually of 35 mm or 16 mm size. Special techniques are used to convert photographic films into video signals. Three types of techniques used are as follows:

1. Projector Tele-cine

2. Flying spot scanner

3. Charge coupled device Tele-cine.

7. Control of reverberation in a TV:

Sound being a wave motion suffers reflection, diffraction and absorption in accordance with the specified rules as for any wave motion. A listener in an auditorium receives sound directly from the source as well as sound reflected from walls, ceiling and floor. The reflected sound will be heard as a distinct echo if time gap between the direct wave and the reflected wave is more than 60 ms. Reflections over shorter distances shall simply prolong the sound. Due to multiple reflections coming at different instances of time due to path differences, sound persists even after the source of sound stops sounding.it fades away only gradually. Such gradual fading of sound is called reverberation. Reverberation time is defined as the time taken for the sound energy to drop to 10^{-6} times its initial value.

b) Draw the block diagram of DVD player. State the function of each block. State any four advantages of DVD.

Ans: Diagram 2 M, function 3 M, advantages 3 M

Diagram: 2M

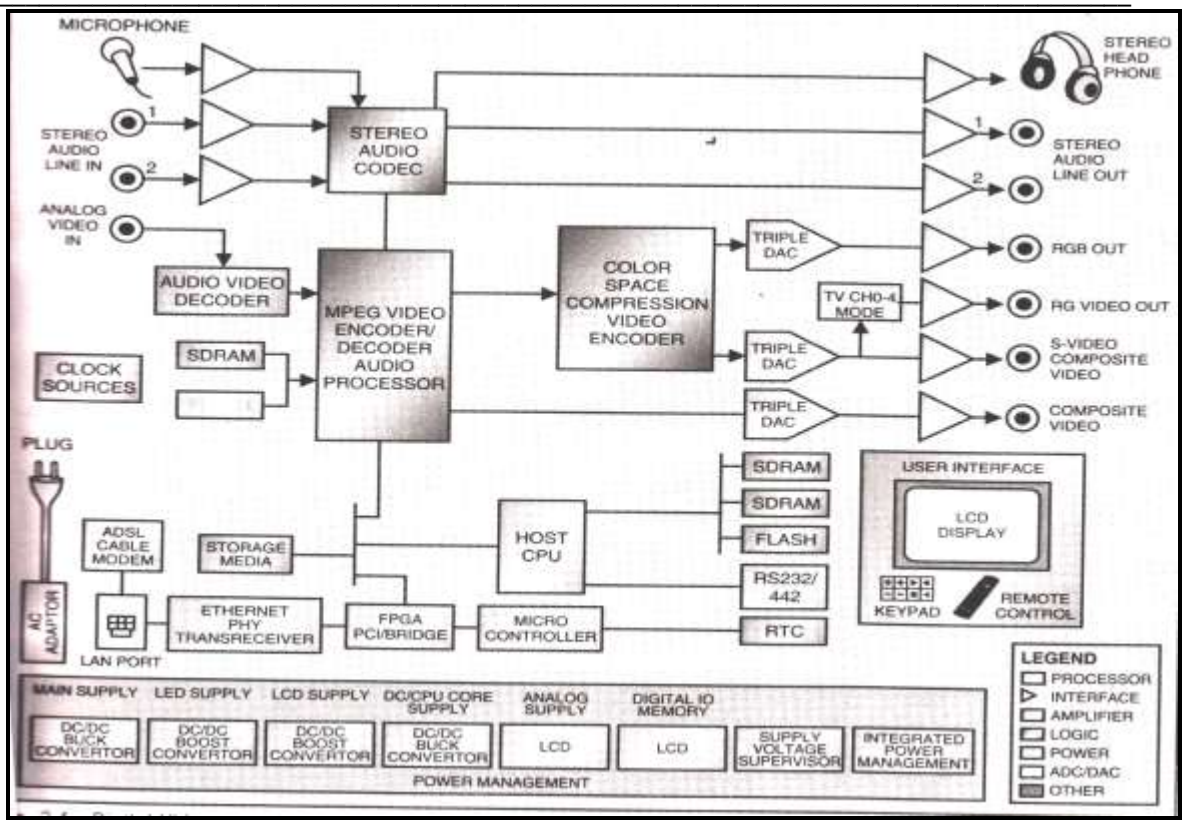


Figure:- Block diagram DVD player

Functions: **3M**

A digital Video Recorder(DVR) is a consumer video/audio product that can record and play back full-motion video/audio using MPEG audio/video standards for the compression of video and audio content. The storage media include hard disks and recordable Cd/DVD disks. Core subsystem include:

Analog Video Decoder:

Digitize and decodes baseband analog video formats (NTSC/PAL/SECAM) into digital component video.

MPEG Video CODEC/Audio Processor:

Performs MPEG video encoding/decoding, MPEG Audio encoding/decoding, and multiplexing / DE multiplexing of the audio and video bit streams.

CPU:

Controls the DVR operating system software, overlay of text/graphics, and the user interface.

Triple DAC:

Converts digital video into analog video output in different formats: NTSC/PAL , S video, and YPrPb component video. The output stages require high-performance op-amps to amplify the PCI bus.

FPGA/PCI Interface:

Provides data/command transfer between devices connecting to the PCI bus.

Stereo /Audio CODEC:

Uses audio ADC and DAC to digitize and playback analog audio.

User Interface:

Allow the user to control the DVR using the panel keypad or the remote control .

Broadband Connectivity:

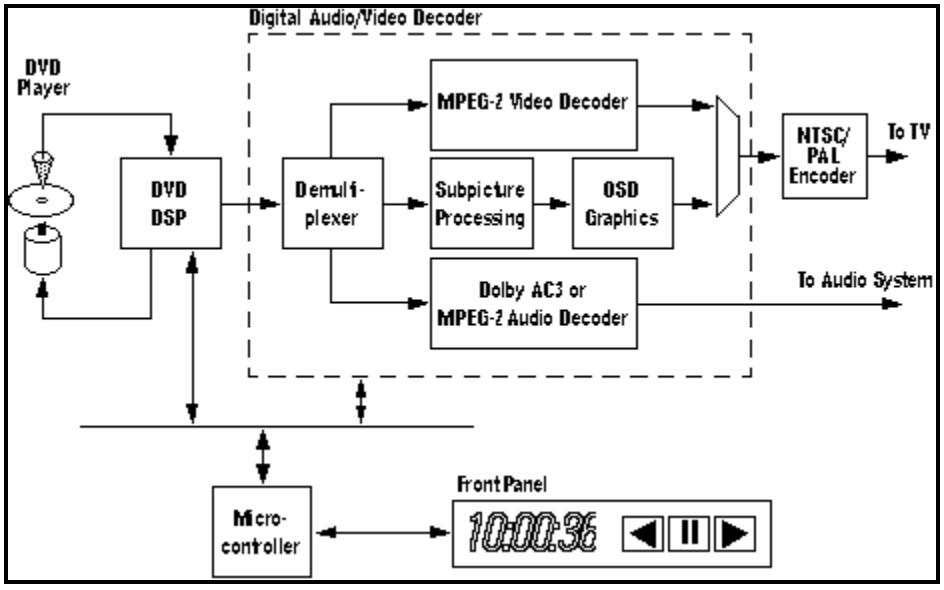
Allows streaming audio and video to transmit and receive through ADSL . and cable modem.

Power Conversion:

Converts the input power from the AC adapter to run various functional blocks.

OR

Diagram:-



Functions:

The DVD players consist of the following major components:

- **Disc Reader Mechanism**: It consists of the motor which spins the disc and the laser which reads the information from it. The laser uses red light (as opposed to an audio CD player's infrared laser).
- **The DVD-DSP (digital signal processor)**: It is an integrated circuit that translates the laser pulses back into electrical form that other parts of the decoder can use.
- **The Digital Audio/Video Decoder**: This complex integrated circuit reconstitutes the compressed data on the disc, converting it into studio-quality video and CD-quality audio for output to TVs and stereo systems.
- **Microcontroller**: This device controls the operation of the player, translating user inputs from the remote control or front panel into commands for the audio/video decoder and the disc reader mechanism. The microcontroller would also be responsible for implementing parental lockout, dialing distributors for access codes and controlling decryption.

Advantages of DVD (Any Four) **3M**

1. DVD has a huge storage capacity
2. Designed from the outset for video, audio, computer and multimedia, and not just audio ,it is very versatile.
3. All formats use a common file system, and hence there is no problem of compatibility.
4. Overall size is quite small and handy, hence it is portable.
5. Its replication is easy and inexpensive.
6. The strength is same as in a CD, due to the bonding of two substrates.
7. It uses efficient error detection and correcting codes.
8. CDs and VCDs can be played on a DVD player without any difficulty but not vice versa.

c) Draw the block diagram of HDTV and state the functions of each block

Ans: (dig –->4marks,function ->4marks)

Basic Function -4M

- The picture captured in HDTV camera tube is video processed which after being suitably processed it is in the frame memory (current) and referred to as new frame.

