MAHARASHTRASTATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)

MODEL ANSWER
SUMMER– 19 EXAMINATION

Subject Title: VIDEO ENGNEERING   Subject Code: 17668

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 anyequivalent 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.

Q. No.	Sub Q.N.	Answer	Marking Scheme
Q.1	a)	**Attempt any THREE of the following:**	12-Total Marks
	i)	**Describe the following file format.** **1) BMP** **2) PNG** **3) TIFF** **4) GIF**	4M
	Ans:	**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. **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. **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.	1M Each

		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.	
ii)		**List the application of CCTV.**	**4M**
Ans:		**Applications of CCTV are [Any Four]:-** •**Surveillance: -**CCTV is effectively used for security in the campus of defense, banks , supermarkets, etc. To keep eye over 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**	**1M Each**
iii)		**List name of different optical lens used in CD player and state its uses.**	**4M**
Ans:		**The different optical lens used in CD player and state its uses are:-** **Collimation lens:** The collimator lens is used to produce completely parallel beams of laser. This lens together with the objective lens is used to focus the laser beam to the disc surface. **Concave lens:** In single-beam linear optical block assembly this concave lens is used to concentrate the laser beam, reflected from the disc surface, onto the photodiode array. This lens is mainly used to improve the sensitivity of the photodiode array. **Objective lens:** Before hitting the disc surface, the laser beam comes out of the pickup assembly through an objective lens. The objective lens is used to focus, laser beam onto the CD surface and to receive the reflected laser beam. This lens is moved up/down to achieve the focus of the laser beam on the disc face. The objective lens is always kept in focus using a system similar to the voice system used in the audio speakers. It is also moved horizontally in the linear pickup assembly to keep the laser in proper track. In players that used the radial tracking method the objective is unit does not move horizontally (laterally).	**1M Each.(Name -1M Exp-3M)**

Cylindrical lens (in Three-Beam Linear Optical Blocks):

The main action of this lens is to enable the reflected beam from the CD to assist in creating the necessary signal to make sure that focus of the laser beam on the playing surface the disc is maintained.

iv)	**Compare DVD and BD(four points)**	**4M**

Ans: **Any 4 Points** — **1M Each**

Parameter	DVD	BD
Developed by	DVD forum in 1995	BD association in 2002
Sensor	Red laser(650 nm)	Blue-violet
Numerical aperture	0.6	0.85
Compression	MPEG-2	MPEG-2 and MPEG4/H.264
Capacity	per layer 4.7 GB	25GB
Disk size	12 cm	12 cm
Track pitch	0.32 micrometer	0.74 micrometer
Single side dual layer	8.5 GB	50 GB
DSDL	17GB	100GB
Thickness of cover	0.6 mm	0.1 mm
Resolution	480/576	1080/720/576/480
SDTV movies	8 hours	23 hours
HD movies	Not Possible	8 hours

b)	**Attempt any ONE of the following:**	**6- Total Mark**
(i)	**Draw block diagram of DTH receiver and illustrate** ▨▨▨▨ ▨▨▨▨▨▨▨▨	**6M**

Ans: **Diagram Of DTH Receiver:-[Any other relevnt diagram may be considered]** — **3M**

Figure:- Block diagram of DTH receiver

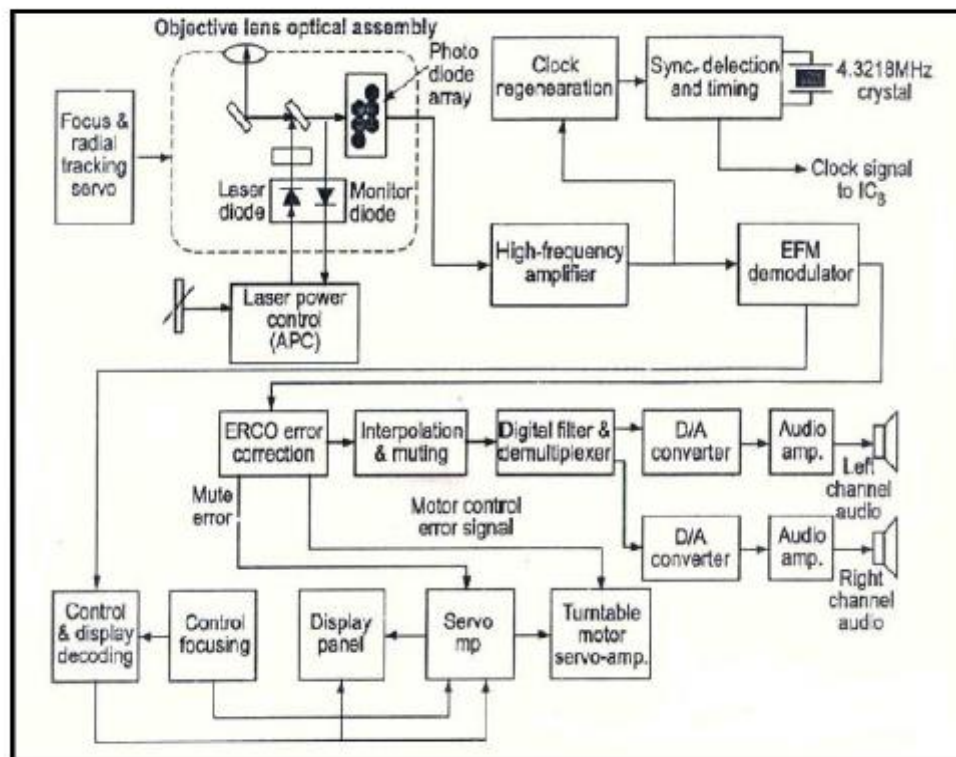|			
		Explanation:- It consists of following stages: **1. Dish antenna and LNB (low noise band converter) section:-** The feed horn collects microwave signals reflected from the antenna surface and ignores noise and othersignals coming from off-axis directions. Then LNB amplifies the signal received through feed horn andconverts its frequency from 11.7 to 12.2 GHz to 1.450 to 0.950 GHz. Thus it down converts frequency. Italso 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 losscable. 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 detects 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 forChannel-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.	**3 M**
	(ii)	**Draw block diagram of VCD player and illustrate function of each block .**	**6M**
	Ans	**Diagram of VCD Player:- [Any other relevnt diagram may be considered]**	**3M**

Figure: Block diagram of CD player

Explanation:-
CLV: The CD player is also known as CLV or constant linear velocity system. In a CLV device such as the CD player the rotational speed of disc player is adjusted with movement of reading mechanism on the disc surface. This speed is changed to maintain constant linear velocity i.e. the signal on the disc surface always moves at constant speed of 1.3 m per second under the pick-up head.

Half-Full Memory: This half full memory circuit makes the disc to maintain a constant linear velocity when the reading mechanism moves from outer tracks of disc to inner tracks or from inner tracks to outer tracks on disc surface.

