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 judgment 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

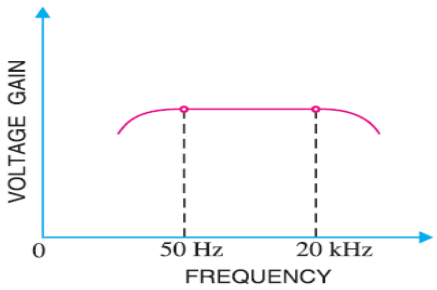
i) Define audio amplifier. State its type. Draw its frequency response curve.

Ans: (Defination:2 M, Type:1 M, Frequency Response:1 M)

An audio power amplifier is an electronic amplifier that increase the strength of low-power audio signals (signals composed primarily of frequencies between 20 - 20 000 Hz, the human range of hearing) to a level suitable for driving loudspeakers. It is the final electronic stage in a typical audio playback chain.

Types of Audio systems :

- Mono Amplifier system
- Stereo Amplifier system



ii) State the advantages of fluorescent display system (any four).

Ans: (Any 4: 01M each)

Advantages of fluorescent display system are: (any four)

1. Emits a very bright light with clear contrast.
2. Easily support display elements of various colors.
3. The light produced by most VFDs contain many colors and can often be filtered to produce a more pure Colour such as deep green or deep blue.

4. Being rugged, inexpensive.
5. Easily configured to display a wide variety of customized messages.
6. Most VFD's continue to function normally in subzero temperatures making them ideal for outdoor devices in cold climates.
7. In addition to ten numerals, the display can be used to show letters including punctuation.
8. It gives hexadecimal encoding for display the digits 0 to F.
9. To remove the ambiguity letter "B" is small "b" and number "8" is in 7 segment display, otherwise both would have looked same.
10. It can give short message giving status information in CD player like "no disc" or "error" etc.
11. The fluorescent numbers and messages can be seen in the dark also.

iii) Define the following terms i) Aspect ratio u) Scanning iii) Image continuity iv) Pixels.

Ans: (1M Each)

i)Aspect Ratio

The ratio of width to height ratio of a picture frame is called aspect ratio.
Standard aspect ratio of 4:3 is preferred for most televisions.

$$Aspect\ Ratio = \frac{Width\ of\ the\ Screen}{Height\ Of\ the\ Screen} = \frac{4}{3}$$

ii)Scanning

The scene is scanned rapidly both in the horizontal and vertical directions simultaneously to provide sufficient number of complete pictures or frames per second to give the illusion of continuous motion. Instead of the z4 as in commercial motion picture practice, the frame repetition rate is 25 per second in most television systems.

iii)Image Continuity

While televising picture elements of the frame by means of the scanning process, it is necessary to present the picture to the eye in such a way that an illusion of continuity is created and any motion in the
scene appears on the picture tube screen as a smooth and continuous change.

iv)Pixels

A pixel , short for 'picture element', is the smallest active element or dot in an image. A well-defined picture will be general have more pixels than in less defined one.

iv) List any eight specifications of dish antenna.

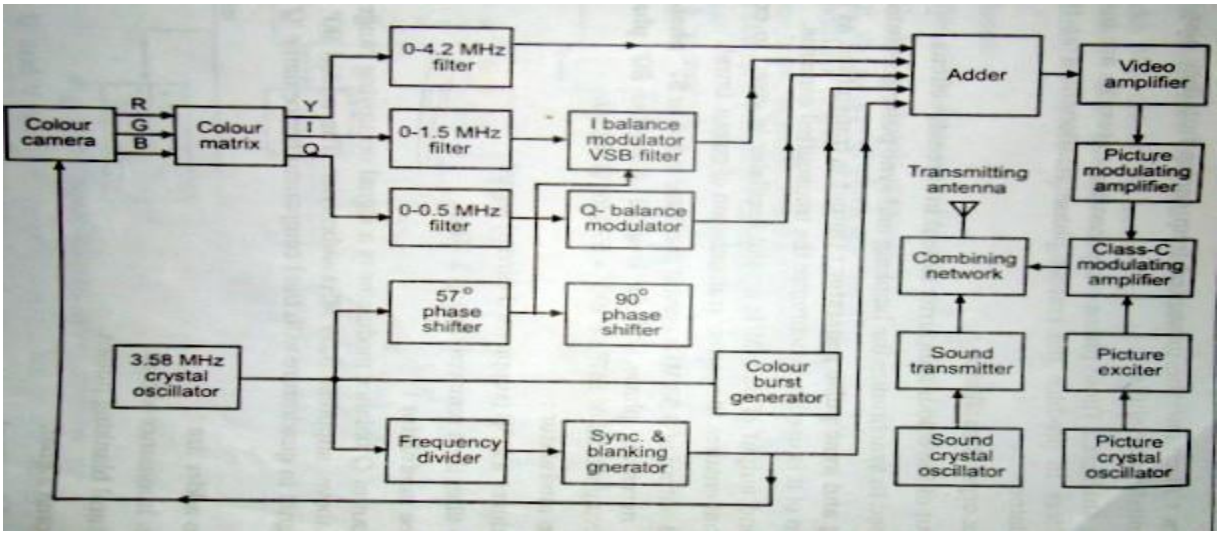
Ans:(Each 0.5M)

1. Size-8 feet.
2. Gain-36 dB.
3. Band-C-(3.7 to 4.2 GHz downlink frequency).
4. Look angle- 360 degree rotation in azimuth.18 to 90 degree rotation in elevation.
5. Offset angle-24.62 limit.
6. Focal length – 90 cm.
7. Elevation angle range= 17 to 90 limit
8. Azimuth angle = 0 to 360 degree
9. Aperture efficiency= 75%

b) Attempt ANY ONE of the following: 8M

i) Draw block diagram of colour TV transmitter and label it.

Ans: (Diagram: 4 M)



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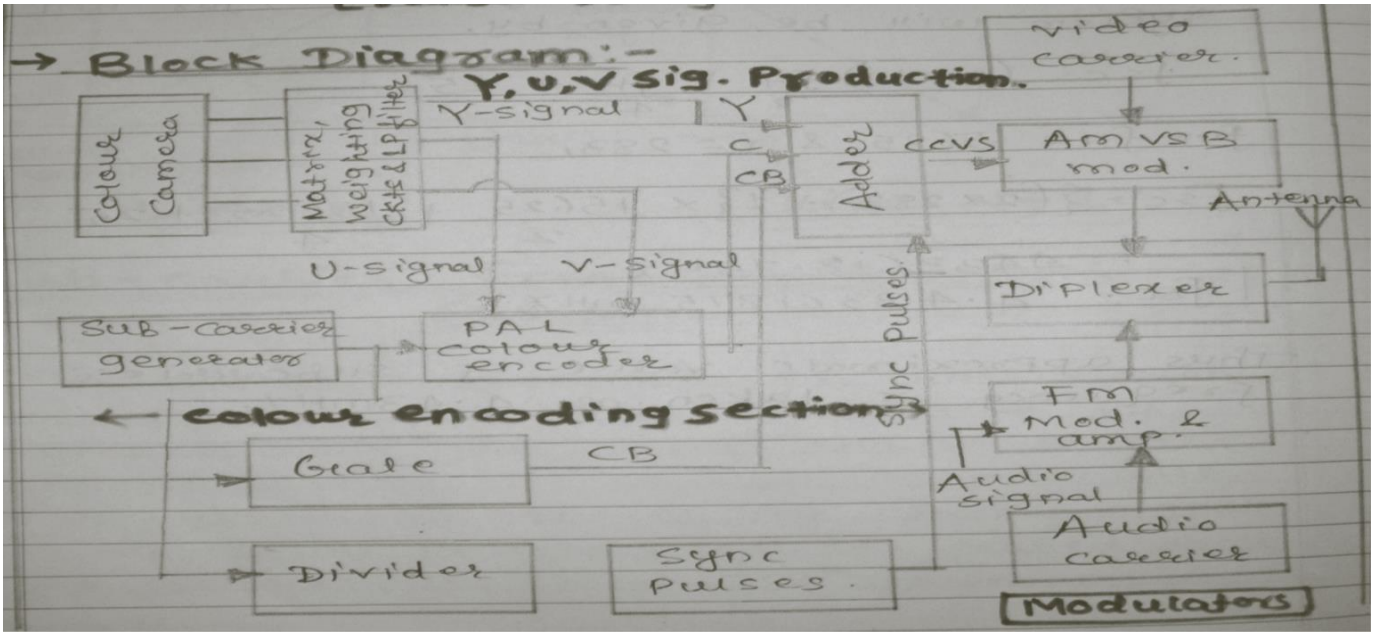
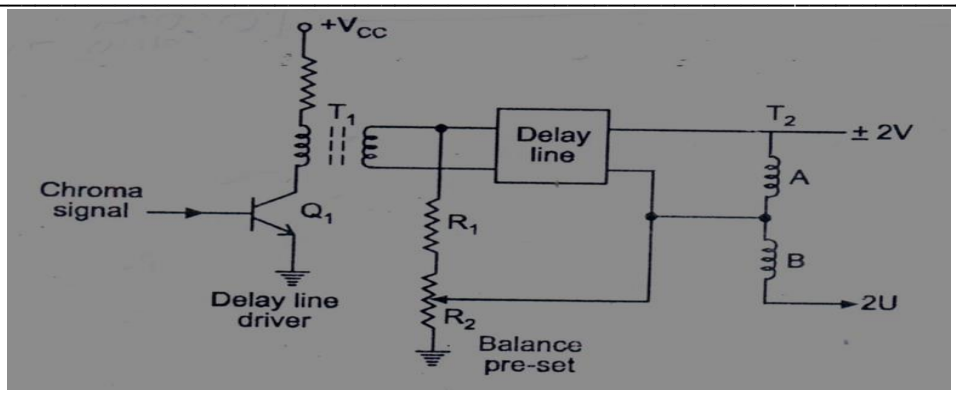