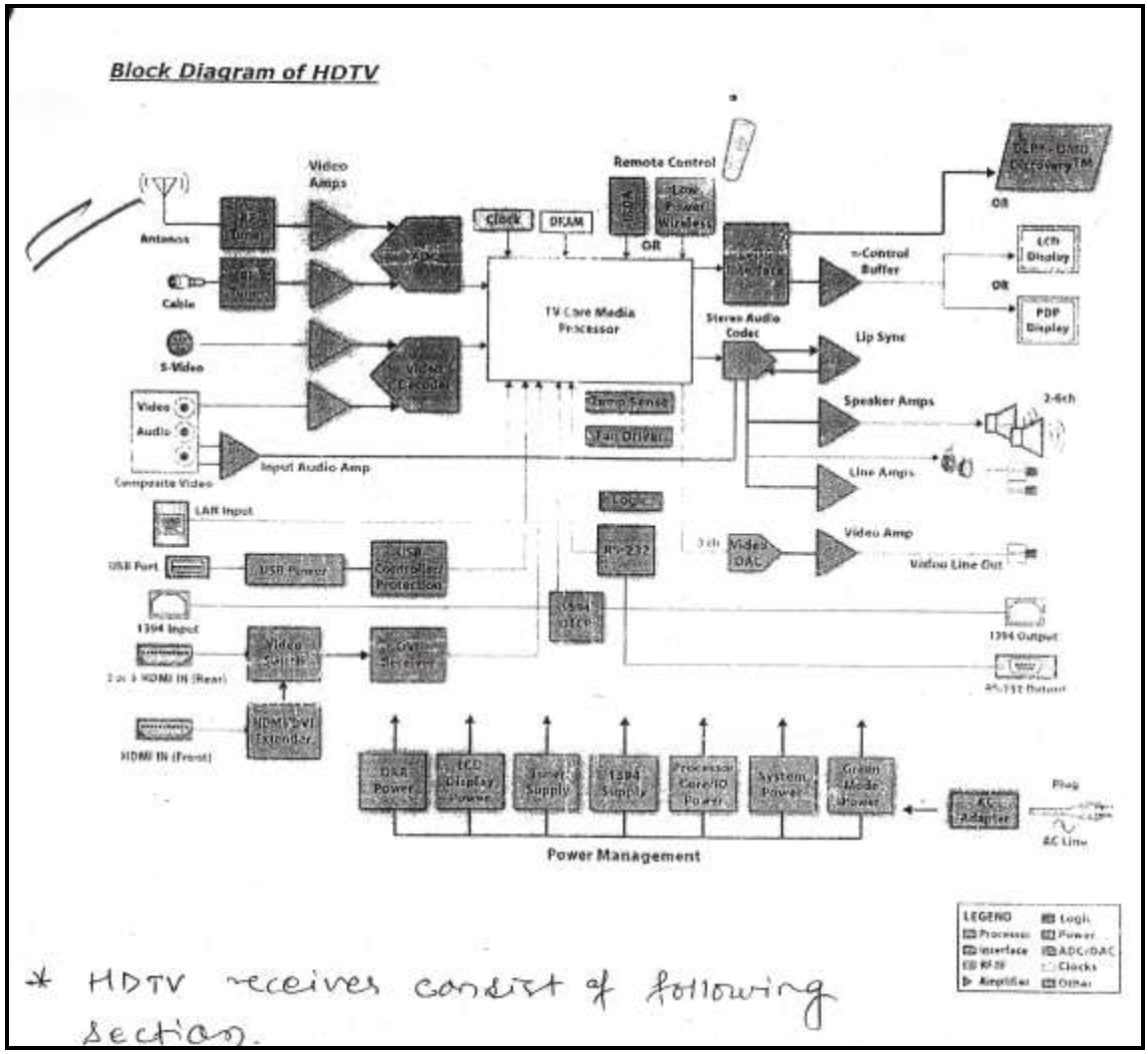
A predicted frame is generated by past frames accumulated in the frame memory (previous).

A difference frame is obtained by subtracting the predicted frame from the new frame since the predicted frame closely represents the new frame, there is little information left to be transmitted in the difference frame. this is the first step in video compression.

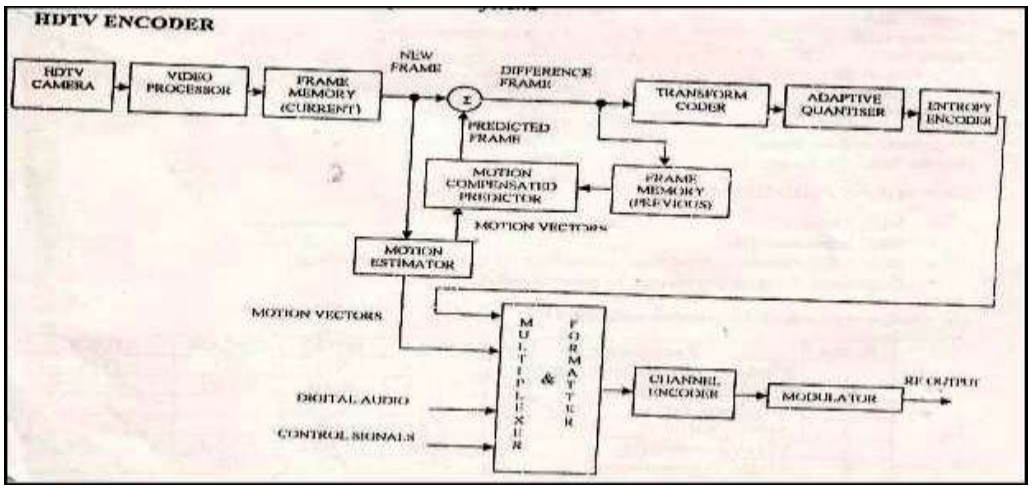
- compression, of the video signal is achieved by using:
  i) a transform coder
  ii) Entropy encoding which takes advantage of redundancy in the signal obtained at the output of the transform coder.
- The coded signals along with the digital audio & control signals are multiplexed.
- To take care of error during transmission the output of the multiplexer is passed through the channel encoder.
- The final signal which feeds the modulator.
- RF signal is demodulated in the demodulator

- Channel decoder corrects any errors that occurred during transmission.
- The DE multiplexer separates out encoded signals, motion vectors, digital audio & control signals
- The encoded signals are processed in an inverse manner recovering the decompressed signals. This is the update information.
- The update information is added to the predicted frame to reconstruct the new frame.
- The new frame signals are fed to the HDTV display after suitably processed in the video processor. Here the high quality images are finally displayed.

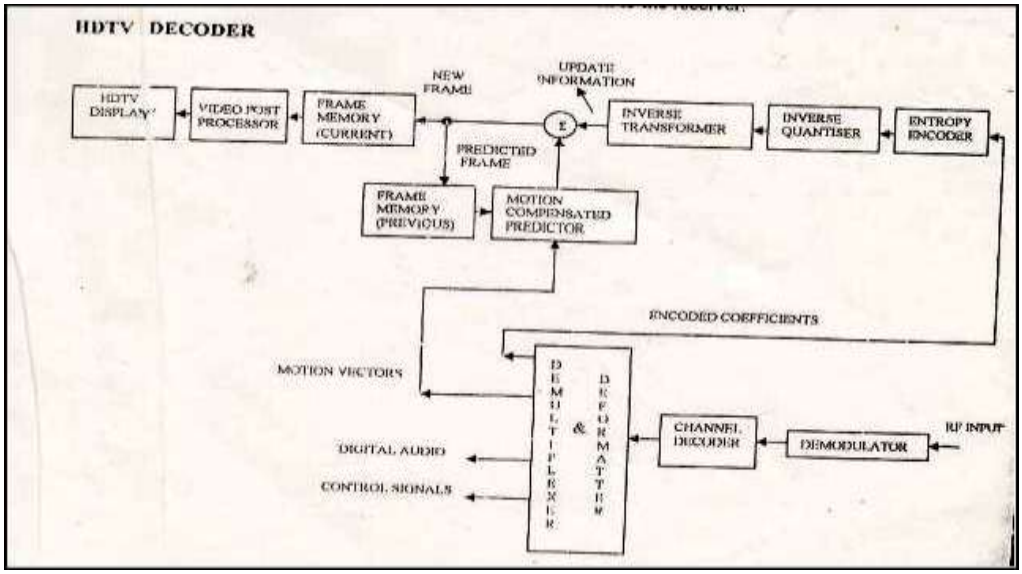
Diagram :- **4M**



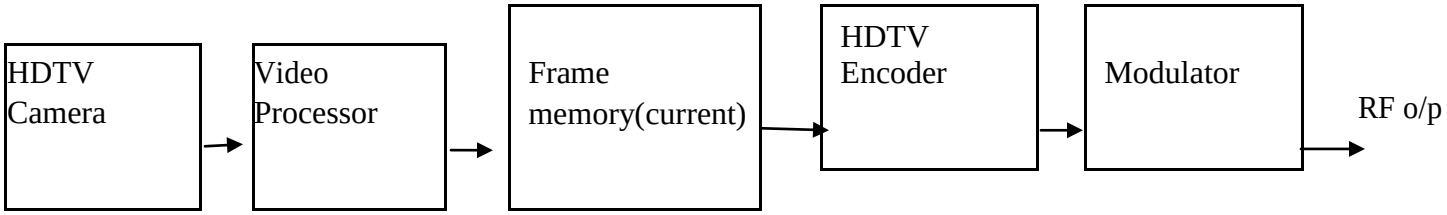
OR


HDTV ENCODER
HDTV CAMERA
VIDEO PROCESSOR
FRAME MEMORY (CURRENT)
NEW FRAME
DIFFERENCE FRAME
TRANSFORM CODER
ADAPTIVE QUANTISER
ENTROPY ENCODER
PREDICTED FRAME
MOTION COMPENSATED PREDICTOR
FRAME MEMORY (PREVIOUS)
MOTION VECTORS
MOTION ESTIMATOR
MOTION VECTORS
MULTIPLEXER & FORMATTER
DIGITAL AUDIO
CONTROL SIGNALS
CHANNEL ENCODER
MODULATOR
RF OUTPUT