Decoding CD: During the decoding, the digital data on the disc surface is read by the decoding circuit and is converted into the analog and that signals are required to drive the speakers and regenerate the stored music.
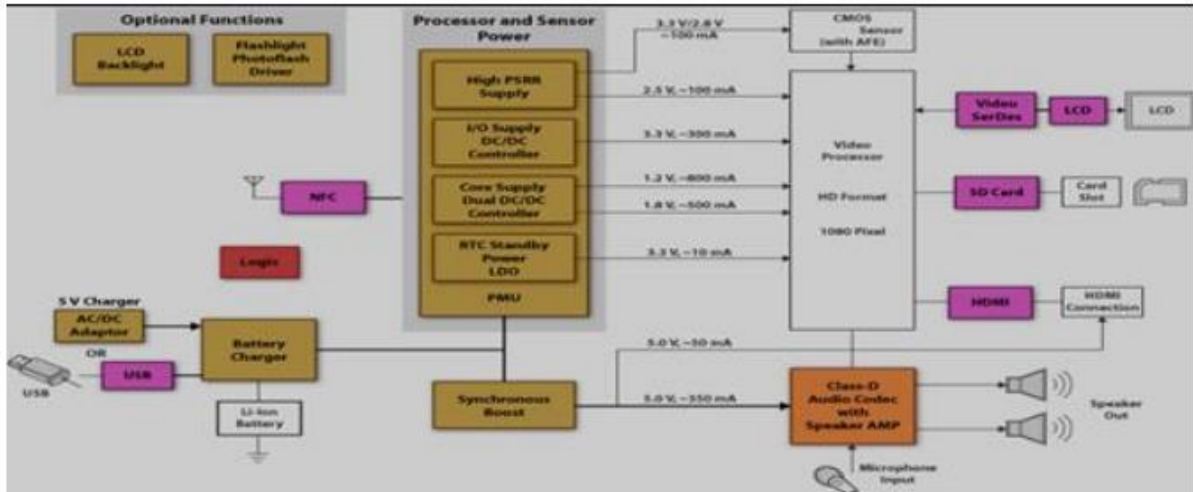
Optical pick-up: the signal stored on the CD surface as pits and flat areas are first picked up by the optical pickup made of lens assembly, prism ,photo detectors and laser diodes assembly in the optical pickup unit.

High frequency amplifier: The signal is very weak so it is amplified by a high frequency RF amplifier circuit to bring signal to a proper level. This amplified and filtered high-frequency signal contains audio signal as well as synchronization signal in 14-bit EFM (eight to fourteen modulations) format; this signal is sent to an EFM demodulator circuit.
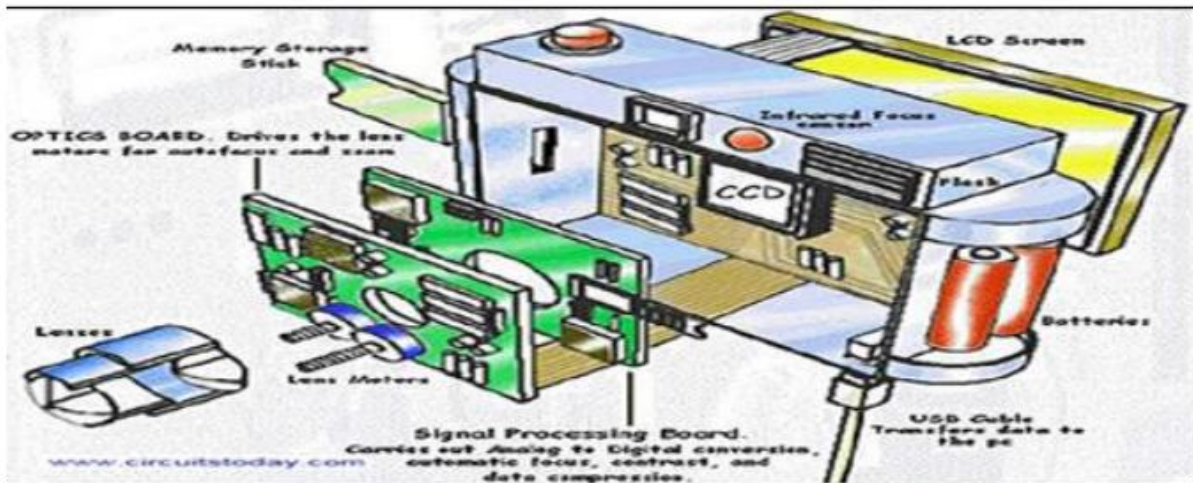
EFM Demodulator: The EFM modulator separates the modulated data and the timing signal

3M

from the signal received at its input.

ERCO Circuit: Demodulated data from EFM demodulator is send to error correction (ERCO)circuit. The demodulated data signals also send to control and display decoding circuit , which recovers the control and display signals which are further multiplexed into signals received from CD.

Interpolation and muting: The ERCO circuit is used for error detection and correction purpose . Any error found in the incoming data signal is send to interpolation and muting section by the ERCO circuit .

CLV using the Clock Signal: The ERCO also responsible for maintaining constant linear velocity of CD rotation motor , For this , The TRCO circuit compare the clock signal derived from the incoming data with reference clock frequency.

De- interleaving : Signals from the ERCO contains audio signal in the interleaved format . Before doing any further operation on this signal , it must be interleaved . The signal is then de-interleaved in the interpolation and muting section to restore the original sequence of information.

Digital Filter and De-multiplexer: The de-interleaved and regenerated is then send to digital filter and de-multiplexer , where it is filtered and separated in to left and right channel data. This circuit removes any effect of sampling frequency from the data signal , which would appear as interference in the form of aliasing noise in analog signal.

D/A convertor: The output from digital filter and de-multiplexer circuit is send to D/A convertors. The right and left channels are processed by different D/A convertors . These convertors convert the 16-bit digital signal into the original analog audio signal. Because of the over sampling , done in the digital filter and de-multiplexer circuit simple low-pass filter is used . Following the D/A process.

Stereo Amplifier: The analog output from converter is passed through a sample & hold circuit & a LPF circuit to obtain a smooth noise free output at the speakers. These signals are next fed to a stereo audio amplifier to raise left & right audio channel signal.

Q 2		Attempt any two of the following :	16-Total Marks
	a)	Describe the working of camcorder and state the function of each block.	8M
	Ans:	[Note: Marks should be credited if students draw any equivalent diagram which shows lens optical assembly,signal processing unit, memory storage, USB point and battery section] **Diagram Of The Working Of Camcorder:-**	4M