ii) Describe how separation of U and V signals are achieved in colour TV with the help of neat sketch (diagram).

Ans: (Diagram:2 M,Working:2M)



Working:

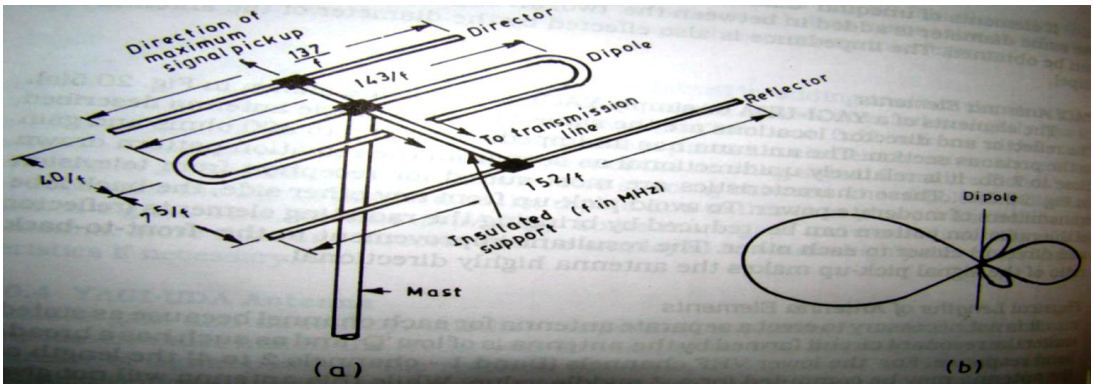
Chroma signal is applied to Q1. Chroma signal is applied to delay line through transformer T1.This signal after delay line appears across A winding. Direct signal is fed to center top of T2transformer. Voltage induced into winding A and B is equal in magnitude but opposite in phase due to signal from delay line. Whereas voltage induced into winding A and winding B is equal in magnitude and same phase. This means that direct and delayed signals have same phase in one winding but are of opposite phase in second winding. Thus results in separation of U and V signal.

2. Attempt ANY FOUR of the following: 16M

a) Draw and describe Yagi - Uda antenna with neat sketch and its radiation pattern.

Ans: (Principle Yagi-uda antenna- 2 mark & diagram-1 M,Radiation pattern 1M)

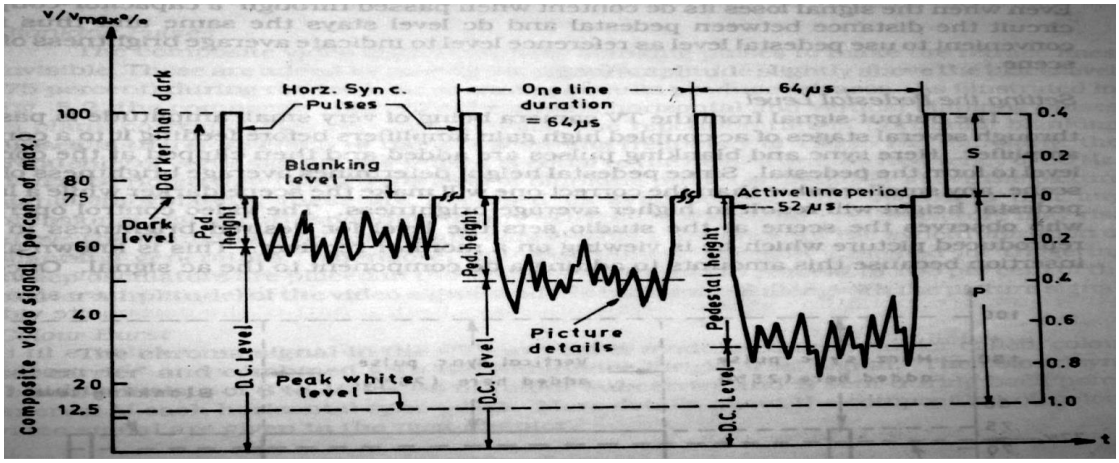
This antenna is widely used with television receiver for a location within 40 to 60km from the transmitter has folded dipole with one reflector one director. The elements of its array are as shown in fig.(a) and is relatively unidirectional as seen from its radiation pattern drawn in fig.(b)



Function of reflector: The reflector rod is longer in length by about 10% of the length of dipole. The dipole is 0.5λ and reflector is 0.55λ. Reflector acts as s tuned circuit whose resonant frequency is lower than the frequency of the signal being received by the active dipole element. Function of director: Director concentrates the energy in the same direction in which the radio wave is moving. The director rod is shorter than the dipole by about 10% of the length of dipole.

b) Draw composite video signal and label its various parts.

Ans: (Diagram-3 marks & label-1 mark)



c) Describe NHK, MUSK system for HDTV.

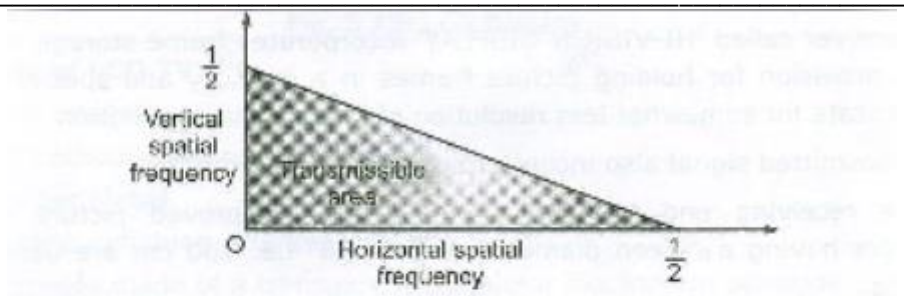
Ans: (Describe :3 M,Digram:1M)

HDTV:

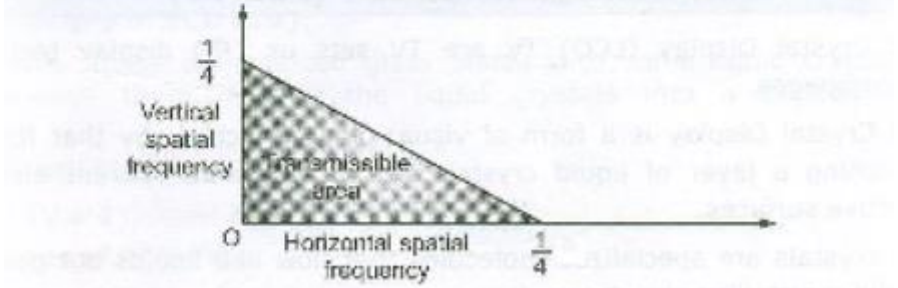
- MUSE stands for Multiple Sub-Nyquist Sampling Encoding and is an HDTV bandwidth compression scheme developed by NHK.
- It uses fundamental concepts for performance exchange in the spatio – temporal (transitory transformation) domain along with motion compensation to reduce the transmission bandwidth down to near about 10 MHz.
- The processed HDTV signal can be then transmitted using a single BDS channel. Temporal Interpolation In MUSE the luminance and colour information are sent by time multiplexed components (TMC) The colour information is sent sequentially with a time compression of four.
- The TMC signal is bandwidth reduced means of 3 – dimensional offset subsampling pattern over a four – field sequence. The stationary areas of the picture are reconstructed by temporal interpolation of samples from four fields.

Spatial Interpolation:

- For a moving picture area the final picture is reconstructed by spatial interpolation using samples from a single field. Hence moving portions of the picture are reproduced with one- quarter the spatial resolution of the stationary areas. The spatial frequency response for both stationary and moving areas of the picture is shown in figure below. The lack of resolution during movements of the entire scene as in case of camera panning, zooming or tilting is prevented by introducing spatial motion compression technique. A vector representing the motion of the scene is calculated for each field at the encoder. This signal is multiplexed in the vertical blanking interval and transmitted to the receiver.
- In decoder, the read – out addresses of picture elements (pixels) from previous fields are shifted according to the information provided by the motion vector so that the data can be processed in still – picture mode.
- These two modes of interpolation, the inter – frame processing for stationary pictures and infra field averaging for moving portions of the picture are switched by detecting the moving areas at the decoder.
- Audio transmission is done by 4 – phase DPSK which is multiplexed with the processed video signal in the vertical blanking interval after frequency modulation of the transmission carrier by the video signal.



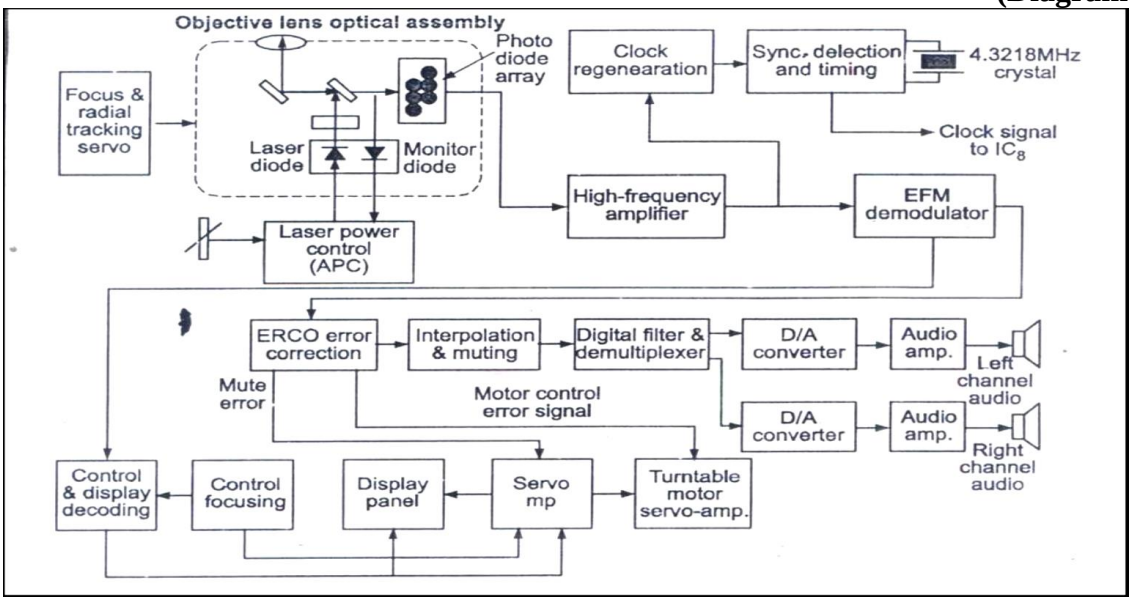
(a) For Stationary Portion of the Picture (Temporal Interpolation)



(b) For Moving Portion of the Picture (Spatial Interpolation)

d) Draw the block diagram of CD player.

Ans: **(Diagram 4M)**



e) State working principle of LCD TV with appropriate diagram.

Ans: **(Diagram-2M , Explanation -2M)**

- LCD (Liquid Crystal Display) TECHNOLOGY: LCD technology is quite different to that found in other TV types such as the original CRT (Tube television) and in Plasma TVs. A liquid crystal layer is stimulated by an electrical current, causing individual pixels to either shut out light, or let it pass through.
- In this way each pixel can be either light or dark, and the use of colour filters gives the necessary red, green and blue light with which to create an image of many millions of colours.

- The main principle behind liquid crystal molecules is that when an electric current is applied to them, they tend to untwist. This causes a change in the light angle passing through them. This causes a change in the angle of the top polarizing filter with respect to it. So little light is allowed to pass through that particular area of LCD. Thus that area becomes darker comparing to others.
- Because the light source is a bulb at the back of the screen, rather than light-emitting phosphors at the front of the screen, this technology is referred to as 'transmissive'.
- Liquid crystals exhibit some of the qualities of both a solid and a gas. There is uniformity to the structure, but it can be influenced by an electrical current.
- Let's look at a very basic LCD structure. Two layers of polarized glass encase a layer of liquid crystal. The rear panel of glass is vertically polarized, while the front panel is horizontally polarized. If light was simply shined through from behind, none would emerge from the front.
- Microscopic grooves are cut into each sheet of glass – vertical grooves for the vertically polarized glass, horizontal grooves for the horizontally polarized glass.
- The liquid crystal between the layers of glass then conforms to these grooves, creating a 90-degree twist. Activate the light source now and the liquid crystal will turn the light through 90 degrees so that it emerges from the front.

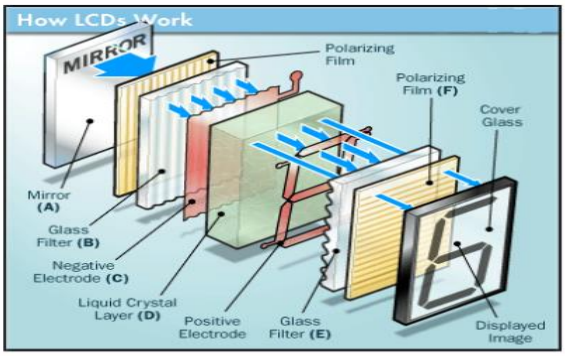
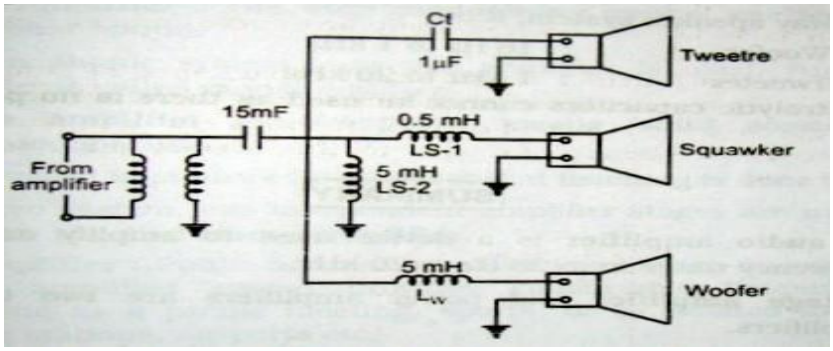


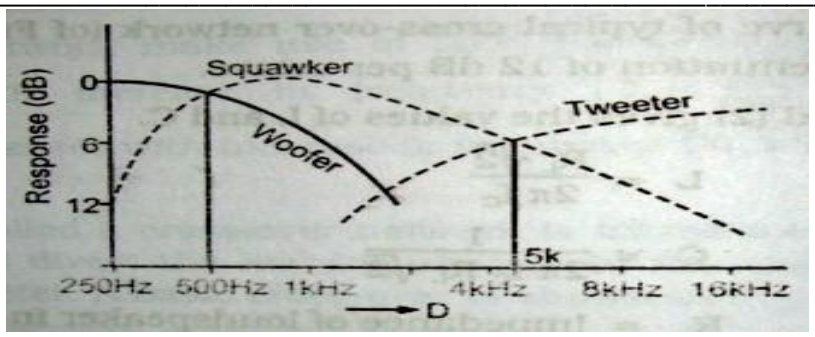
Figure: Construction of LCD

f) Draw basic cross over network and draw its response curve.