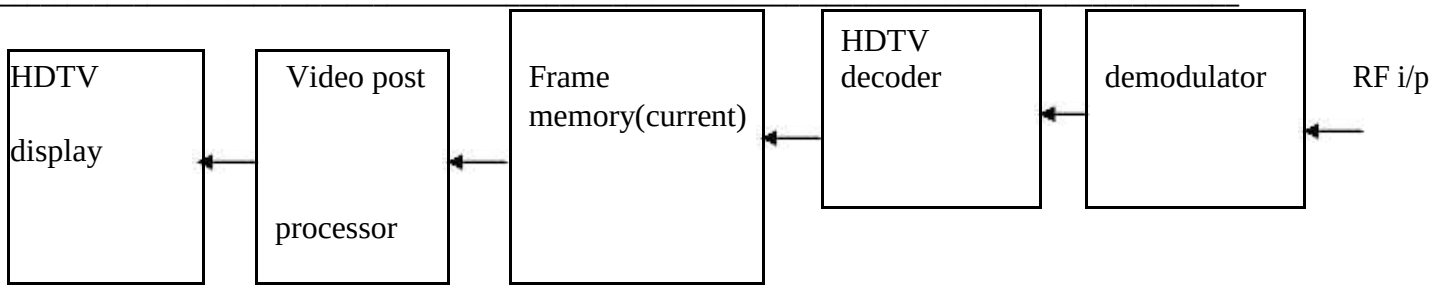
OR


HDTV DECODER
HDTV DISPLAY
VIDEO POST PROCESSOR
FRAME MEMORY (CURRENT)
NEW FRAME
UPDATE INFORMATION
INVERSE TRANSFORMER
INVERSE QUANTISER
ENTROPY ENCODER
PREDICTED FRAME
FRAME MEMORY (PREVIOUS)
MOTION COMPENSATED PREDICTOR
ENCODED COEFFICIENTS
MOTION VECTORS
DEMULTIPLEXER & DEFORMATTER
DIGITAL AUDIO
CONTROL SIGNALS
CHANNEL DECODER
DEMODULATOR
RF INPUT

OR


HDTV Camera
Video Processor
Frame memory(current)
HDTV Encoder
Modulator
RF o/p

OR



Q.3 Attempt any four of the following. 16M

a) State any four applications of CCTV.
Ans:

Application:- 1M each Application

- **Surveillance:-**
  CCTV is effectively used for security in the campus of defence , banks , supermarkets , etc. To keep eye ove intruders , thieves , and mischief mongers.
- **Education**:-
  Close-Up of demonstration experiments, surgical operations, etc. can be shown on large monitors with audio system to a large number of students .
- Medical care:-
  CCTV cameras fitted at intensive care units enable the doctors to monitor the condition of serious or critically ill patients.
- Industry:-
  Remote inspection of machine
- Safety
- Traffic Control
- Good Control

b) State any four application of projection TV.
Ans:
Application:- 1M each application

- Conferences
- Exhibition
- Public meeting
- Mini video theatre
- Educational institutes

c) Describe the role of computer system and power control system in plasma TV.
Ans:- Note:
[Computer system is used for senceing the intensity - 2M,
Power control system is used to control the variations of basic RGB colours-2M]
Role of computer system and power control system in plasma TV:

Plasma panels use pulse-width modulation (PWM) to control brightness. A computerize power control system is used in Plasma TV which varies the width of current pulses flowing through the different cells thousands of times per second.

The control system can increase or decrease the intensity of each sub pixel colour to create billions of different combinations of red, green and blue. In this way, the control system can produce most of the visible colours. Plasma displays use the same phosphors as CRTs, which accounts for the extremely accurate colour reproduction when viewing television.

d) Compare LED and LCD monitor. (Any four)
Ans:
Comparison:- 1M each point

LCD	LED
1.Source of light used is the florescent lamps	1.Source of light used is LED
2.Produces high quality image	2. LED's give more balance in colour resolution.
3. Florescent lamps are arranged in a grid form.	3. The service of diodes are arranged in several rows.
4.use less power	4. Use less power than LCD.
5. They can be made very thin making them less space consuming.	5. They cannot be very thin.

e) State working principle of interactive TV.
Ans:
Working principle of Interactive TV :- 4M

- The latest TV and computer technique have enabled a new technique of viewing is called interactive TV
- In this, user has a choice to determine which aspect of the scene should appear on the screen.
- e.g. Replay of particular action in a cricket match from different angles, it is based on the fact that DBS signals are transmitted in digital packets.
- It is capable to send video audio & computer data in combination to the decoder.

Q.4 Attempt any THREE of the following.

i) Describe the functions of MAC coder in HDTV.

Ans: **[Note**: dig->2marks, brief function of each block->2marks**]**

Diagram:- **2M**

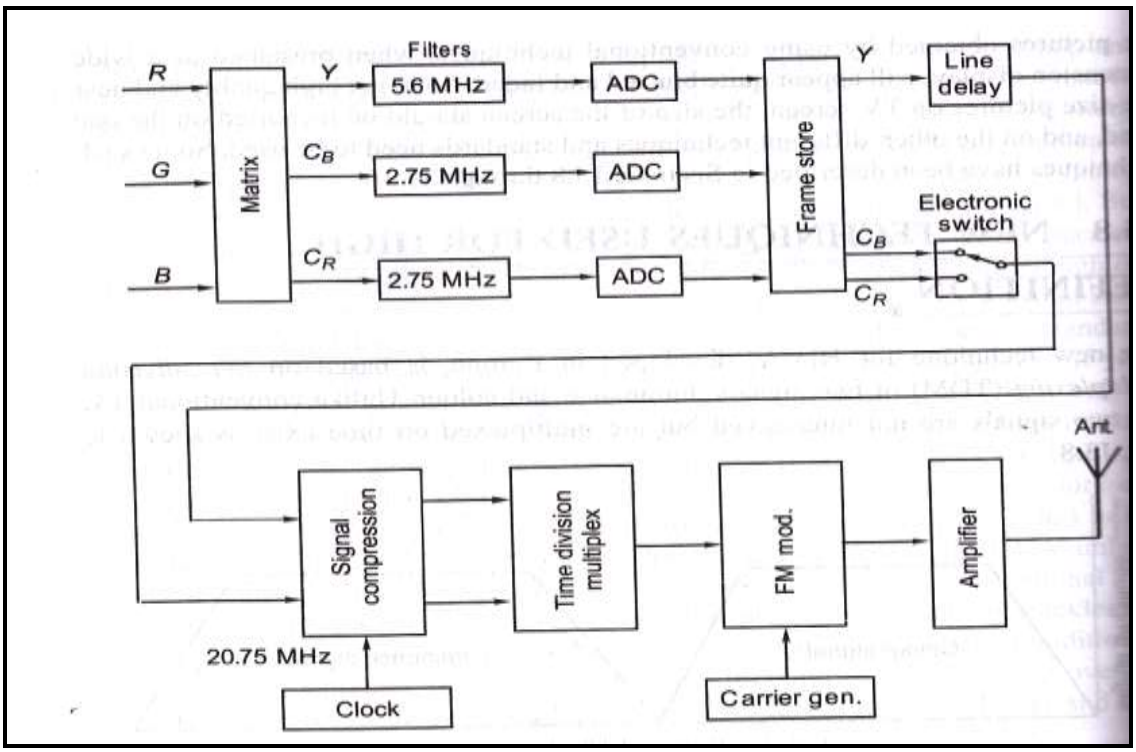


Figure:- Block diagram of MAC(multiplexing analog component) encoder

Functions of MAC coder:- **2M**

Matrix: -

Video signals, R, G, and B, produced by the colour camera tubes represent the intensity of light of three primary colours, red, green, and blue, present in each pixels of the picture. These signals are fed to a resistive matrix, incorporating resistor circuits, investors and adders (as in the conventional TV system) to give luminance signal Y (=0.11 B+0.30 R+0.59G), and duly weighted colour difference signals designated as C_B (for weighted B-Y) and (for weighted R-Y).