OR

Explanation:-
Camcorders have three major components: lens, imager and recorder.
- The lens gathers light, focusing it on the imager. The lens is the first component of the light path
- The imager (usually a CCD or CMOS)sensor converts incident light into an electrical signal. The imagerconverts light into an electrical signal. The camera lens projects an image onto the imager surface,exposing the photosensitive array to light. This light exposure is converted into an electrical charge. At the end of the timed exposure, the imager converts the accumulated charge into a continuous analogvoltage at the imager's output terminals. After the conversion is complete, the photosites reset to start theexposure of the next video frame.
- The recorder converts the electrical signal to video, encoding it in a storable form. The lens and imagercomprise the "camera" section.
- The recorder writes the video signal onto a recording medium, such as magnetic videotape.
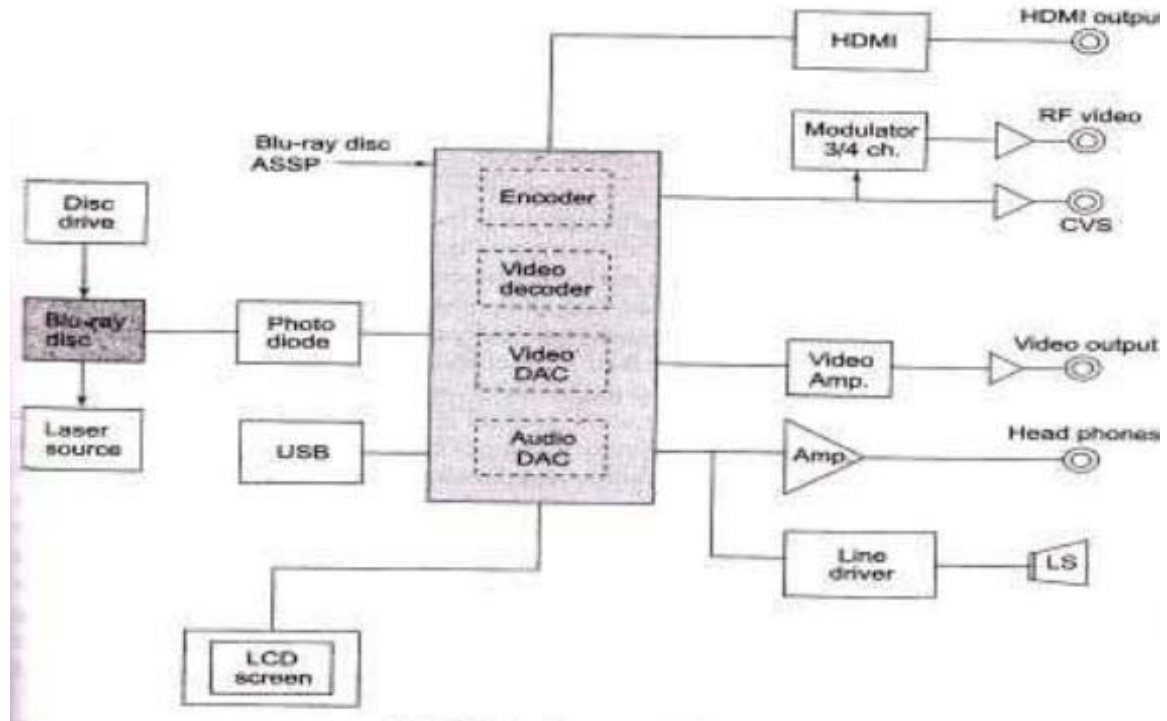- All camcorders have a recorder-controlling section, allowing the user to switch the

4M

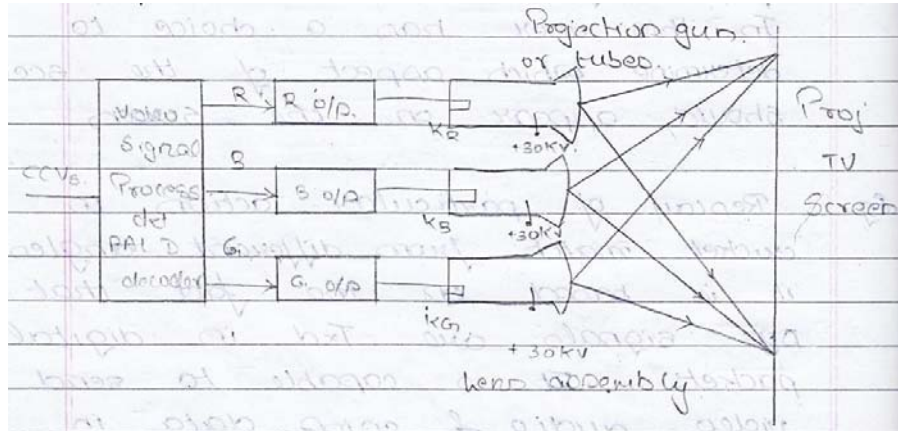|			
		recorder intoplayback mode for reviewing recorded footage, and an image-control section controlling exposure, focusand color balance. • Signal processing unit does analog to digital conversion, automatic focus, contrast and datacompression.	
	b)	**Draw the block diagram of blue ray disc player and write the function of each block.**	**8M**
	Ans:	**Note: Any other Relevant diagram can be considered.** **Diagram of Blue ray disc player:-** **OR** **Figure:- Block Diagram of Recordable Blue-ray disc**	**4M**
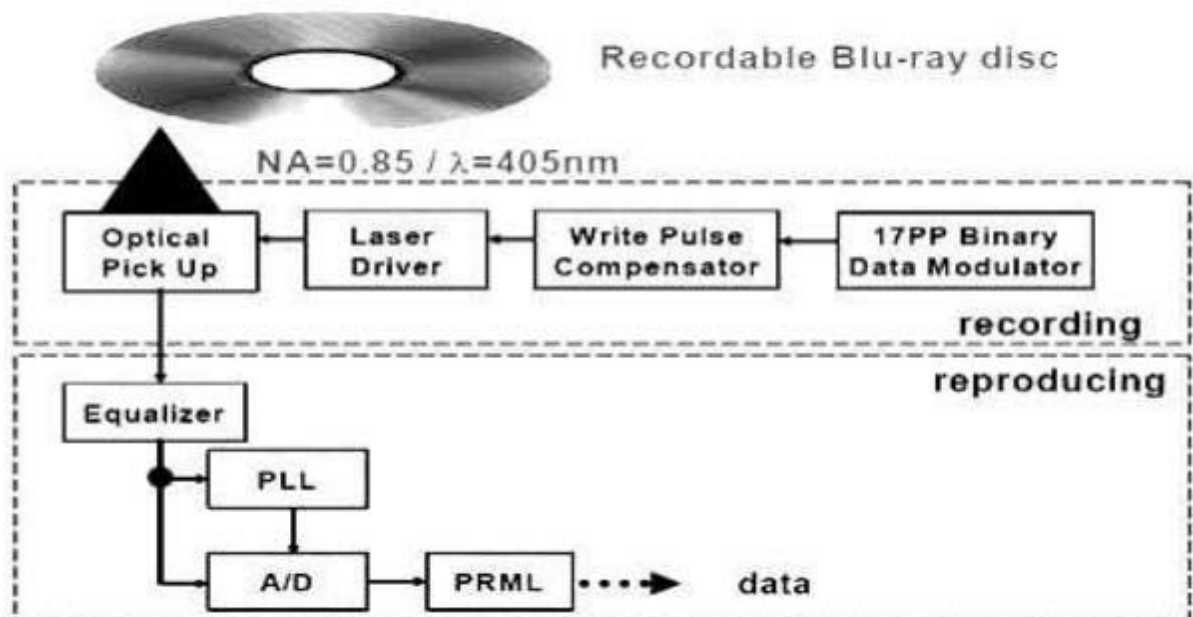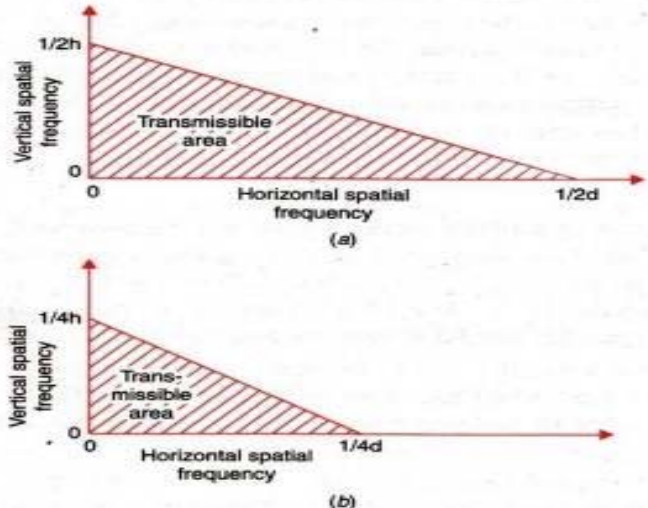
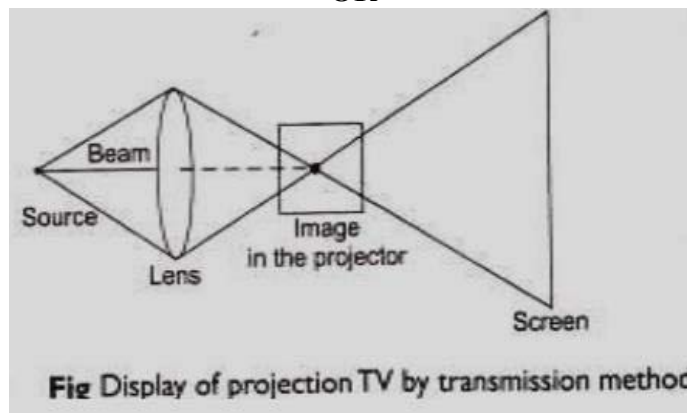|		
	Explanation:- A source of light (laser) is a light emitting diode (LED) , made of gallium nitride semiconductor, whichemits coherent light in blue-violet range at 405nm. This light is incident on the blu-ray disc which isdriven by a synchronous motor through a device called disc drive. The disc has billions of pits and lands or flats. Pits do not reflect light, which is reflected by lands only. Thus the outcome of the disc consistsof logic 1s and 0s. The digital pulses of light are detected by the photodiode which converts opticalpulses into pulses of electric current. The pulses can be easily re-conditional to give amplitude of purelogic 1 and logic 0(removing the deformations caused by lenses). The electric pulses pass through an Application Specific Standard Product (ASSP) processor designedspecifically for blu-ray discs. The ASSP is an integrated circuits containing decompress or decoder anddigital to analog convertors. For a digital receiver, the decompressed and decoded pulses from ASSPmodulate RF carrier using phase shift keying . The modulated signal pertains to the frequency of thirdand fourth channel of TV receiver. The one which is not being used in local broadcast maybe selected. The TV receiver will process thesignal to finally give analog output of sound and picture. The outputs from ASSP For analog receiver, the decoded signal is converted into an analog signal modulated by analog modulator to convert it into an RF modulated signal for 3rd and 4th channel of TV receiver. The BD player is so designed that it compatible with DVDs , so that the DVDs can be played on BDplayer.	**4M**
c)	**Explain how bandwidth reduction is achieved using muse system**	**8M**
Ans:	- 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 schemedeveloped 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 bandwidthdown to near 10MHz. - The processed HDTV signal can then be transmitted using a single DBS channel. In MUSE the luminance andcolour information are sent by Time-multiplexed components (TMC). - MUSE stands for Multiple Sub-Nypuist sampling Encoding ans is in HDTVbandwidth compression scheme developed by NHK. - In Muse the luminance and colour information are sent by time-multiplexedcomponents. The colour information is sent sequentially with a time compression offour. - The TMC signal is bandwidth reduced by means of a 3-dimensional offsetsubsampling pattern over a four field sequence. The stationary areas of the picture arereconstructed by temporal interpolation of samples from four field - For moving picture area the final picture is reconstructed by spatial interpolationusing	**6M**