Ans:

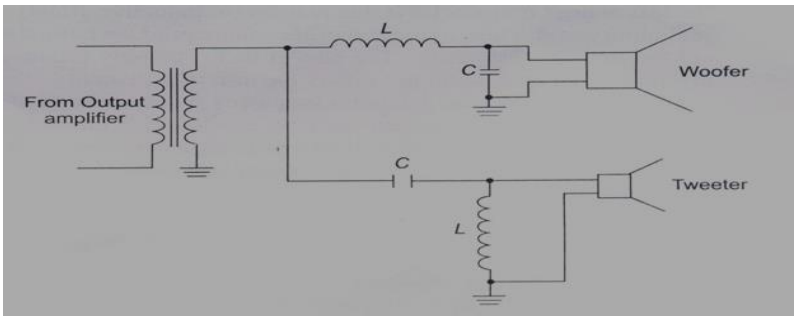


2M

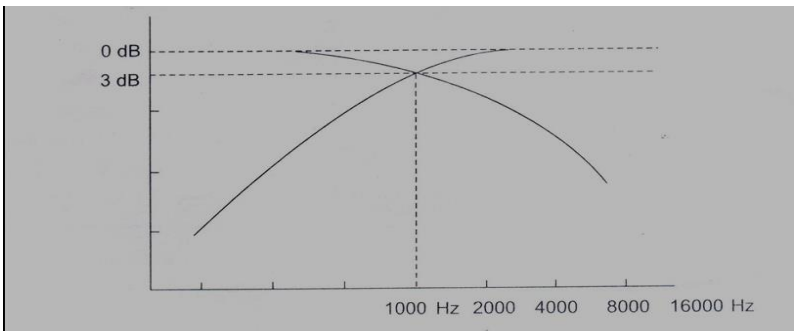


2M

OR



2M



2M

3. Attempt any four of the following: **16M**

a) Draw the block diagram of dB meter and describe its working principle.

Ans: **(2M diagram & 2M working)**

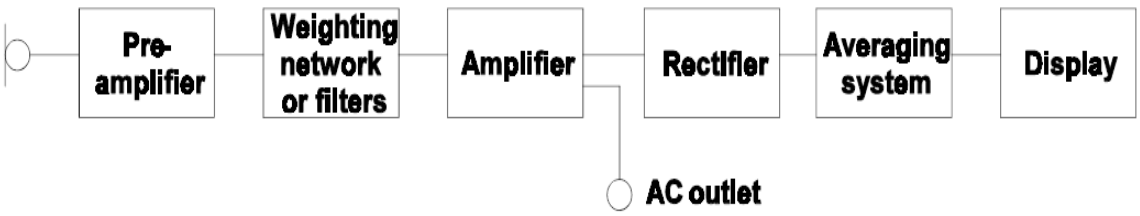


Figure: Block diagram of dB Meter

The two main characteristics are:

1. The frequency response: that is, the deviation between the measured value and the true value as a function of the frequency. As the ear is capable of hearing sounds between 20 Hz and 20 kHz, the frequency response of the sound level meter should be good, with variations smaller than 1 dB, over that range.
2. The dynamic range: that is, the range in dB over which the measured value is proportional to the true value, at a given frequency (usually 1000 Hz). This range is limited at low levels by the electrical background noise of the instrument and at high levels by the signal distortion caused by overloading the microphone or amplifiers.

- The electrical signal from the transducer is fed to the pre-amplifier of the sound level meter and, if needed, a weighted filter over a specified range of frequencies.
- Further amplification prepares the signal either for output to other instruments such as a tape recorder or for rectification and direct reading on the meter.
- The rectifier gives the RMS value of the signal. The RMS signal is then exponentially averaged using a time constant of 0.1 s ("FAST") or 1 s ("SLOW") and the result is displayed digitally or on an analog meter.
- In some cases, the sound level meter does not include a logarithmic converter. The scale on the indicating device is then exponential so that the linear signal may be read in dB.
- In this case, the dynamic range of the display is usually restricted to 10 to 16 dB and the precision of the reading is rather poor. In the case of intermittent noise, the user must constantly adjust the amplifier to adapt the output signal to the dynamic range of the display.
- When a log converter is used, the display scale is linear in dB and its dynamic range is usually much greater. This type of display has the advantage of providing the same precision at any level and permitting a much better appreciation of the range of fluctuations of the noise to be measured. In this regard, digital displays are less useful.

OR

Principle:

- The logarithmic term is applied to an electronic voltmeter when the current or voltage produced in the indicating instrument by an applied voltage is proportional to the logarithm of applied voltage.
- Such a characteristics leads to a linear decibel scale for the indicating instruments and finds many applications in electronics.
- The reading on the meter scale is calibrated in decibels and hence the instrument is called a dB voltmeter or simply dB meter.

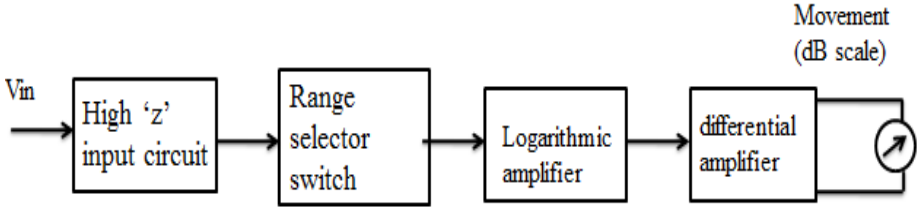


Figure: Block diagram of dB meter

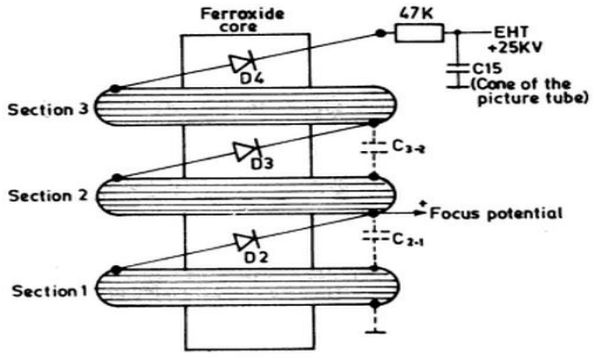
Working:

- The RF signal to be measured is connected to the input of high impedance input circuit through a RF connector, whose input impedance is 75 Ω. The range selector switch selects the band and range of its frequencies to be tuned.
- The logarithmic amplifier is connected to the differential amplified whose signal output deflects the dB scale in the dB meter. To obtain logarithmic characteristics, the meter use a diode in feedback loop of an op-amp. dB is the unit for losses and gains.

b) Draw and describe the circuit diagram for generating EI-IT.

Ans: **(2M diagram, 2M explanation)**

- EHT is a voltage generator, which generates around 17KV for B/W TV & 25 KV for colour TV using the principle of auto transformer action V=L di/dt
- In colour TV to generate EHT up to 25 KV the diode split addition technique is used. The principle of "DIODE-SPLIT ADDITION" is illustrated in figure below.



principle of split-diode addition to obtain EHT and focus anode potentials for a colour picture tube.