Filter:-

These are band pass filters, allowing bandwidth of 5.6 MHz for Y signal and 2.75 for C_B and C_R signals. (These bandwidths are different from the bandwidths used in the conventional TV system and form part of new standards for HDTV.)

Analog to digital converter:-

The filtered signals are sampled for digitization. The minimum sampling rate is equal to twice the maximum bandwidth

frequency. The samples are coded as 8-bit codes, producing a word of 8 bits for each sample of the analog waveform taken.

Frame store:-
Digital pulses are fed to frame to a frame store. The frame store isolates the input and the output and hence synchronization is not required. Total storage capacity is 20.25 million samples per second (6.75 for colour difference signals and 13.5 for luminance signals).

Line delay:-
Luminance signal Y is delayed by one line. This is achieved by using two RAMS, one for storing one line. This is achieved by using two RAMS, one for strong luminance signal for the current line (the line which is scanning) and the other for the previous line (the line which has just been scanned). This automatically synchronizes the sequence of the luminance signal and the Chroma signal.

Line sequential switch:-
It is an electronic switch which allows C_B signal odd numbered lines and C_R signal on even numbered lines, as in the SECAM system.

Comparison stage :-
The luminance signal, clocked (or sampled) at 13.5MHz and 20.25 MHz comparison ratio for U and V is 3:1 and for Y, 3:2.

Time Multiplex Switch:-
This is the final stage of MAC encoder. The Y and C signals are multiplexed so that odd line contains Y and C_B signal. As the bits are allowed to pass at 20.25 million bits per second, (13.25 million bits of Y signal and 6.25 million bits of C signal pass in one second). Thus Y and C bits are divided into time slots.

Frequency Modulator:-
The multiplexed signal modulates a sine wave carrier, using frequency modulation and thus , we get a modulated signal duly multiplexed for Y and C. FM makes the system almost immune to noise.

Final Power Amplifier:-
It finally amplifies the power and delivers it to the transmitting antenna.

iii) Describe the concept of jumbo TV screen size and brightness.
Ans: Screen size 2M, Brightness 2M

- In a jumbo TV, red, green and blue LED's are used instead of phosphor.
- A "pixel" on a jumbo TV is a small module that can have as few as three or four LED's in it (one red, one green and one blue) .in the biggest jumbo TV's ,each pixel module could have dozens of LED's .pixel modules typically range from 4 mm to 4 cm in size.
- To build a jumbo TV, you take thousands of these LED modules and arrange them in a rectangular grid. For example, the grid might contain 640 by 480 LED modules, or 307,200 modules. the size of the ultimate screen depends on the size of the LED modules.

LED Module size	Screen size(meters)	Screen size(feet)
4 mm	2.56 x 1.92	8.4 x 6.3
25 mm	16 x12	52.5 x 39.4
40 mm	25.6 x 19.2	84x 63

iii) State the working principle of VHS video recording format.
Ans:
Working principle:- **4M**
VHS video home system format
The video home system is a consumer –level analog recording videotape-based cassette standard developed by Victor Company of Japan (jvc).
The 1970's was a period when video recording became a major contributor to the television industry. Like other technological innovations, each of several companies made an attempt to produce a television recording standard that the majority of the world would embrace. at the peak of it all, the home video industry was caught up in a series of videotape format wars. Two of the formats, VHS and Betamax , received the most media exposure. VHS would eventually win the war, and therefore succeed as the dominant home video format, lasting throughout the tape format period.

VHS-C
VHS-c is the compact VHS videocassette format introduced in 1982 and used primarily for consumer-grade compact analog recording camcorders. The format is based on the same video tape as is used in VHS, and can be played back in a standard VHS VCR with an adapter . through quite inexpensive, the format is largely obsolete even as a consumer standard and has been replaced in the marketplace by digital video formats, which have smaller form factors.

Super VHS
Several improved versions of VHS exist, most notably super-VHS(S-VHS), an analog video standard with improved video bandwidth. S-VHS improved the horizontal luminance resolution to 400 lines .the audio – system is the same. S_VHS made little impact on the home market, but gained dominance in the camcorder market due to its superior picture quality.

iv)Describe how bandwidth reduction is achieved in HDTV.
Ans:-
Explanation:- 2M
Bandwidth can be reduced by MUSE(Multiple Sub –Nyquist Sampling Encoding) system

- 'MUSE stands for Multiple Sub-Nyquist sampling encoding and is an HDTV bandwidth compression scheme developed by NHK.
- It uses the fundamental concepts of performance exchange in the spatio-temporal (transitory transformation) domain along with motion compensation to reduce the transmission bandwidth down to near 10MHz.
- The processed HDTV signal can then be transmitted using a single DBS channel. In MUSE the luminance and colour information are sent by Time-multiplexed components (TMC).

Diagram:- 2M

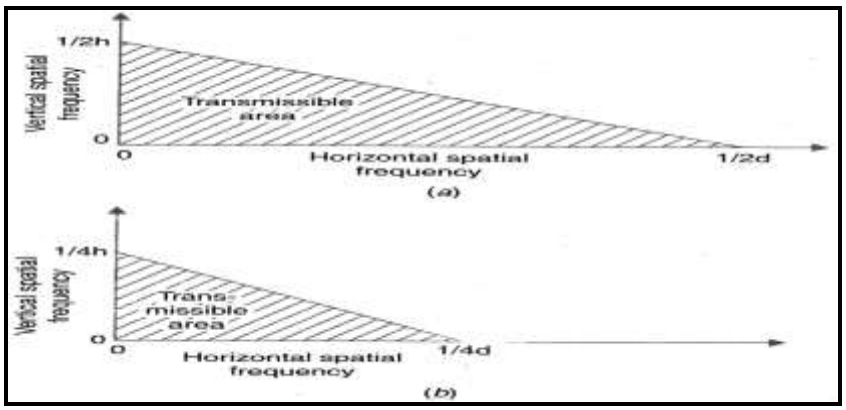


Figure:- Suppression of bandwidth

b) Attempt any ONE of the following.

i) Draw constructional details of CD. Name the material used for construction of CD. Describe how digital signal is stored on tracks of CD.
Ans:

Diagram: 2M

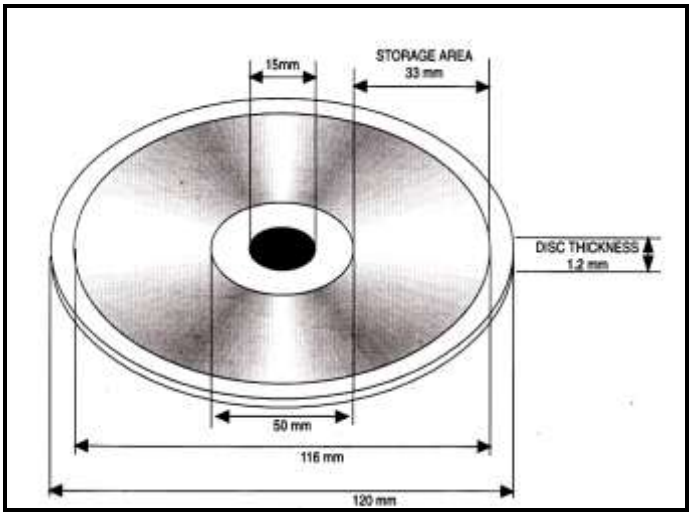


Figure:- Constructional diagram of CD

Explanation:- 1M

The optical read out uses a laser beam ,the laser beam is focused onto the disc by the objective lens microscope and focuses the laser beam into a spot slightly less than 1 µm in diameter. The spot is then used to retrieve the info contained on the disc.

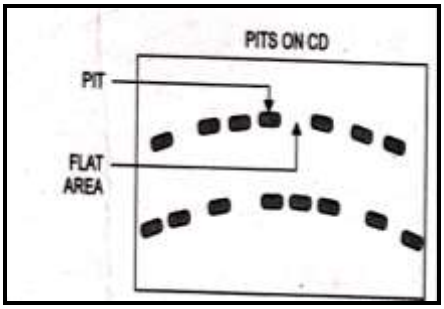
The disc is composed of thousands of circular tracks made in continuous spiral from the inside to the outside of the disc CD tracks consists of tiny pits are indentations in the disc material. The width of pits is 0.4-0.5 µm ,and with the depth of 0.1 µm .

The rotation of the disc ,combined with the pits and flats passing over the light beam , creates a series of ON and OFF flashers of light being reflected back into the system ,this modulating the light beam.