		samples from single field. Hence the moving portion of the picture arereproduced with one-quarter the spatial resolution of the stationary areas	
		Diagram of Band width reduction:-	**2M**
Q.3		**Attempt any FOUR of the following:**	**16-Total Marks**
	a)	**State and explain various steps followed in CATV system**	**4M**
	Ans:	**The various steps followed in CATV system are:** 1. Scrambling system 2. Sync separation scrambler 3. Traps **Explanation:-** **Scrambling system:** The cable companies offer several local TV program for a minimum charge. in addition premium services on separatechannels 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 incomingsignal is scrambled i.e. picture is an intelligible on the receiver screen unless de-scrambled i.e. restored to its normalform with a signal supplied by the cable operator at the subscriber request with additional payment. **Sync separation scrambler:** The most common method of scrambling signal is known as sync separation . In this, sync is only compressed in theRF modulation envelope of the video carrier in the cable channel. Then the receiver cannot lock in with the syncsuppressed 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 RFsignal. **Traps:** One method of blocking the serial is by inserting an interfering carrier in the pay channel and notching it out by asuitable sharp filter at the subscribers end. Such a method is easy to tamper and hence scrambling is more commonlyemployed for conditional access to a channel.	**1M -Stating steps.** **3M**
	b)	**State concept of projection TV to get large screen.**	**4M**

Ans:		**Diagram-2M**

OR

Fig Display of projection TV by transmission method
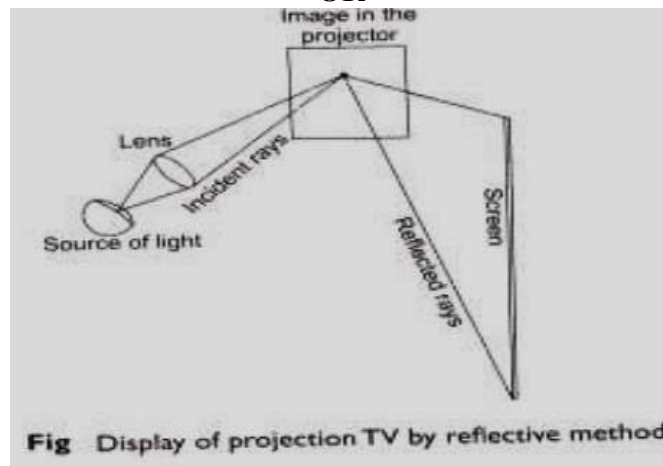
OR

Fig Display of projection TV by reflective method

Principles of Projection TV:-
- The projection TV uses a projector to create small images into large images as output on screen. Thereare two types of projections front projection & rare projection.
- Projection TV uses beams of bright light and magnifying lenses & project on the ▓▓▓▓▓▓▓▓▓▓▓▓▓▓
- It consist of three special tubes(R,G and B) with concave lens which are enlarged and projected on a screen located 2.5m away.
- Video signal process circuit contains PAL-D decoder IC. It convert input CCVS to R, G, B signal.

Principle:-2M

|			

		• R, G, B signal are amplified and applied to cathode of three different projection guns or tubes.
		• Display of projection TV is done by two techniques:
		  1. Transmission Technique
		  2. Reflective Technique	

c)		**Describe the operation of jumbo TV screen.**	4M
Ans:		**Diagram Of Jumbo TV screen**:-	2M

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
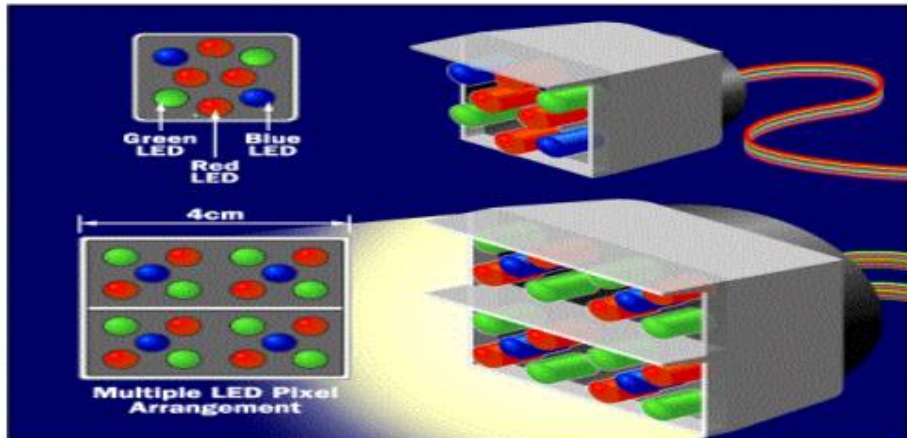
Explanation:-

• ░░ instead of phosphor.