Figure: Split Diode Technique

- The three layers of secondary windings are shown wound round on the ferroxide core of the L.O.T. Each winding is identical to the other and has the same number of turns.
- The same magnitude of voltage will therefore be induced in each section every time the flyback derived input pulse get applied to the primary winding.
- Because of the close proximity of individual layers and interlayer capacitance exists between each of them. It is indicated in the diagram by dotted because this capacitor physically does not exist.
- If a diode is connected between the end of one layer of winding and the start of the next the AC voltages induced in each layer can be made to charge up all the inter-layer capacitances to the same voltage. Since capacitances are effectively in series, the total output voltage appearing at the output terminal is the sum of all the voltages appearing across all of them.
- The diode shown connected in series between the layers are physically embedded in the windings and form an integral part of the transformer. The three windings are so designed that voltage induced in each layer form the fly back transformer is 8.33KV. This makes the total potential equal to (8.33KV+8.33KV+8.33KV≈25 KV) and forms the EHT supply source.

OR

EHT generation (2nd Method):

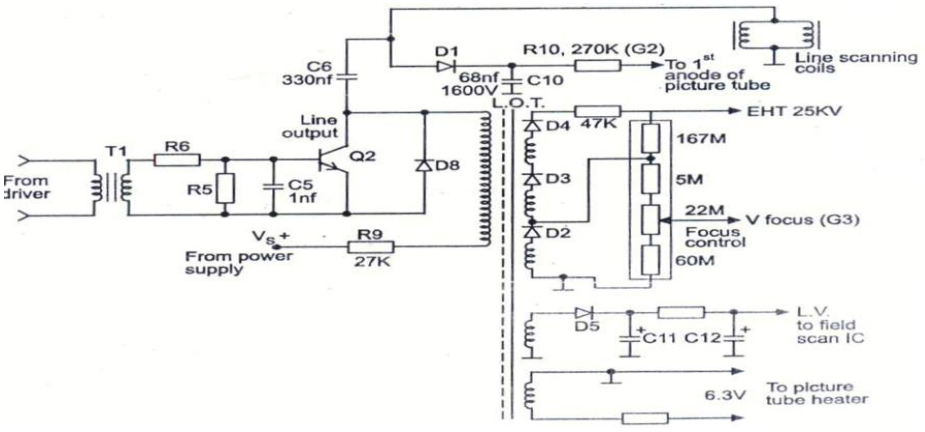


Figure: EHT Generation

- Anode potential (G2) is obtained for screen grid separately at collector of Q2.

- This is rectified by D1 and then filtered by C10. Output DC voltage is 550 to 800 V. Any failure of G2 means no beam current and hence no spot is produced on screen.
- Focus anode (G3) potential needed is 6.5kV to 7.5kV.It is obtained from diode split winding (D2, D3 and D4). Each stage produces potential of 8kV.

c) Compare Woofer, Squawker and Tweeter with respect to definition, size, weight and frequency range.

Ans: **(1M each points)**

SR. NO.	PARAMETER	WOOFER	MID-RANGE (SQUAWKER)	TWEETER
1.	Definition	A woofer is a technical term for loudspeaker driver designed to produce low frequency sounds	A mid-range speaker is a loudspeaker driver that reproduces sound in the frequency range from 250 to 2000 Hz	A tweeter or treble speaker is a special type of loudspeaker that is designed to produce high audio frequencies
2.	Range of Frequency	16Hz to 500Hz	500Hz to 5KHz	5KHz to 20KHz
3.	Size & Physical Structure	Size is largest to match the impedance to the air.	They are of medium size, kept in between tweeter & woofer.	They process High frequency, hence their size is small. They are light in weight so that they can respond rapidly to applied signal.
4.	Weight	Heavier than tweeter & Squeaker	Heavy than tweeter & light in weight than woofer	Light in weight than woofer & Squeaker

d) State the functions of various drive motors in CD player.

Ans: (1.5 M disc, spindle or turntable motor, 1.5 M slide, feed or sled motor, 1M tray or loading motor)

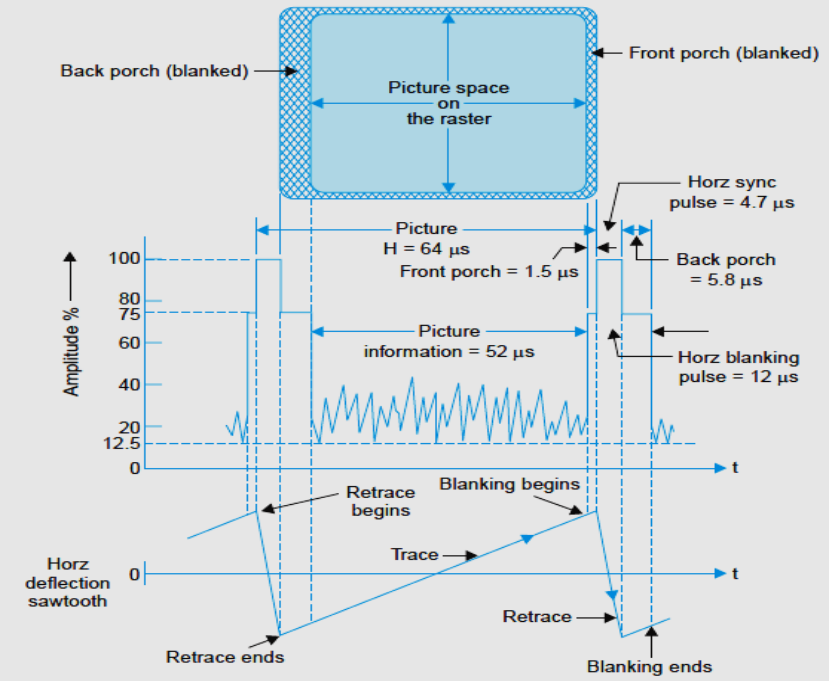
Different types of motors used in CD players are:

- Tray loading or carriage motor,
- Slide sled feed motor and
- Spindle, disc, turn table motor.
- There are three basic motors used in the CD player.CD players with auto CD changer or the table top changer may have up to five different motors or some portable or combination CD and cassette player may have only two motors but three motors used In CD players are most common.
- The tray or loading motor moves the CD tray in and out for loading and unloading the CD when the open/close switch is pressed.
- A disc, spindle or turntable motor rotates the CD at a variable speed. The disc motor rotates faster at the beginning and slows down as the laser assembly moves toward the outer edge of the CD.
- The slide, feed or sled motor moves the optical pickup unit from the center to the outer edge of the disc on sliding rods. Some players have a pick-up motor that travels in a radial or semicircle fashion.

e) Draw with label the details of horizontal sync pulse.

Ans: **(1M Labeling, 3M diagram)**

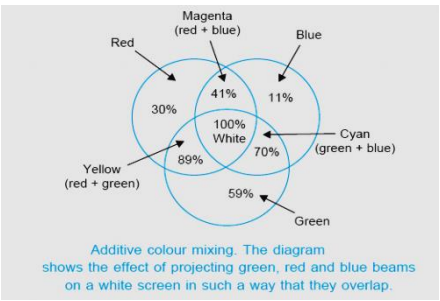
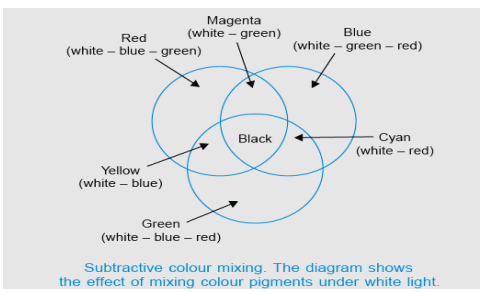
(Note: any other relevant diagram can be considered)



4. a) Attempt any three of the following

i) Compare between additive colour mixing and subtractive colour mixing with respect to working principle, sketch, application and primaries used.