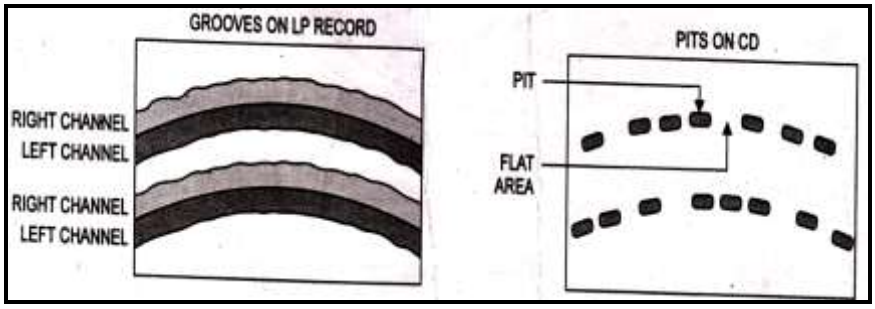
Name of the material used **1M**

The master disc is made up of glass coated with photo resistive material.
Final compact disc is made of poly carbonate with thin layer of aluminum

Diagram Digital signal is stored on tracks of CD:- **1M**



OR



Digital signal is stored on tracks of CD-

Using Laser cutting i.e Recording beam **1M**

The image is created by the laser beam on photo resist material which is developed to create pits on those areas wherever the laser beam strikes.

ii) 1) Identify Figure NO. 1Diagram.

2) Draw waveforms at A, B and C points when S is open and S is closed.(Refer Figure No. 1).

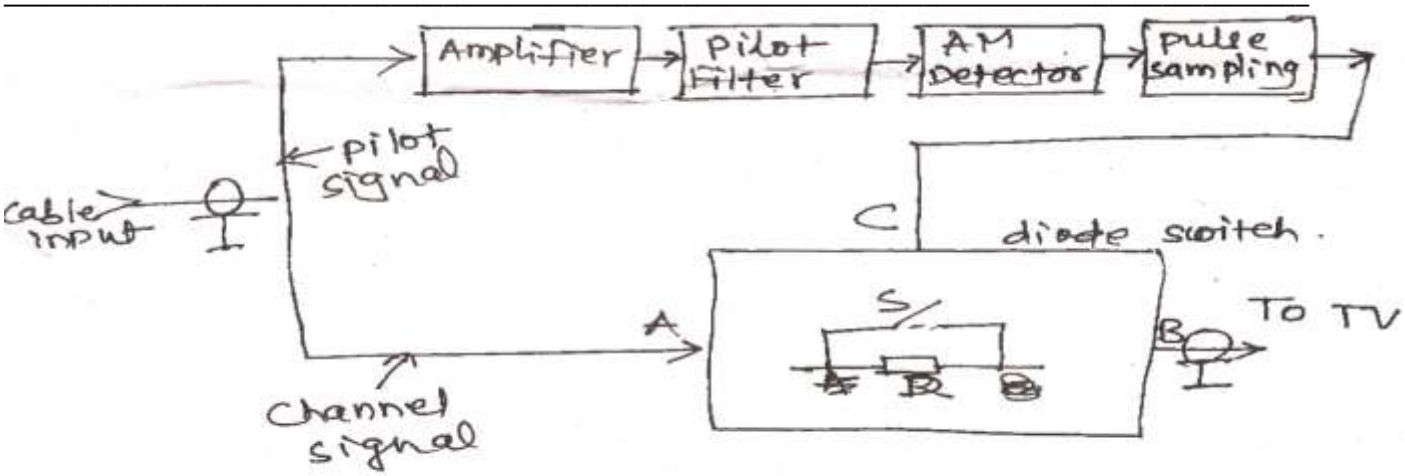
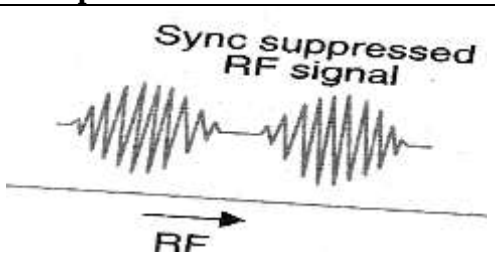
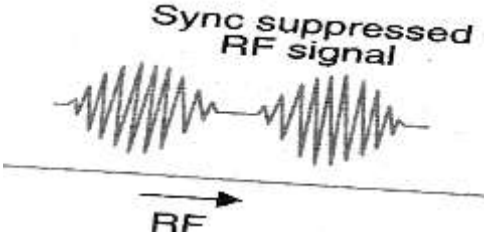
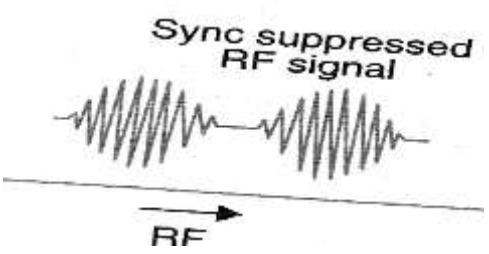
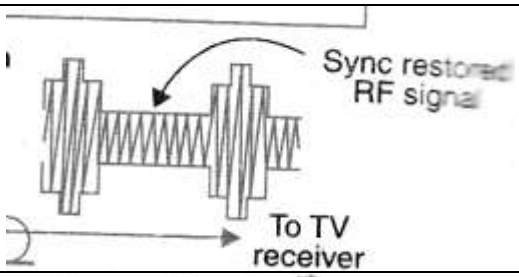
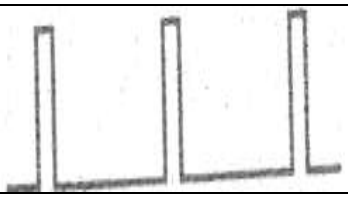
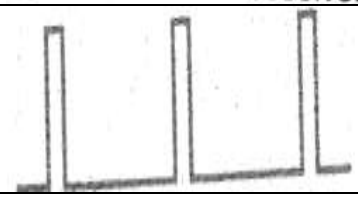


Fig. No. 1

1. The diagram shows :Sync separation type of descramble**r** **2M**

2. Waveform **4M**

Points	S is open	marks	S Closed	marks
A		**1/2**		**1/2**
B		1		1
C		1/2		1/2

Q5) Attempt any FOUR of the following:- 16M

a) Draw well labeled block diagram of Blue –ray disc, State its two advantages ?

Ans} Block Diagram 2M

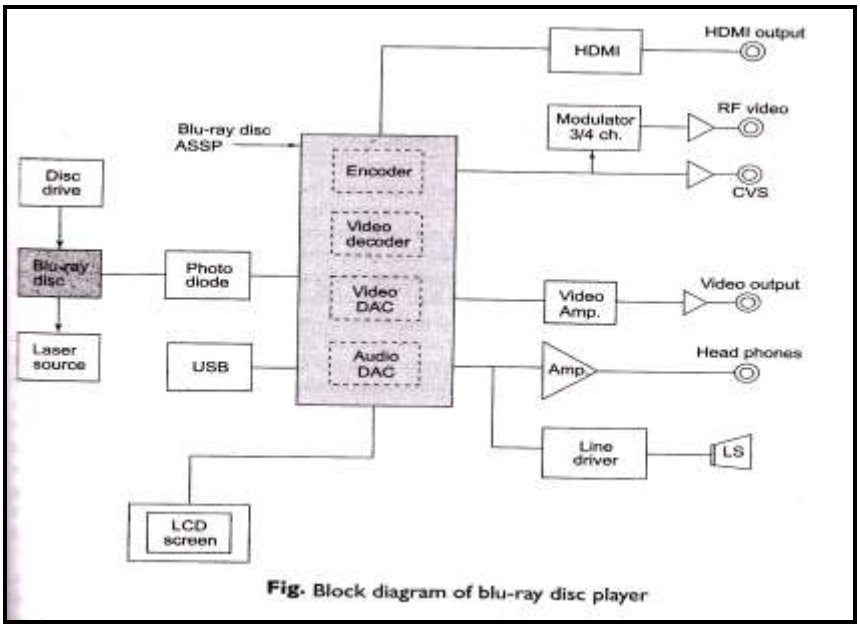


Fig. Block diagram of blu-ray disc player

OR

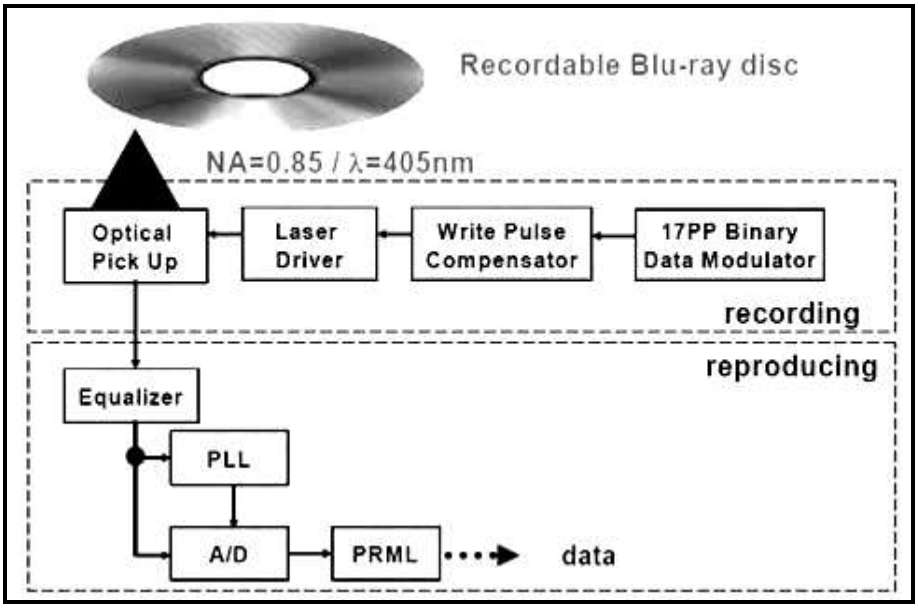


Figure:- Block Diagram of Recordable Blue-ray disc

Advantages: (Any two advantages 2M)

1. **Large Storage Capacity:-**up to 25GB (Gigabytes) , 50GB of data .
2. **High Resolution Video:-**Blu-ray Disc deliver up to 48 Megabits per second of rich, high definition video content.