• ░░ 1mm to 4 cm in size.

• To build a jumbo TV, thousands of these LED modules are taken and arranged them in a rectangular grid.

For example, the grid might contain 640 by 480 LED modules, or 307,200 modules. the size of theultimate screen depends on the size of the LED modules.
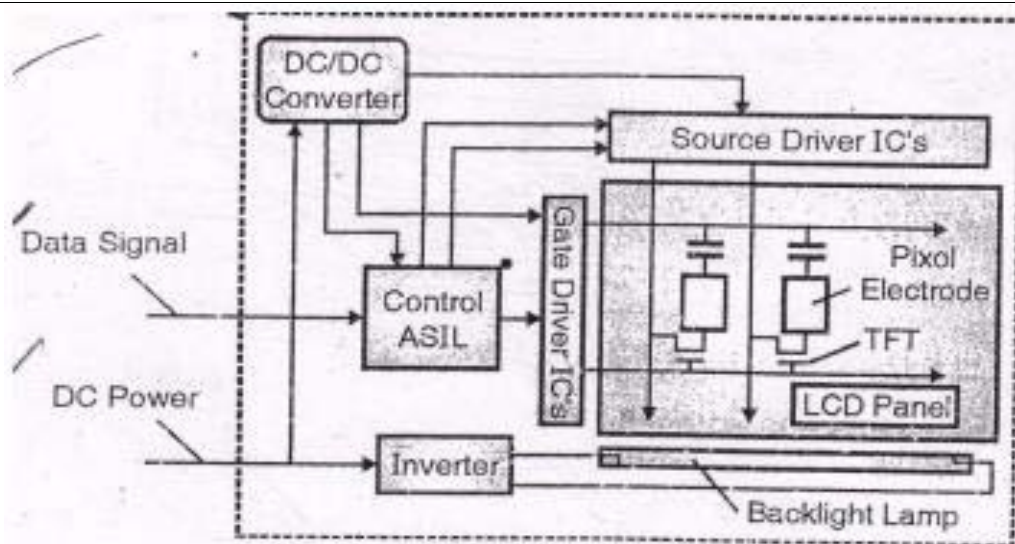
			2M
d)		**Draw block diagram of LCD monitor and explain function of each block.**	4M
Ans:		**Diagram of LCD monitor:-**	2M

Explanation:
- The individual components (glass casing, liquid crystal, cell, alignment layer, conducting electrodes, andpolarizers) are combined.
- Light entering the display is guided by the orientation of liquid of the liquid crystal molecules that are twisted by 90 degrees from the top plate to the bottom.
- This twist allowsincoming light to pass through the second polarizer.
- When voltage is applied, the liquid crystal molecules strengthen out and stop redirecting the light.
- As aresult light travels straight through and is filtered out by second polarizer.
- Consequently no light can pass through making this region darker compared to the rest oft thescreen.
- To display characters or graphics, voltage is applied to the desired regions making them dark andvisible to the eye

2M

e)		**State concept of Interactive TV**	**4M**
Ans:		**Working principle of Interactive TV :-**	**4M**

- The latest TV and computer technique have enabled a new technique of viewing is called interactiveTV.
- 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 DBSsignals are transmitted in digital packets.
- It is capable to send video audio & computer data in combination to the decoder

Q.4	**a)**	**Attempt any THREE of the Following :**	**12- Total Marks**
	(i)	**Draw block diagram of MAC encoder and state the function of each block.**	**4M**
	Ans:	**Note: Any other relevant diagram can be considered**	**2M**

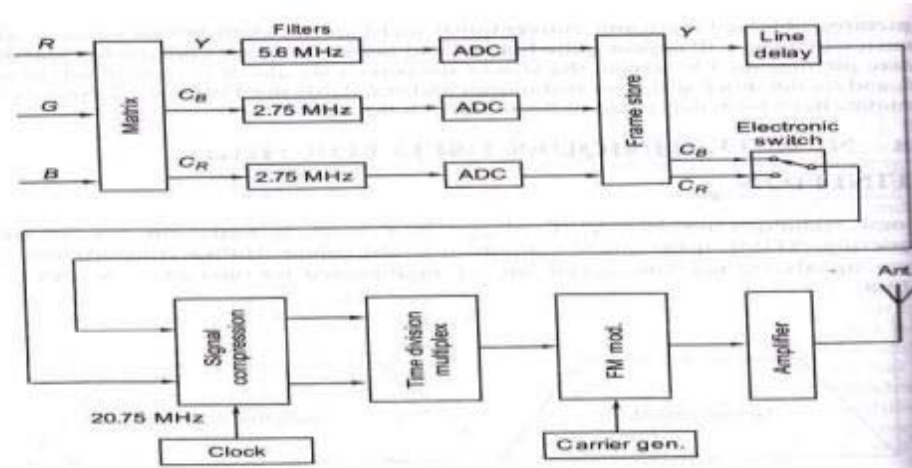**Block Diagram Of MAC encoder:-**

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

Explanation:-

2M

Functions of MAC coder:-

Matrix: -Video signals, R, G, and B, produced by the colour camera tubes represent the intensity oflight of three primary colours, red, green, and blue, present in each pixels of the picture. These signalsare fed to a resistive matrix, incorporating resistor circuits, investors and adders (as in the conventionalTV system) to give luminance signal $Y(=0.11 B+0.30 R+0.59G)$, and duly weighted colour differencesignals designated as CB (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 CB andCR signals. (These bandwidths are different from the bandwidths used in the conventional TV systemand 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:-The frame store isolates the input and the output and hence synchronization is notrequired.