Ans: **(1M each valid point)**

PARAMETER	ADDITIVE MIXING	SUBTRACTIVE MIXING
Working Principle	Additive mixing of three primary colours red, green and blue with proper proportions can create any colour.	In subtracting mixing reflecting properties of pigments are used which absorb all wavelengths but for their characteristics colour wavelengths.
Primaries Used	Different colours are created by mixing pure colours hence used in TV.	Different colours are created by subtracting parts from white so not suitable for TV.
Sketch	 Additive colour mixing. The diagram shows the effect of projecting green, red and blue beams on a white screen in such a way that they overlap.	 Subtractive colour mixing. The diagram shows the effect of mixing colour pigments under white light.

Application	Additives primaries are Red, Green, and Blue.	Subtractive primaries are Magenta, Yellow, and Cyan.

ii) Draw and describe the working of vidicon camera tube.

Ans: **(2M diagram 2M explanation)**

(Note: any other relevant diagram can be considered)

- The Vidicon came into general use in the early 50's and gained immediate popularity because of its small size and ease of operation. It functions on the principle of photoconductivity, where the resistance of the target material shows a marked decrease when exposed to light.
- Fig. illustrates the structural configuration of a typical vidicon.

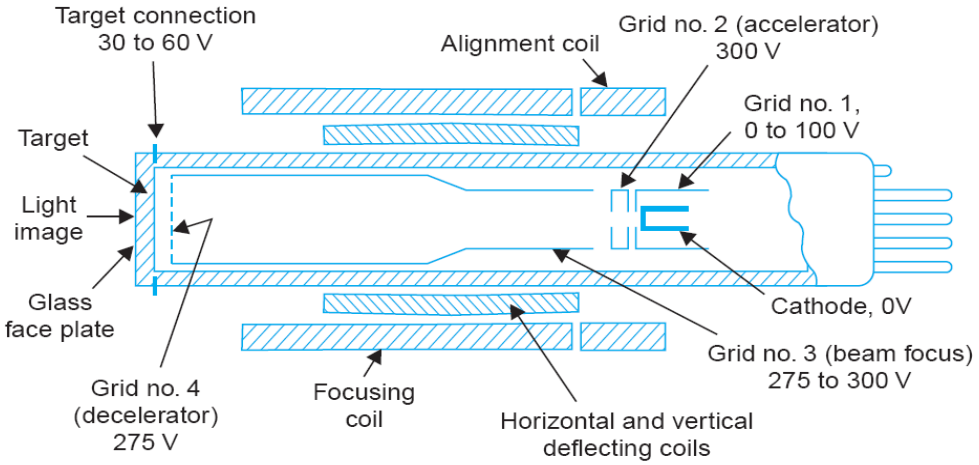


Figure: Constructional details of VIDICON camera tube

- As shown there, the target consists of a thin photoconductive layer of either selenium or antimony compounds. This is deposited on a transparent conducting film, coated on the inner surface of the face plate.
- This conductive coating is known as signal electrode or plate. Image side of the photo layer, which is in contact with the signal electrode, is connected to DC supply through the load resistance RL.
- The beam that emerges from the electron gun is focused on surface of the photoconductive layer by combined action of uniform magnetic field of an external coil and electrostatic field of grid No 3. Grid No. 4 provides a uniform decelerating field between itself, and the photoconductive layer, so that the electron beam approaches the layer with a low velocity to prevent any secondary emission.
- Deflection of the beam, for scanning the target, is obtained by vertical and horizontal deflecting coils, placed around the tube.

iii) With the help of neat sketch, describe working of `pickup unit' of a CD player .

Ans: **(2M diagram, 2M explanation)**

(Note: any other relevant diagram can be considered)

The pick-up assemble consist of –

- A low power laser diode to illuminate the CD tracks.

- Lens and prism arrangement to direct the laser beam to the CD surface and to direct the reflected laser beam towards photodiode array.
- A photodiode array to obtain data, focus and tracking signal from the reflected laser beam.
- Focus and tracking coils to focus the beam to the CD surface and to move the assembly to proper track across the disc surface.
- Some optical units do not contain the tracking coil, for example, the single-beam radial tracking assembly, this is explained in latter sections.

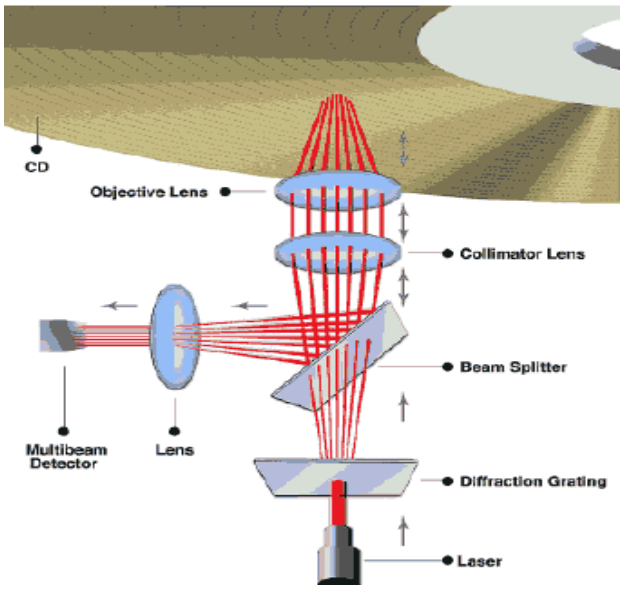


Figure: Optical pickup assembly

iv) Draw the layout diagram for distribution of cable connection for MATV and describe it.

Ans: **(2M diagram, 2M explanation)**

(Note: any other relevant diagram can be considered)

- The block diagram of a basic MATV system is shown in Fig. One or more antennas are usually located on roof top, the number depending on an available telecasts and their direction.

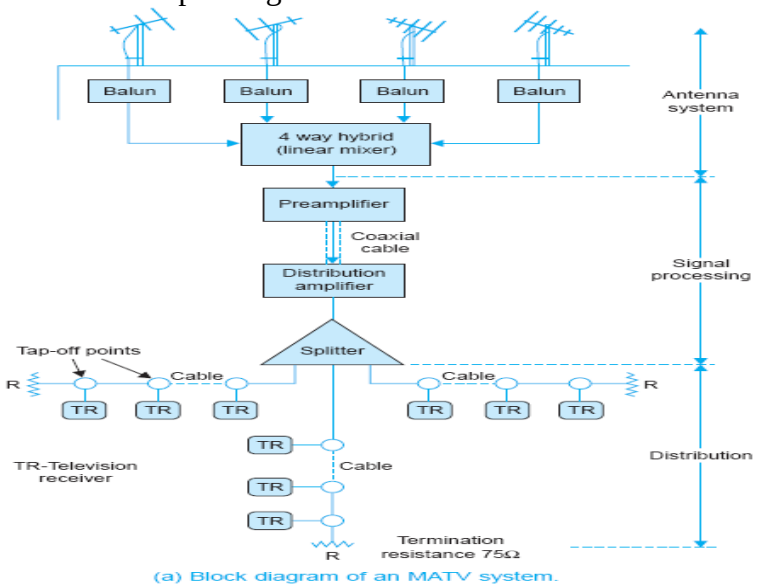


Figure: Block diagram of MATV

- Each antenna is properly oriented so that all stations are received simultaneously. In order to allow a convenient match between the coaxial transmission line and components that make up the system, MATV systems are designed to have a 75 Ω impedance. Since most antennas have a 300 Ω impedance, a BALUN is used to convert the impedance to 75 ohms.
- As shown in the figure, antenna outputs feed into a 4-way hybrid. A hybrid is basically a signal combining linear mixer which provides suitable impedance matches to prevent development of standing waves.
- The standing waves, if present, result in ghosts appearing in an otherwise good TV picture. The output from the hybrid feeds into a distribution amplifier via a preamplifier.
- The function of these amplifiers is to raise the signal amplitude to a level which is sufficient to overcome the losses of the distribution system while providing an acceptable signal to every receiver in the system.
- The output from the distribution amplifier is fed to splitters through coaxial lines.

b) Attempt ANY ONE of the following: 6M

i) Draw the block diagram of PAL-D decoder. Describe the function of each block.