Additionally, Blu-ray Disc can provide full 1080p resolution video to increase the viewing quality even further.

3. **Superior Audio Experience:-**

Blu-ray Disc has support for up to 7.1 channels of high definition, uncompressed surround sound; with additional support for up to 32 simultaneous streams of audio. This unlocks the door for real-time multi-language support and even user selected audio commentary, all in real-time.

4. **Increased Interactivity and Navigation:-**

Java is used to implement interactive menus with increased functionality and interaction with the disc's audio and video content. It also allows for integrated games and features like BD Live, which connects the Blu-ray Disc player to the Internet and local networks.

5. **Increased Durability:-**

Recent advancements in polymer technology have made the surface of Blu-ray Discs more durable than their CD and DVD counterparts. Replicated BDs use proprietary "hard coating" techniques to add a scratch-resistant layer to the discs and duplicated BD-R and BD-RE used a similar spin-coated protection layer.

b) Describe the working Principle of Multi-Sync monitor.

Ans}

Working Principle of Multi Sync Monitor: **4M**

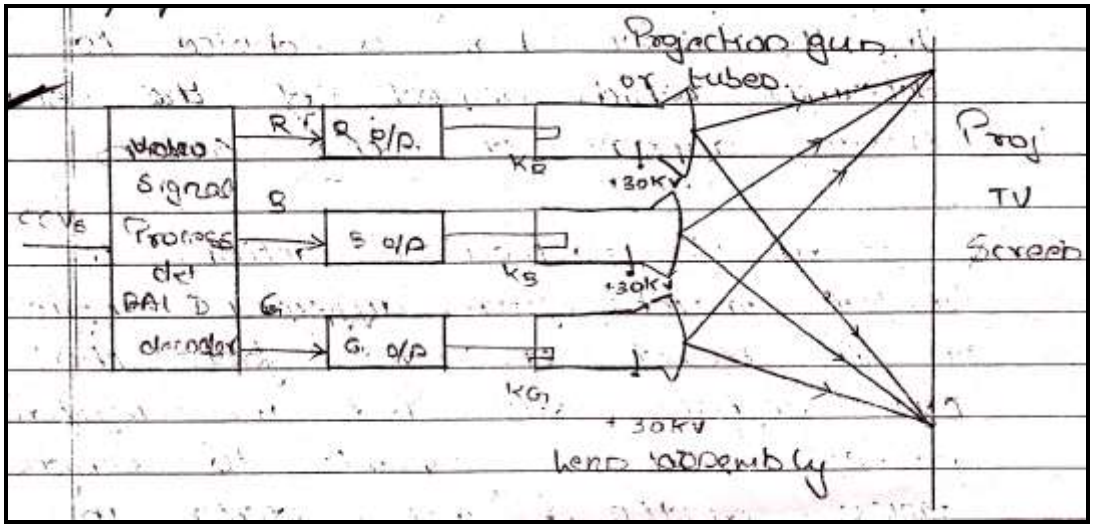
- A mutisync monitor is a monitor that can properly synchronise with various horizontal and vertical scan frequencies.
- In contrast , fixed frequency monitors can only synchronise with specific horizontal and vertical frequencies, Limiting their flexibility.
- Multisync monitors became common place during the 1990s as desktop computer systems began to support an increasing number of display resolutions.
- Fixed frequency monitors, and multisynchronous monitors that only support a set of frequences, may upon receiving scan frequencies outside design limits overheat their transformers. This is especially true vertical scanrate. Some monitors have protection circuits that will block invalid scan frequencies.

Or

- Multi Sync monitor is a display device for computers that is able to display images across a range of different refresh rates, rather than being stuck with one option.
- The "refresh rate" of a screen refers to the number of times each second that a still image is displayed on it. A Multi Sync monitor can be adjusted to synchronize to a wide range of refresh rates, which allows it to function with more graphics cards without being damaged.
- The name “MultiSync monitor” comes from a combination of the words “multiple synchronizations,” which refers to the refresh rate for these devices. A display screen of any kind, whether it is a television or a monitor for a computer, functions through a system that effectively creates still images multiple times per second.

c) Illustrate with block diagram how projection TV is used to get large screen pictures.

Ans} Diagram:- **2M**



OR

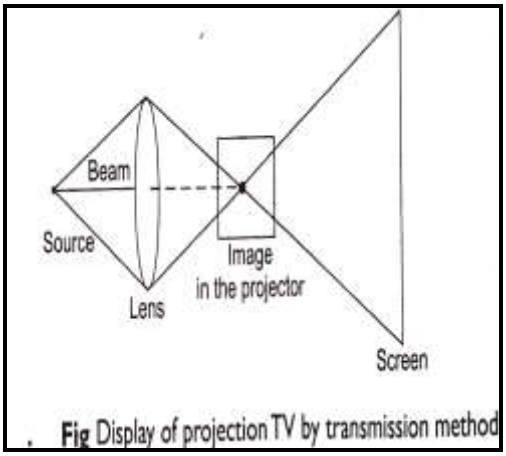


Fig Display of projection TV by transmission method

OR

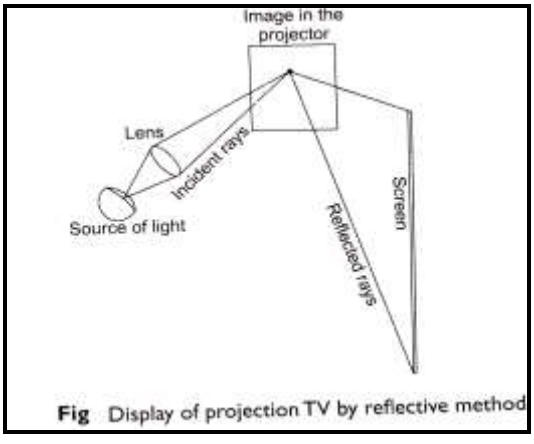


Fig Display of projection TV by reflective method

Explanation:- **2M**

The projection TV uses a projector to create small images into large images as output on screen. There are two types of projections front projection & rare projection.

Projection TV uses beams of bright light and magnifying lenses & project on the screen's front or back by either transmission or reflection.

Transmission Technique: - In this type of projectors small CRT's or small LED's are used. Three small sized are used to create small pictures by making phosphor elements glow when the electron beam whose strength varies as per video signal, strike the phosphor's. Beam from a source of light is focused on this small image by a magnifying lens. The rays coming out of the image diverge and reach the screen creating magnified image.

Small low cost LCD can also be used in place of CRT's.

Reflective Technique:-

This technique uses Digital light processing (DLP) device which contains millions of micro mirror's, integrated on a small chip. There is a mirror for each pixel. The chip is known as digital micro mirrors device (DMD). When the mirrors point towards the lens, the reflected lights reaches the lens, and when they are away from the lens, there is no light coming to lens. The mirrors are moved as per the video signal pulses

d) Describe why

(i) CCTV is wired system.

(ii) Audio signal is not transmitted in CCTV.

Ans:- (i) CCTV is wired system **2M**

1. In CCTV a signal is transmitted without modulation in limited physical area.
2. The monitor which are receiver uses, only requires signal through cable without RF and IF signals.

ii) Audio signal is not transmitted in CCTV (Any Four points 2M)

The following are the reasons why in CCTV Audio signal is not transmitted in CCTV.

1. It may increase total cabling and switching
2. We have to use microphones and audio processing units. Therefore system cost and complexity will increase
3. The system may require large power source
4. Audio transmission system may interfere with video transmission
5. Provision to record audio signal will be required

e) Draw Block Diagram of DTH receiver and state the function of each block.