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

Line sequential switch:-It is an electronic switch which allows CB signal odd numbered lines and CRsignal on even numbered lines, as in the SECAM system.
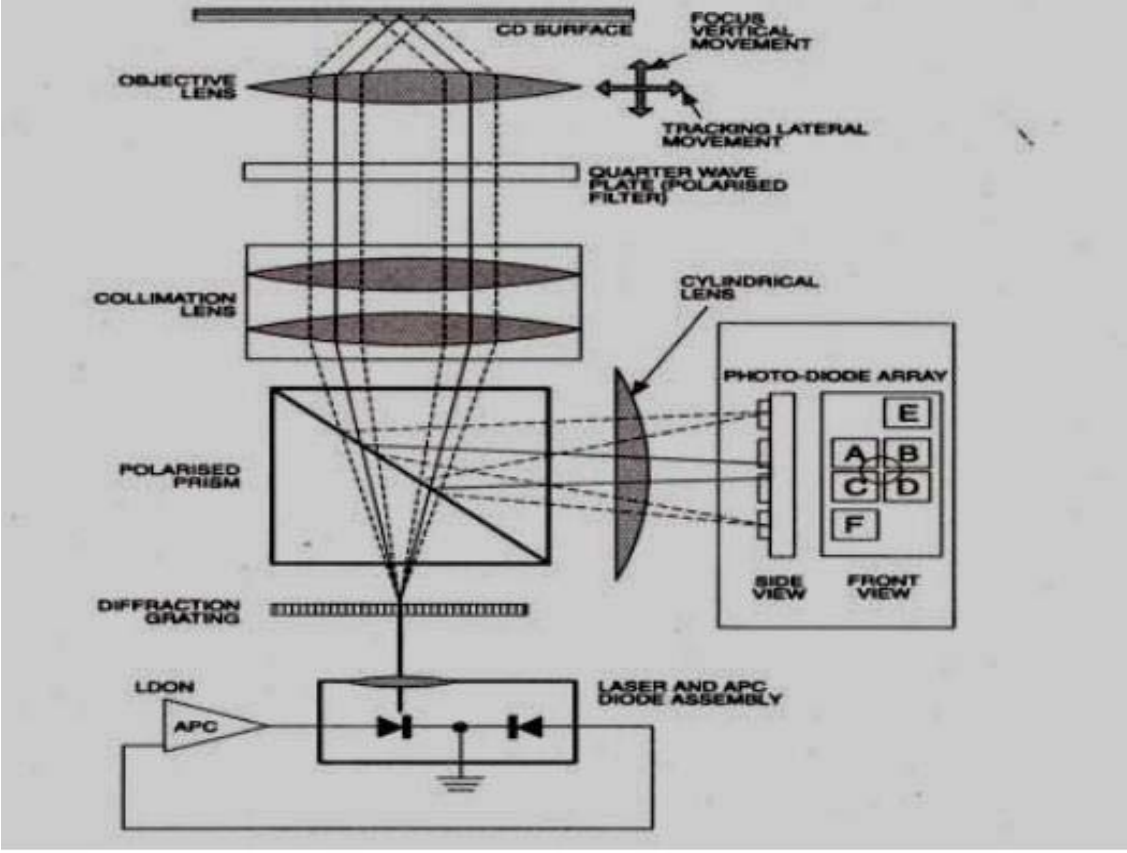
Comparison stage :-The luminance signal, clocked (or sampled) at 13.5MHz and 20.25 MHz comparison ratio for U and V is 3:1 and for Y, 3:2.

		Time Multiplex Switch:-This is the final stage of MAC encoder. The Y and C signals are multiplexedso that odd line contains Y and CB signal. **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. **Final Power Amplifier:-**It finally amplifies the power and delivers it to the transmitting antenna.	
(ii)		**Describe the concept of plasma TV.**	**4M**
Ans:		**Diagram of Plasma TV**	**2M**
		Explanation:- • Two plates of glass are taken between which millions of tiny cells containing gases like xenon and neon are filled. Electrodes are also placed inside the glass plates in such a way that they are positioned in front and behind each cell. The rear glass plate has with it the address electrodes in such a position that they sit behind the cells. The front glass plate has with it the transparent display electrodes, which are surrounded on all sides by a magnesium oxide layer and also a dielectric material. They are kept in front of the cell. • As told earlier when a voltage is applied, the electrodes get charged and cause the ionization of the gas resulting in plasma. This also includes the collision between the ions and electrons resulting in the emission of photon light. • The state of ionization varies in accordance to colour plasma and monochrome plasma. For the latter a low voltage is applied between the electrodes. To obtain colour plasma, the back of each cell has to be coated with phosphor. When the photon light is emitted they are ultraviolet in nature. These UV rays react with phosphor to give a coloured light.	**2M**

		• The working of the pixels has been explained earlier. Each pixel has three composite coloured sub-pixels. When they are mixed proportionally, the correct colour is obtained. • There are thousands of colours depending on the brightness and contrast of each. This brightness is controlled with the pulse-width modulation technique. With this technique, it controls the pulse of the current that flows through all the cells at a rate of thousands of times per seconds.	
(iii)		**List various video editing techniques and editing equipments.**	**4M**
Ans:		**[NOTE: Any other video editing techniques /equipments/softwares may be considered]** **The various video editing techniques are:(Any Two)** 1) **Match Cut** 2) **Flash cutting** 3) **Subliminal cut** 4) **Cross cutting** 5) **Discontinuity editing** 6) **Elliptical editing** 7) **Jump cut** **The various video editing equipments are: (Any Two)** 1) **SDC Free Video Editor** 2) **Pinnacle studio** 3) **DaVinci Resolve** 4) **iMovie** 5) **Avidemux** 6) **Adobe Premiere** 7) **Corel Digital studio**	**1M Each**
(iv)		**Differentiate between digital video signal and analog signal.[Any Four Points]**	**4M**

Analog Video Signal	Digital Video Signal	
Analog is a wave that is recorded or used in its original form.	Discrete time signals generated by digital modulation.	**1M each**
Analog has many lines per frame	Digital has different frames such as P frames, B frames and I frames	
Signal sine waves (Electrical signals)	Stored in the form of binary bit	
Affected by noise	Less affected by noise	
Cost of decoding equipment is low	Cost of decoding equipment is high	
Analog instrument draws large power	Digital instrument draws negligible power	

b)	**Attempt any ONE of the following:**	**6M**
(i)	**Draw three beam optical pickup assembly in CD player and explain its working.**	**6M**

|		
Ans:	**Figure: - Three beam optical pick-up assembly is used in CD player.**	**3M**
	Explanation: • This type of optical assembly is used in the most of the current VCD players. In these units ,three laserbeams are generated from a main laser beam ,the main or center beam provides data retrieval as well asfocus 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) fortracking, 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 thissingle beam by using a diffraction grating. • As the lens has limited amount of lateral movement, the complete assembly is moved gradually acrossthe surface of the disc to read the signal on the VCD surface.	**3M**
(ii)	**Draw block diagram of two way cable system and write function of each block and write application of CATV.**	**6M**
Ans:	**Note: Any other relevant diagram can be considered.** **Diagram Of two way cable system :-**	**2M**
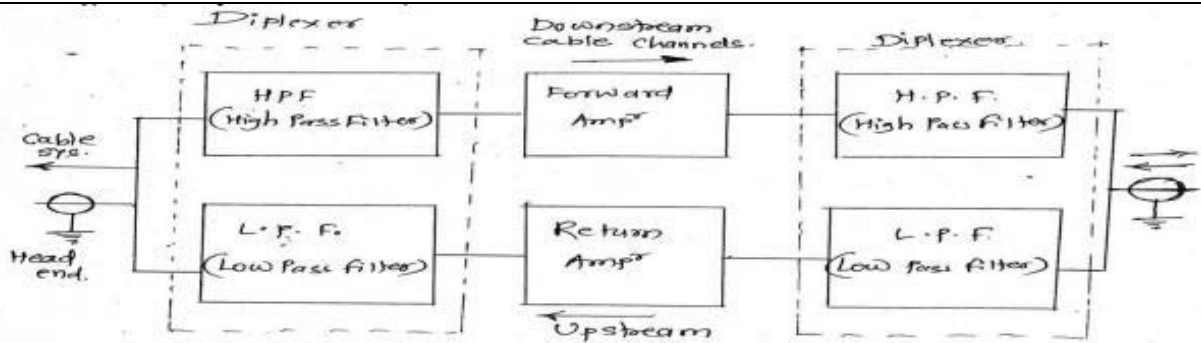
Fig: Two-way cable system.