Ans: (3M diagram, 3M explanation)

(Note: any other relevant diagram can be considered)

Block diagram and operation of PAL-D decoder:

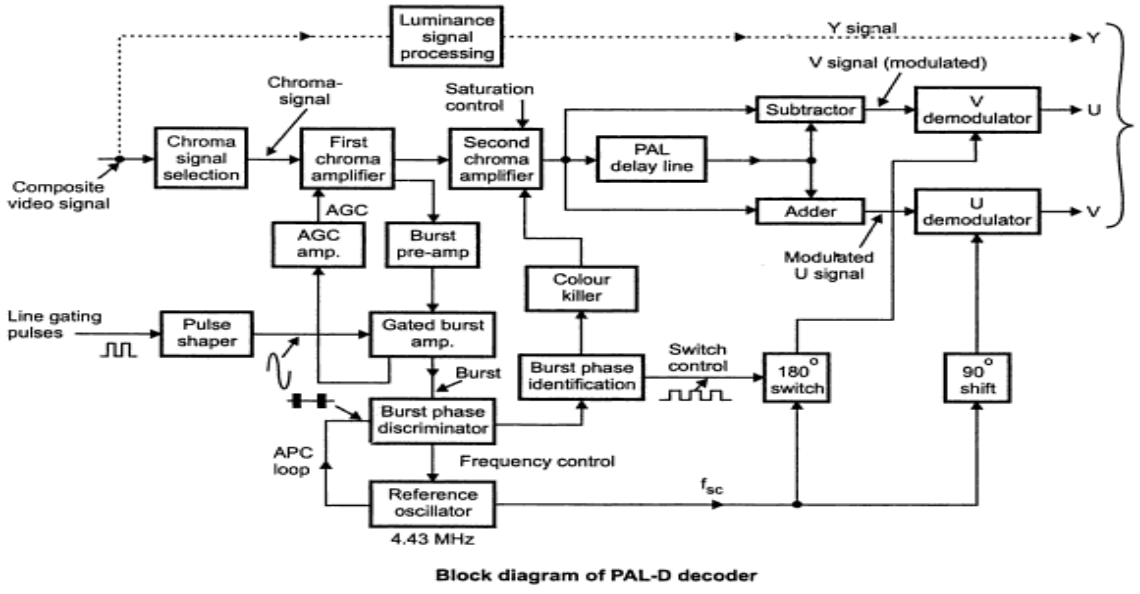


Figure: Block Diagram of PAL D decoder

Chroma signal selection:

Its function is to select Chroma and colour burst signal from the incoming CCVS signal. It essentially consist of band pass circuit whose center frequency is chosen to be equal to that of Chroma sub-carrier itself i.e.4.43MHz.

- *1st Chroma amplifier:*
  The Chroma and burst signals are amplified by first Chroma amplifier which is controlled by DC voltage developed by the Automatic Chroma Control (ACC) amplifier.
- *2nd Chroma amplifier:*
  The second Chroma amplifier incorporates colour saturation control circuit. The output of colour killer also feeds into it.

- *PAL delay line (separation of U and V colour phasors):*
  This network separated U and V signals with are then fed to respective demodulator.
- *Gated burst amplifier:*
  The gated burst amplifier separates the burst pulses and amplifies them a level suitable to operate the burst phase discriminator.
- *Automatic Chroma Control (ACC):*
  The magnitude of the voltage so fed back is proportional to the magnitude of the burst and therefore to the amplitude of Chroma signal itself. This voltage is used to control the first stage of Chroma amplifier in such way to ensure constant Chroma signal amplitude.
- *Burst phase discriminator:*
  It is sensitive to burst pulses and is designed to detect any differences which might exist between the phase of burst pulse and that of the reference oscillator. It produces at its output a dc voltage whose magnitude and polarity are proportional to the magnitude and direction of the detected phase difference.
- *Burst phase identifier:*
  This circuit is able to identify the phase relationship of the colour burst.
- *180º switch:*
  This switch is used to periodically invert the waveform fed to the v-signal demodulator.
- *Colour killer control:*
  This is just a half wave rectifier which produces a steady dc potential from the succession of burst pulses. During black and white transmission the dc potential is absent and hence biases the 2nd Chroma amplifier to cut off state.

ii) State TV channel allocation for band I and band III.

Ans: **(3M Band 1, 3M Band 3)**

	Ch No.	*Frequency range*	*Picture carrier Frequency (MHz)*	*Sound carrier Frequency (MHz)*
BAND I (41-68 MHz)	1	41–47 (not used)		
	2	47–54	48.25	53.75
	3	54–61	55.25	60.75
	4	61–68	62.25	67.75
BAND III (174-230 MHz)	5	174–181	175.25	180.75
	6	181–188	182.25	187.75
	7	188–195	189.25	194.75
	8	195–202	196.25	201.75

	9	202–209	203.25	208.75
	10	209–216	210.25	215.75
	11	216–223	217.25	222.75
	12	223–230	224.25	229.75

5. Attempt any two of the following: 16M

a) Compare between positive and negative modulation (any four points).

Ans: (2 M for each point)

Sr No	Parameter	Positive modulation	Negative Modulation
1	Effect of noise interference on picture signal	Produces white blobs on the screen as the noise extends in the direction of white during active scanning interval	Less pronounced as the noise pulse extends in black direction of the signal during active scanning period.
2	Effect of noise interference on synchronization	Not much affected	Produces spurious random pulses and hence affects the synchronization of the receiver.
3	Peak power available from transmitter	Non linear distortion is introduced for more power output	Transmitter may be over modulated and also permits large peak power output. No linear distortion.
4	Use of AGC circuits in the receiver	Difficult to develop true AGC voltage	Easy to develop true and steady AGC voltage
5		When the intensity of picture brightness causes increase in the amplitude of the modulated envelope it is called positive modulation	When the intensity of picture brightness causes decrease in the amplitude of the modulated envelope it is called negative modulation

b) What is CCTV? State its use. Compare CCTV with MATV (any four points).

Ans: (Definition 2M, use 2M, difference. 4M)

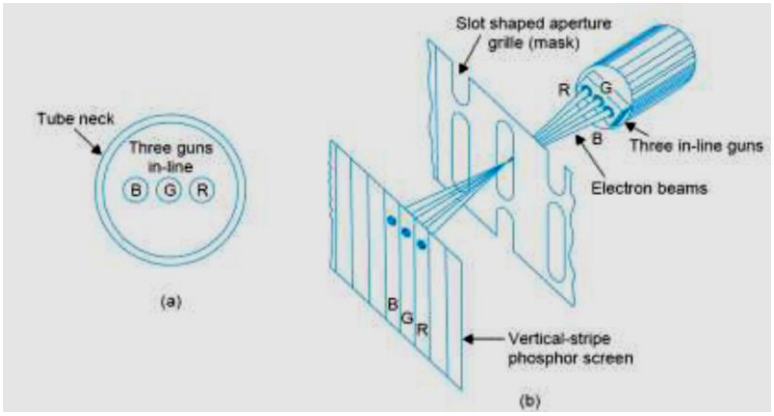
- CCTV stands for Closed Circuit Television.

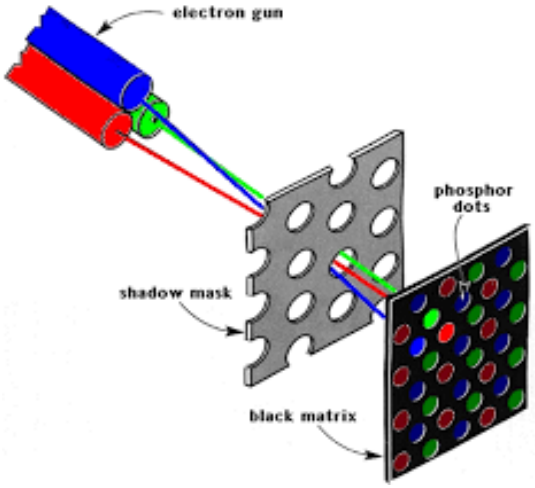
- CCTVs are used for industrial applications, security and surveillance, education and training, public information displays and many others.