Ans}

Diagram:- **2M**

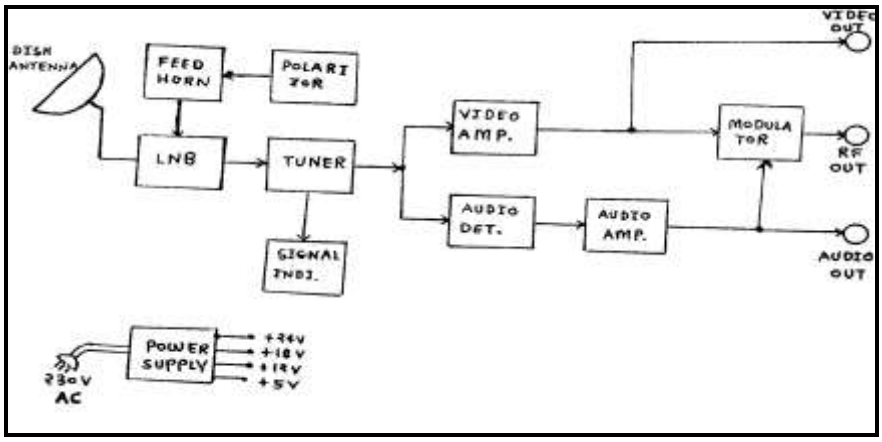


Figure:- Block diagram of DTH receiver

Explanation:- **2M**

It consists of following stages:

(1) Dish antenna and LNB (Low Noise Band Converter) section:-

The feed horn collects microwave signals reflected from the antenna surface and ignores noise and other signals coming from off-axis directions. Then LNB amplifies the signal received through feed horn and converts its frequency from 11.7 to 12.2 GHz to 1.450 to 0.950 GHz. Thus it down converts frequency. It also converts microwave signals into electrical signals.

(2) Tuner section:-

The down converted signal from LNB is given to Tuner of Receiver amplifier through co-axial low loss cable.

The received signal is amplified by the R.F. Amplifier and further converted in the mixer amplifier stage to yield the intermediate picture and sound I.F. signals (Composite I.F. Signal) by heterodyning with local Oscillator frequency. Tuner also incorporates Video IF amplifier and detector. The output of Tuner is the MPEG Baseband signal which consists of Video signal and Sound signal in compressed form.

(3) MPEG DECODER:-

The output of DTH Tuner, the MPEG Baseband signal, is applied to MPEG decoder which encodes audio and Video signal.

(4) VIDEO AMPLIFIER:-

The base band signal is applied to video amplifier. This section amplifies Video signal and final amplified signal is given to the R.F. modulator and Video Out Socket.

(5) SOUND I.F. AND AUDIO AMPLIFIER:-

The base band signal is applied to sound IF and Audio amplifier subsystem. This system amplifies and detect the sound I.F. Then IC 741 is used for further amplification of obtained audio. The final amplified signal is given to the R.F. modulator and Audio Out Socket.

(6) R.F. Modulator sect

It modulates Audio and Video signals obtained from above sections

and concerts into R.F signal for Channel-2. This R.F. output is then connected to the antenna input of T.V receiver.

(7) Power supply section:-

R.P.S. stage provides the different DC voltages required for various stages of receiver viz. +3.3V, +5.0V, +12V, +22V and +30V.

Q6) Attempt any Four of the following :-

a) Describe video compression technique of JPEG 2000 with suitable diagram.

Ans} Diagram:- 2M

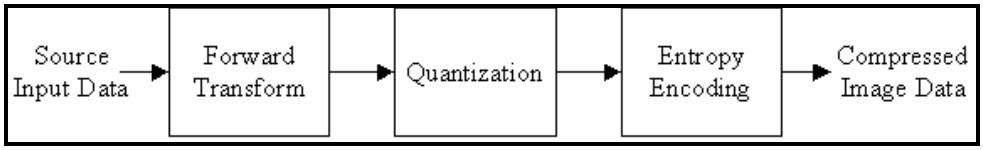


Figure :- Block diagram of JPEF 2000

Explanation:- 2M

JPEG 2000 Compression technique:

- JPEG 2000 (JP2) is an image compression standard and coding system.
- It uses wavelet based compression
- Wavelet compression converts the image into a series of wavelets that can be stored more efficiently than pixel blocks. Although wavelets also have rough edges, they are able to render pictures better by eliminating the "blockiness" .
- It also gives smaller file sizes .
- The transform is first applied on the source image data. The transform coefficients are then quantized and entropy coded, before forming the output. The decoder is just the reverse of the Encoder. Unlike other coding

schemes, JPEG 2000 can be both loss and lossless. This depends on the wavelet transform and the quantization applied.

Qb)**Draw planning diagram of CATV system installation & state the function of each block .**
Ans} Diagram: 2M