OR
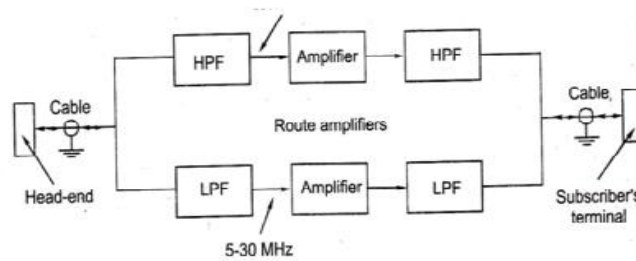
Explanation:-

- In addition to downstream signal from head end to each subscriber most cable system aredesigned for bidirectional i.e. Two way service; wherethe same cable is used for both directions.
- However separate amplifiers are used for upstream signals as shown in Fig. towards the headend, communication is in the 5-30 MHz band while the downstream transmission, to subscriberis around 50 MHz or higher.
- As shown in fig. directional H.P & L.P filters are used to keep thetwo paths dependent of each other.

2M

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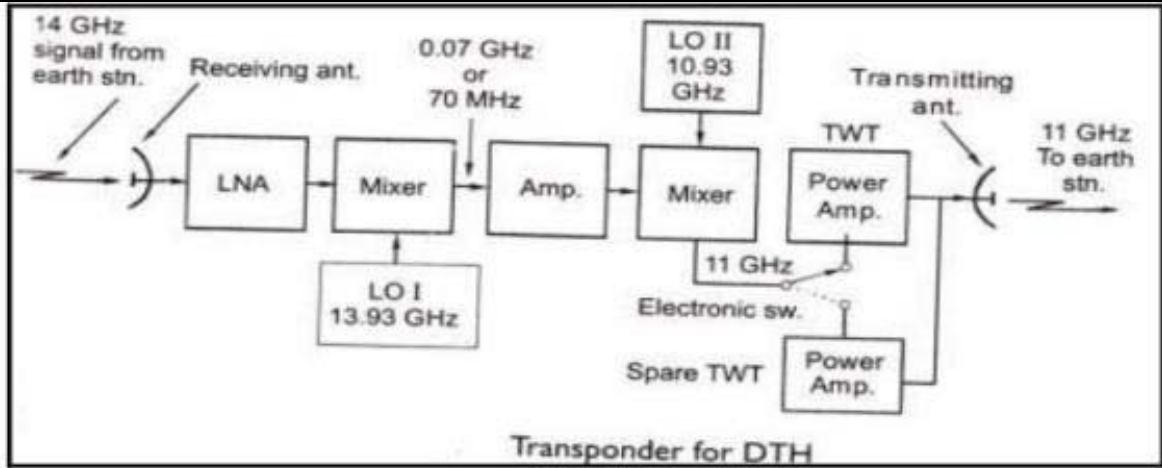6. Video-Tex
7. Cable phone
8. E-business
9. Local advertising

2M

Q.5		**Solve any FOUR of the following :**		16-Total Marks
	a)	**How data storing capacity is enhanced in DVD.**		**4M**
	Ans:	**Explanation:--**		**4M**

as follows:

- The real breakthrough in enhancing the capacity of laser disc came when laser of smaller wavelengthwas used. In DVDs, red light laser was being used 635 nm. For professional use an 650 nm. Forcommercial use. This wavelength was lot smaller than the wavelength of 718nm (Infrared light) used inCDs .A smaller wavelength resulted in smaller spot. A sharper beam spot increased in capacity in twoways.
  1. Adjacent tracks became closer allowing mode tracks per disc .DVD track pitch was reduced to0.74mm which is less than half of CDs (1.6mm)
  2. The pits where data is stored became much smaller than those in a CD. Minimum pit length inDVD is 0.4 mm only which is less than half of 0.834mm in CD. This allowed more pits pertrack.
- Information can be scanned from more than one layer in DVD, simply by changing the focus of the laserbeam. Instead of using an opaque reflective layers ,it is possible to translucent layer with an opaquelayer behind it .while a single cannot be as dense as the first layer and therefore the capacity of twolayers is slightly less than two time 0f single layer by about (10%). The provision of two layers enablesthe user to use the DVD with higher capacity without removing it from the drive and turning over.
- DVD allows double sided discs. Thinner plastic disc was required for the laser beam to focus on thesmaller pit depths. This required only 0.6mm thick dick, just half thickness of CD. Such thin discs wererather too thin to with stand handling. Hence two discs were bounded back to back, making the wholediscs 1.2mm thick. While bonding was necessary for rigidity, is doubled the storage capacity as twosubstrates could be used to record the data. (In single sided DVD also, bounding is used for strength, butthe data is recorded on one substrate only ,theother one remaining black.)
- DVD uses more efficient error correction code (ECC). The bits used for error detection consume thespace which otherwise could have been used to carry the data. Smaller the number of error detectingand correcting bits, les would be the space require for them and hence more would be the room for real data.
- DVD uses the format of MPEG-2 (Moving Picture Experts Group of International StandardsOrganization) for coding and recording which gives higher quality than MPEG-1 used in CD.

	b)	**Compare CRT monitor and LCD monitor.**		**4M**
	Ans:	**Note: Any 4 points**		**1M each**

CRT	LCD
A CRT has a gun which shoots an electron beam to the screen, which energizes a phosphor.	Source of light used is the fluorescent lamps
More power consumption	Use less power

Bulky and heavy	They can be made very thin making them less space consuming.	
Moderate picture quality	Produces high quality image	
High voltage DC supply is required for Operation	Fluorescent lamps are arranged in a grid form.	

c)	**Illustrate the difference between normal TV and Projection TV on the basis of aspect ratio, number of lines, resolution and application.**	**4M**

Ans:	Parameter	Normal TV	Projection TV	
	Aspect ratio	4:3	4:3	
	Resolution	720 * 576 pixel	1920*1080 pixel	
	Number of lines	625 lines	625 lines	**1M**
	Application	Used in Home	Used in Seminars,Conferences,Elicitation,Public meeting,Mini Video theatre	**Each**

d)	**How CCTV works and why audio signal is not transmitted in CCTV**	**4M**
Ans:		**1M**

(a) Direct camera link   (b) Wireless link

P = Pad
M-TV monitor

OR

Camera set-up at location of interest   Monitor at receiving end

		Working :- CCTV is a system in which video signal obtained by one or more camera tubes is sent to one or moremonitors through coaxial cables. **Camera Tube:** It is the eye of CCTV system and can be placed at any strategic location to see the scene and convert itinto a video signal. It is equipped with scanning circuit which produces deflection current for horizontaland vertical deflection. These currents are duly synchronized by blanking and sync pulse generators. Thecamera tube is visually of vidicon type. **Video Amplifier at the Transmitting End:** This amplifies video output of the camera tube. Banking and sync pulses are added to the signal,resulting in a composite video signal. As high frequency component of the video signal are attenuatedmore in the coaxial cable than low frequency components, there is pre-emphasis of high frequencysignals. This takes care of uneven attenuation in the cable. The camera tube along with the amplifiers isput in a weather proof case. **Coaxial Cable:** It carries the video signal to the monitoring room. The characteristic impedance of the cable is **Video Amplifier at the Receiving End:** Due to the attenuation in the coaxial cable, the signal level drops below the level required by themonitor. An amplifier is therefore used. The input impedance of the amplifier matches with theimpedance of the cable. In case of several monitor, a distribution amplifier is used which feeds signal toindividual monitor through matching pads. A monitor is a TV receiver without RF, IF and detectorstages. Each monitor contains video amplifiers detection stages and a picture tube. The scene at whichthe camera tube was focused is display on the screen of the monitor. A signal monitor for several cameratubes can be used by employing a switching arrangement to switch the video signal from variouscameras in an automatic sequence or manually as per need. **Reasons of Audio signal is not transmitted in CCTV** 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	**2M** **1M**
e)		**List the application of CATV**	**4M**
Ans:		**Applications of CATV: (Any 4)** 1. As Television broadcast system 2. Cable internet modem. 3. Education	**1 M** **each**