Sr No	CCTV	MATV
1	CCTV stands for Closed Circuit Television	MATV stands for Master Antenna Television
2	CCTVs are used for industrial applications, security and surveillance, education and training, public information displays and many others	MATVs is used to provide RF signals from antennas to every television receiver in buildings, schools etc.
3	In this CVS are directly fed to the receivers.	In this splitter or directional coupler is used to direct the signal to the receivers.
4	Simple circuitry.	Complex circuitry.

c) Draw and describe the principle of delta gun tube and precision in line (PIL) picture tube.
Ans: (Dig of delta gun tube 2M, explanation 2M, Dig of PIL 2M, explanation 2M)

- This tube as the name suggests has three guns which are aligned precisely in a horizontal line. The gun and mask structure of the P.I.L. tube together with yoke mounting details are illustrated in Fig. The in-line gun configuration helps in simplifying convergence adjustments.





- As shown in the figure colour phosphors are deposited on the screen in the form of vertical strips in triads. (R, G, B) which are repeated along the breadth of the tube.
- To obtain the same colour fineness as in a delta-gun tube the horizontal spacing between the strips of the same colour in adjacent triads is made equal to that between the dots of the same colour in the delta-gun tube.
- As shown in Fig. (b), the aperture mask has vertical slots corresponding to colour phosphor stripes. One vertical line of slots is for one group of fine strips of red green and blue phosphors. Since all the three electron beams are on the same plane, the beam in the center (green) moves along the axis of the tube.
- However, because of inward tilt of the right and left guns the blue and red beams travel at an angle and meet the central beam at the aperture grill mask. The slots in the mask are so designed that each beam strikes its own phosphor and is prevented from landing on other colour phosphors.
- The P.I.L. tube is more efficient, i.e., has higher electron transparency and needs fewer convergence adjustments on account of the in-line gun structure. It is manufactured with minor variations under different trade names in several countries and is the most used tube in colour receivers.

6. Attempt any four of the following: 16M

a) State the need for pre-equalising and post equalising pulses in composite video signal.

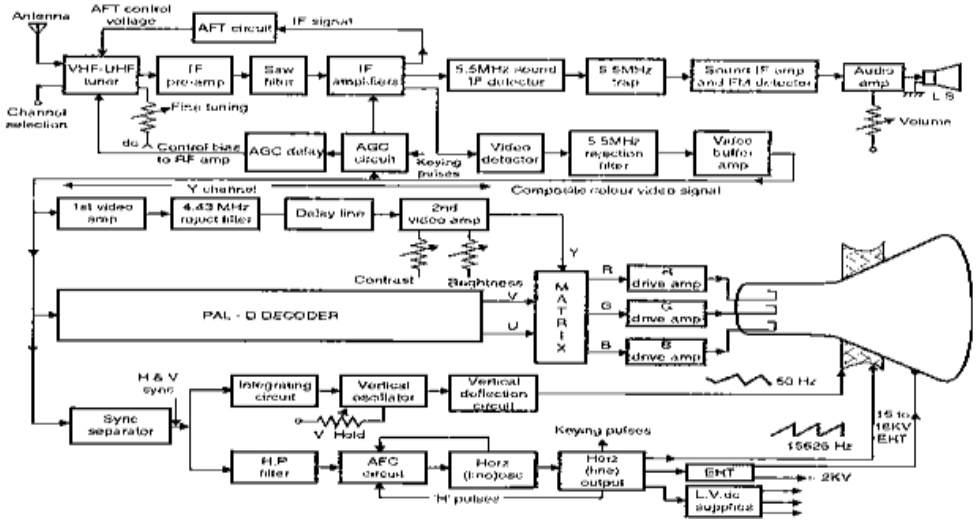
Ans: (2M for pre equalizing and 2M for post equalizing)

- pre-equalizing pulses result in the discharge of the capacitor to essentially zero voltage in both the fields despite the half line discrepancy before the voltage build-up starts with the arrival of vertical sync pulses.

- Post-equalizing pulses are necessary for a fast discharge of the capacitor to ensure triggering of the vertical oscillator at proper time.

b) Draw the block diagram of colour TV receiver.

Ans: ***(Note: Any other relevant Diagram can be considered.)***



c) State the need of multiplexer and attenuator in cable TV.

Ans: (Need of multiplexer and attenuator- 2 marks each)

Need of Multiplexer:

- In cable distribution center many channel signals are separated, modulated and frequency is allotted to each channel.
- Now to distribute this channel to users many channel signal must put into one single cable. So multiplexer gives one output from many signal.

Need of Attenuator:

- To equalize the signal
- To mix the signal at different proportion
- Reduces distance by specific value which is express in dB

d) Draw and describe the block diagram of Hi-Fi amplifier.

Ans:

Explanation:- 02M

- High- fidelity sound can be obtained from the recorded stereo tape or in live system from the
- microphones. (Stereo signal can also be obtained from the record player.)
- The stereo signal is fed to two independent amplification channels through a tape-mic switch. The amplifier system consists of a low noise high gain pre-amplifier, equalizer, well designed amplifier giving flat frequency response and little distortion by using negative feedback circuit and then the matching transformer.(A balancing circuit is incorporated to balance out then the matching the characteristics of otherwise identical circuits.).The Secondary of the matching transformers of each channel I connected to the respective loudspeaker column. For hi-fi, the loudspeaker columns consisting of woofer, squaker and tweeter are used.

- All the blocks are designed so as to get flat frequency response (from 40 to 15000 Hz). Little distortion (less than 1%), high signal-to-noise ratio(more than 50dB) and high dynamic range (100 dB) to achieve the final output5 of high fidelity.

Diagram:- **02M**

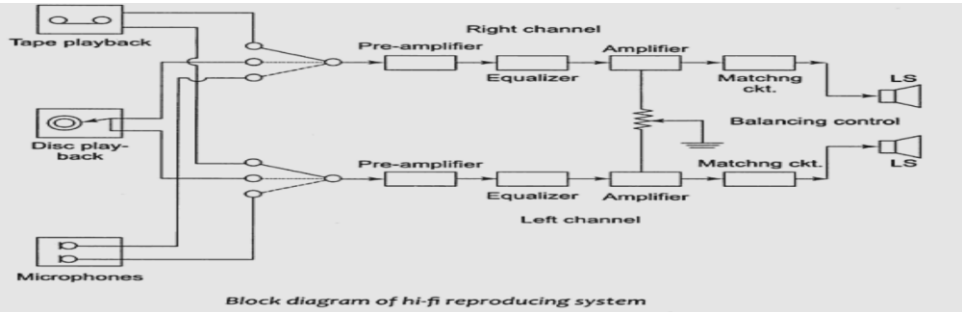


Figure: Block diagram of Hi-Fi audio amplifier system

e)Y State any eight CCIR-B standard for colour signal transmission and reception.

Ans: **(any eight standards ½ M each)**

Parameters	CCIR B standard
Number of scanning lines/frame	625
Field (vertical) frequency	50Hz
Line(horizontal) frequency	15625Hz
Aspect ratio(width/height)	4:3
Horizontal trace time	52µs
Horizontal retrace time	12µs
Total scanning line lost in vertical retrace	64µs
Front porch	1.5µs
Back porch	5.8µs
Horizontal sync pulse	4.7µs
Colour sub carrier frequency	4.43MHz
Colour system	Phase Alteration by Line –Delay (PAL-D)
U signal(weighted B-Y)	U=0.493 (B-Y)
V signal(weighted R-Y)	V=0.877(R-Y)
Total vertical blanking duration	1280µs or 1.280ms
Vertical sync pulse	160µs
Pre and post equalizing pulse	5 pulse each
Sync pulse top	100%
Blanking/pedestal level	75%
Black level	72-75%
White level	10-12.5%
Width of video signal	5MHz
Chroma signal bandwidth	-1.3MHz to +1.57MHz
Video IF	38.9MHz