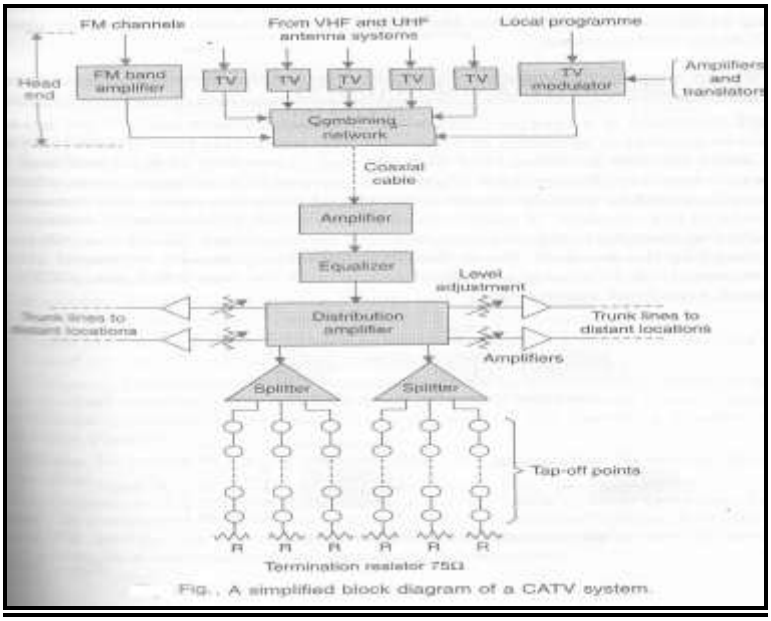


Fig., A simplified block diagram of a CATV system

OR

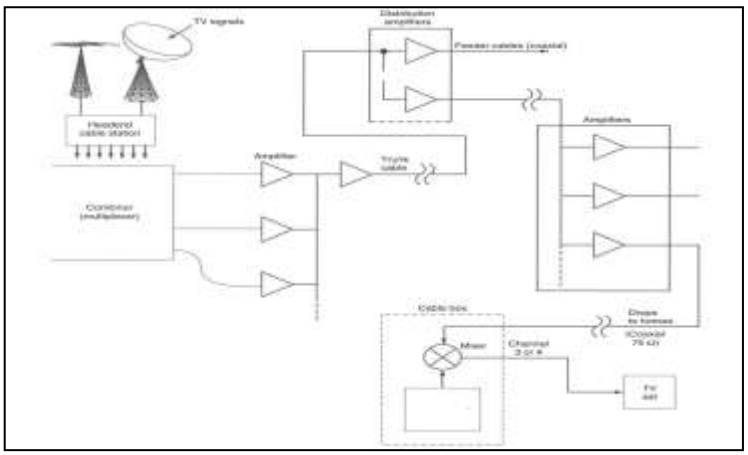


Figure:- **Planning Diagram of CATV System**

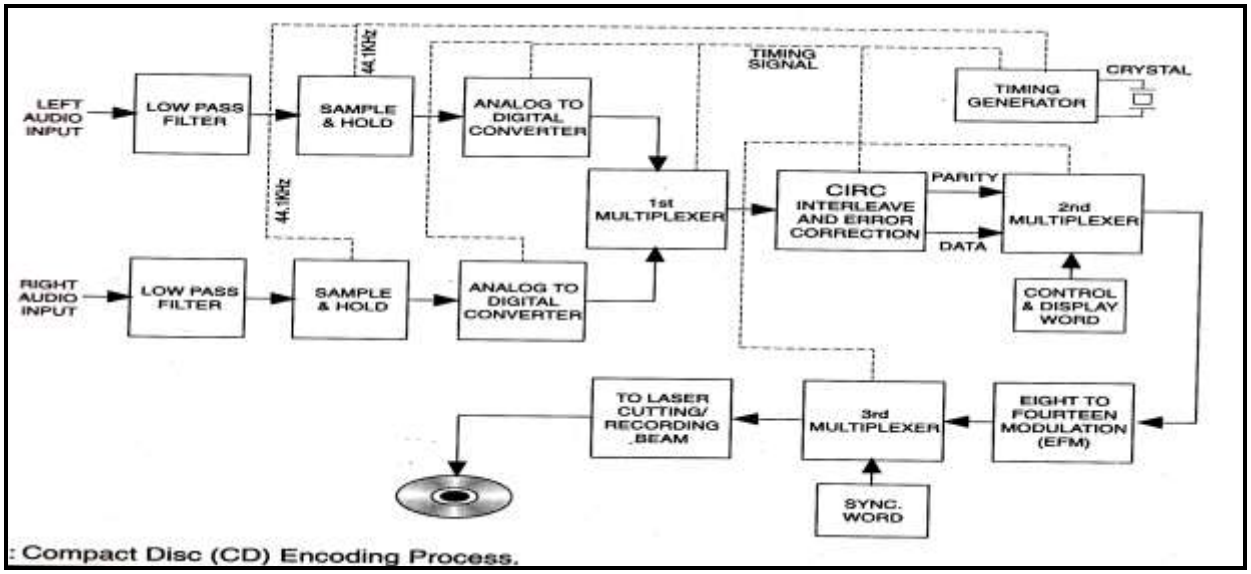
Brief Function of each block: **2M**

- The main building or facility is called the headed.
- The antennas receive local TV stations and other nearby stations plus the special cable channel signals distributed by satellite.
- Parabolic dishes are used to pick up the so-called premium cable channels. A cable TV company uses many TV antennas and receivers to pick up the stations whose programming it will redistribute. These signals are then processed and combined or frequency-multiplexed onto a single cable.
- The main output cable is called the trunk cable which is buried and extended to surrounding areas.
- A junction box containing amplifiers takes the signal and redistributes it to smaller cables, called feeders, which go to specific areas and neighborhoods.
- From there the signals are again rejuvenated with amplifiers and sent to individual homes by coaxial cables called drops. The overall system is referred to as a hybrid fiber cable (HFC) system.
- The coaxial cable (usually) comes into a home and is connected to a cable decoder box, which is essentially a special TV tuner that picks up the cable channels and provides a frequency synthesizer and mixer to select the desired channel.
- The mixer output is heterodyned to TV channel 3 or 4 and then fed to the TV set antenna terminals.
- The desired signal is frequency-translated by the cable box to channel 3 or 4 that the TV set can receive.

b) Describe the working of CD encoder with the help of suitable diagram .

Ans}

CD encoder Diagram: 2M



: Compact Disc (CD) Encoding Process.

Working: **2M**

In CD player the signals are first send to low pass filter to remove unwanted frequencies for e.g. In audio signal frequency above 20KHz are removed. The filtered signal is fed to sample and hold and A /D convertor.

The Sample and Hold circuit will sample the input signal at fixed intervals. Each sample value sampled is held in this circuit for a brief period to convert the sampled value into binary coded signal.

The A/D convertor samples analog signal to 16 bit or 32 bit word.

The output of A/D convertor is sent to multiplexer which takes number of input signal and transmit them over one single path.

Interleaving is a method to improve the error correction capability of CD. When interleaving is used, the order of the data to be stored on disc is changed. To achieve interleaving, the data words are sent through a series of delays before writing them to the disc.

Before writing the data on CD, after error detection and correction the bits are added to the data stream, and the interleaving operation is done, the data word is mixed with another 8-bit word known as the 'control/display word'.

After the control words are added to the data words, the signals, before sending them to the laser beam that writes them to the CD, are passed through another circuit known as 'Eight To Fourteen Modulator' or EFM circuit.

Before writing this digital information to the disc the final information added to the data stream is the 'Sync Words'.

c) List specifications of monitor.

Ans}Specifications of monitors: **(Any four 4M)**

1. **Panel Size**:

Panel size is a simple topic, it refers to the physical size of a panel. While the bezel (outer edge) of the monitor will make it slightly larger than the actual panel size, it's no more than 1 to 2 Inches. Panel size is measured diagonally, corner to corner.

2. **Aspect Ratio & Resolution**:

Aspect Ratio is related to the ratio of the image in terms of its size in correlation to the height vs the width. The aspect ratio can be determined by considering the ratio between horizontal and vertical pixels. Common aspect ratios are 4:3 and 16:9 which are both used for TV Broadcasting.

3. **Resolution**:

It is the number of distinct pixels in each dimension that can be displayed. All LCD's have a certain number of pixels making up their liquid crystal matrix, and so each LCD has a "native resolution" which matches this number.

4. **Response Time**:

Response time is the measured rise time (tR) and fall time (tF) of a pixel as it changes black > white > black. This is effectively the time it takes to change a pixel from one color to another and the total 'response time' should be quoted as the total of the tR + tF.

5. **Contrast Ratio**:

Contrast Ratio of a TFT is the difference between the darkest black and the brightest white. As a rule of thumb, the higher the contrast ratio, the better. On modern monitors you want to look for the "Static Contrast" which won't be more than 1000:1 on modern monitors.

6. **Brightness:**

Brightness is a measure of the brightest white the TFT can display. Brightness is measured in Candela-per-square-meter (cd/m2).

7. **Backlighting**:

There are 3 Primary Types of backlighting. CCFL (Cold Cathode Florescent Lamps) W-LED (White LED) and RGB-LED (Red, Green, & Blue LED.) Each has their own benefit and draw back.

8. **Viewing Angles**:

Viewing angles are quoted in horizontal and vertical fields and often look like this in listed specifications: 170/160 (170° in horizontal viewing field, 160° in vertical). The angles are related to how the image looks as you move away from the central point of view, as it can become darker or lighter, and colors can become distorted as you move away from your central field of view. Because of the pixel orientation, the screen may not be viewable as clearly when looking at the screen from an angle.

9. **Refresh Rate:**

TFT screens do not refresh in the same way as a CRT screen does, where the image is redrawn at a certain rate. A TFT monitor will only support refresh rates coming from your graphics card between 60Hz and 75Hz. Anything outside this will result in a "signal out of range" message or similar. The "recommended" refresh rate for a TFT is 60hz, a value which would be difficult to use on a CRT. The "maximum" refresh rate of a TFT is 75hz, but usually if you are using a DVI connection the refresh is capped at 60hz anyway.

10.**Color Depth & Reproduction:**

Color Depth is like Accuracy Color Reproduction is Precision. The color depth of a TFT monitor is related to how many colors it can produce. The more colors available, the better the color range can potentially be.

8Bit Color Depth allows a total of 16.2 million reproducible colors. This is the most common color depth to find on most monitors.

11. **Pixel Pitch:**

The pixel pitch of a TFT is related to the distance between pixels. Pixel pitch is normally listed in the manufacturers specification. Generally you need to consider that the 'tighter' the pixel pitch, the smaller the text will be, and potentially the sharper the image will be.

e) State two advantages and disadvantages of Plasma display.

Ans}

Advantages of Plasma Display: Any two 2M

1. The slimmest of all displays
2. Very high contrast ratios [1:2,000,000]
3. Weighs less and is less bulky than CTR's.
4. Higher viewing angles compared to other displays [178 degrees].
5. Can be placed even on walls.
6. High clarity and hence better colour reproduction. [68 billion/236 vs 16.7 million/224]
7. Very little motion blur due to high refresh rates and response time.
8. Has a life span of about 100,000 hours.

Disadvantages of Plasma Display: Any two 2M

1. Cost is much higher compared to other displays.
2. Energy consumption is more.
3. Produces glares due to reflection.

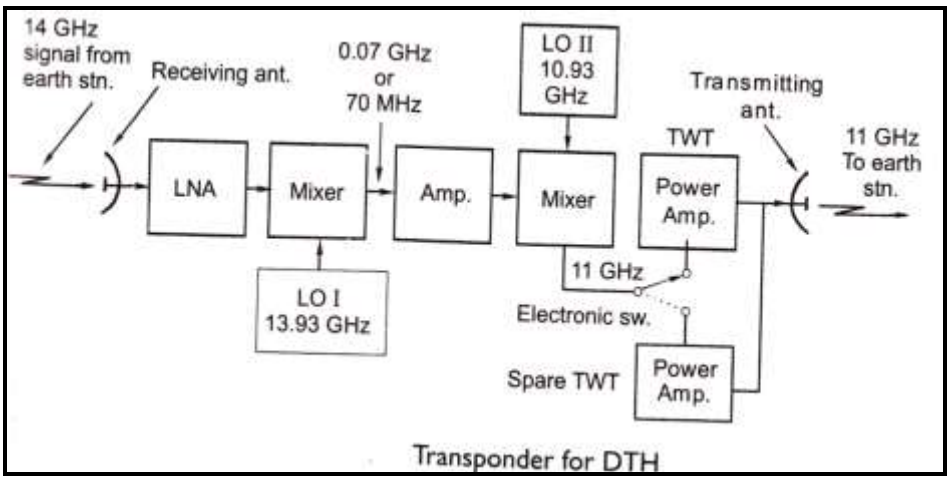
These displays are not available in smaller sizes than 32 inches.

4. Though the display doesn't weigh much, when the glass screen, which is needed to protect the display, is included, weighs more.
5. Cannot be used in high altitudes. The pressure difference between the gas and the air may cause a temporary damage or a buzzing noise.
6. Area flickering is possible.

f) Describe the function of transponder in DTH system with suitable diagram.

Ans: **DTH Transponder: Diagram 2M, Function 2M**

Diagram:-



Explanation:-

- The transponder in DTH system has to produce high power of about 100W.
- The transponder uses double conversion of the signal.
- The input signal is first down-converted to an intermediate frequency of 70MHz .
- Much higher gain of the signal can be achieved at 70MHz than at microwave frequency.
- The amplified output of the IF amplifier is now up-converted to the down-link frequency of about 11GHz for getting better output power , travelling wave tube (TWT) is used as a power amplifier.