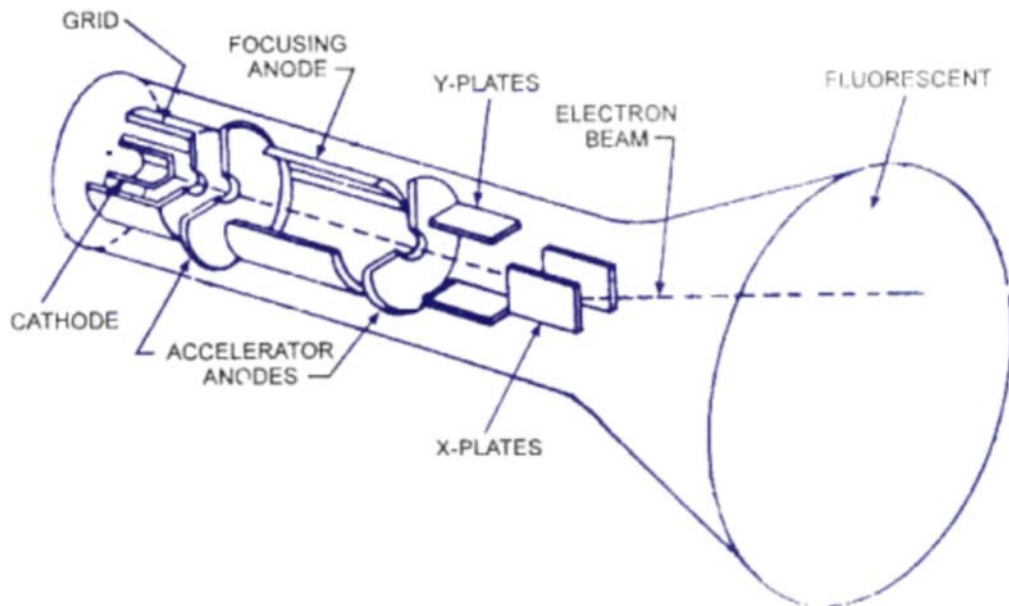|			
		4. FM Radio broadcasting. 5. Program on demand broadcasting from cable operator. 6. Video-Tex 7. Cable phone 8. E-business 9. Local advertising	
Q.6		**Attempt any FOUR of the following :-**	**16-Total Marks**
	a)	**Illustrate the JPEG video compression techniques**	**4M**
	Ans:	**Diagram Of JPEG compressor system:-** **Figure:-JPEG compressor system**	**2M**
		Explanation of JPEG Compression System:- • JPEG typically achieves 10:1 compression ratio with little perceptible loss in quality. It specifies thecodec used by digital cameras and other photographic image capturing devices. The principle behindcompression of image take note of the fact that the human eye is less sensitive to gradual transitions andalso less sensitive to color variations as compared to brightness variations. • Pixel in the image are converted into luminance and chrominance (Y, Cob and Cr) components, samplingthem with 4:4:2 or 4:2:0 proportions, depending on the quality required. Then the image is convertedinto 8X8 matrix blocks. They are processed, using discrete cosine Transform (DCT), the frequencycomponent in samples is taken at regular intervals. The distinction in two types of formats uses realcomponents only. The process discards those frequencies which do not affect the image as the humaneye perceives it. The signals accepted in quantization process are coded using Huffman code. Thecompressed data is stored and transmitted.	**2M**
	b)	**Draw block diagram of transponder for DTH and explain its working**	**4M**
	Ans:	 **Block diagram of transponder for DTH**	**2M**

Transponder for DTH

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 about11GHz for getting better output power , travelling wave tube (TWT) is used as a power amplifier.

2M

c)	**Describe the working of CRT monitor.**	4M
Ans:	**Diagram ofthe working of CRT monitor**	

Cathode Ray Tube

2M

2M

Explanation:-

- The incoming signal feeds into the antenna socket on the back of the TV.
- The incoming signal is carrying picture and sound for more than one station (program). An electronic circuit inside the TV selects only the station you want to watch and splits the signal for this station into separate audio (sound) and video (picture) information, passing each to a separate circuit for further processing.
- The electron gun circuit splits the video part of the signal into separate red, blue, and green signals to drive the three electron guns.
- The circuit fires three electron guns (one red, one blue, and one green) down a cathode-ray tube, like a fat glass bottle from which the air has been removed.
- The electron beams pass through a ring of electromagnets. Electrons can be steered by magnets because they have a negative electrical charge. The electromagnets steer the electron beams so they sweep back and forth across the screen, line by line.
- The electron beams pass through a grid of holes called a mask, which directs them so they hit exact places on the TV screen. Where the beams hit the phosphors (colored chemicals) on the screen, they make red, blue, or green dots. Elsewhere, the screen remains dark. The pattern of red, blue, and green dots builds up a colored picture very quickly.
- Meanwhile, audio (sound) information from the incoming signal passes to a separate audio circuit.
- The audio circuit drives the loudspeaker (or loudspeakers, since there are at least two in a stereo TV) so they recreate the sound exactly in time with the moving picture.

d)		**Explain the principle of VHS video recording format.**	**4M**
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 VictorCompany of Japan (jack recording became a major contributor to the television industry. Like othertechnological innovations, each of several companies made an attempt to produce a television recording standard thatthe majority of the world would embrace. At the peak of it all, the home video industry was caught up in a series ofvideotape format wars. Two of the formats, VHS and Betamax, received the most media exposure. VHS wouldeventually 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 compactanalog recording camcorders. The format is based on the same video tape as is used in VHS, and can be played back ina standard VHS VCR with an adapter. Through quite inexpensive, the format is largely obsolete even as a consumerstandard 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 improvedvideo 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	
e)		**State two merits and two demerits of plasma display.**	4M
Ans:		**Merits: [Any two]** 1. The slimmest of all displays 2. Very high contrast ratios [1:2,000,000] ▨▨▨▨ ▨▨▨▨▨▨▨ ▨▨▨ ▨▨▨▨▨▨▨ ▨▨▨▨▨ ▨▨ ▨▨ ▨▨ ▨▨▨▨ 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	2M
		Demerits of Plasma Display: [Any two] 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. ▨▨▨▨▨▨▨▨▨ ▨▨▨ ▨▨▨▨▨▨▨▨ ▨▨▨▨▨▨▨▨▨ ▨▨▨▨▨ ▨▨ ▨▨▨▨▨▨▨ ▨▨▨▨ ▨▨▨▨ ▨▨▨▨▨▨▨▨▨ ▨▨▨▨▨▨▨ ▨▨▨ ▨▨▨▨▨▨▨▨ the display,is included, weighs more. 5. Cannot be used in high altitudes. The pressure difference between the gas and the air may cause atemporary damage or a buzzing noise. 6. Area flickering is possible	2M