UNIT-1 (8 M)

1.Explain any four basic characteristics of sound signal. 2M

Ans: (Note: two to three line explanation is enough foe each beat)

Level and loudness:

The amplitude of a sound wave determines its loudness or volume. A larger amplitude means a louder sound, and a smaller amplitude means a softer sound. The loudness of a sound is also determined by the sensitivity of the ear. The human ear is more sensitive to some frequencies than to others. The volume we receive thus depends on both the amplitude of a sound wave and whether its frequency lies in a region where the ear is more or less sensitive.

The loudness is a sensation of how strong a sound wave is at a place. It is always a relative term and is a dimensionless quantity. Loudness is measured in decibel (dB). It is given as:

L = log(I), here „I" is the intensity.

Pitch: Pitch is tone frequency.Pitch is a characteristic of sound by which a correct note can be distinguished from a grave or a flat note. We can identify a female and male voice without seeing them. The term „pitch" is often used in music. Pitch depends upon the frequencies of the sound wave. A note has a higher pitch when the frequency is high and a note of low frequency has a low pitch.

Frequency response:

The audio spectrum range spans from 20 Hz to 20,000 Hz and can be effectively broken down into seven different frequency bands, with each having a different impact on the total sound.

Fidelity:

Fidelity is the quality of faithfulness or loyalty.

Sensitivity:

sensitivity It is defined as output in millivolts (or in dB below 1 volt) for the sound pressure of 1 Pa (or 10 microbars) at 1000 Hz. As the normal level of speech provides a sound pressure of I microbar ((or 0.1 Pa), the sensitivity based on this criteria for 1 microbar pressure (or 0.1 Pa) level would be one-tenth the value for 1 Pa pressure.

Selectivity:

The human ear is very sensitive to sound intensity. It can detect sound intensity as low as 10 dB below the threshold of hearing. The ear is sensitive, not to the absolute values of intensity, but to the ratios (or dB). The sound power generated by a large orchestra is a fraction of a microwatt at the softest tones and about a thousand milliwatts at the loudest ones. Similarly, speech during whispering is in picowatts, and while shouting, it is several milliwatts. It is not necessary for a sound-reproducing system to produce sound of the same magnitude of power as at the source, but the reproducing system should be capable of handling the maximum and minimum power in the same ratio.

2.Describe the operating principle of condenser type microphone with neat diagram. 4M

Ans:

Principle:

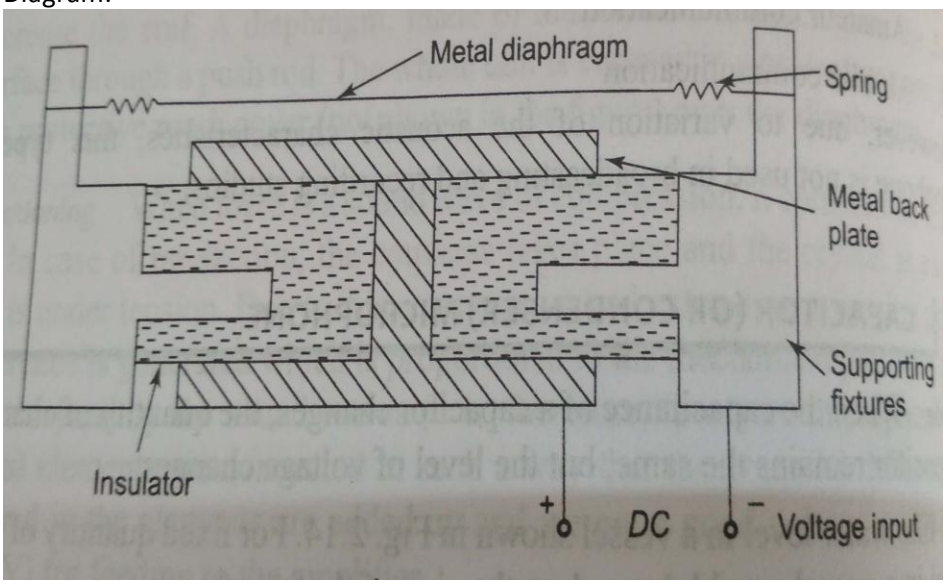
- When sound pressure moves the diapharam in, the capacitance increases, and when it moves out, the capacitance decreases.
- The change in capacitance results in change in out put voltage of microphone. Equation 1 shows that if C increases, V will decrease and if C decrease, V will increase V=Q/C ---------- (1)

Where V=Voltage across the capacitor in volts.

Q= charge in coulombs

C= capacitance in farad

Diagram:



3.Differentiate between mono and stereo amplifier. 4M

Ans:

Parameter	Mono amplifier	Sterio amplifier
Number of amplifier	Single amplifier	Two amplifier
Applications	Used in public address system	Used in Hi-Fi amplifier system

4.Describe with the help of diagram the working of crystal type microphone. 4M
Ans:

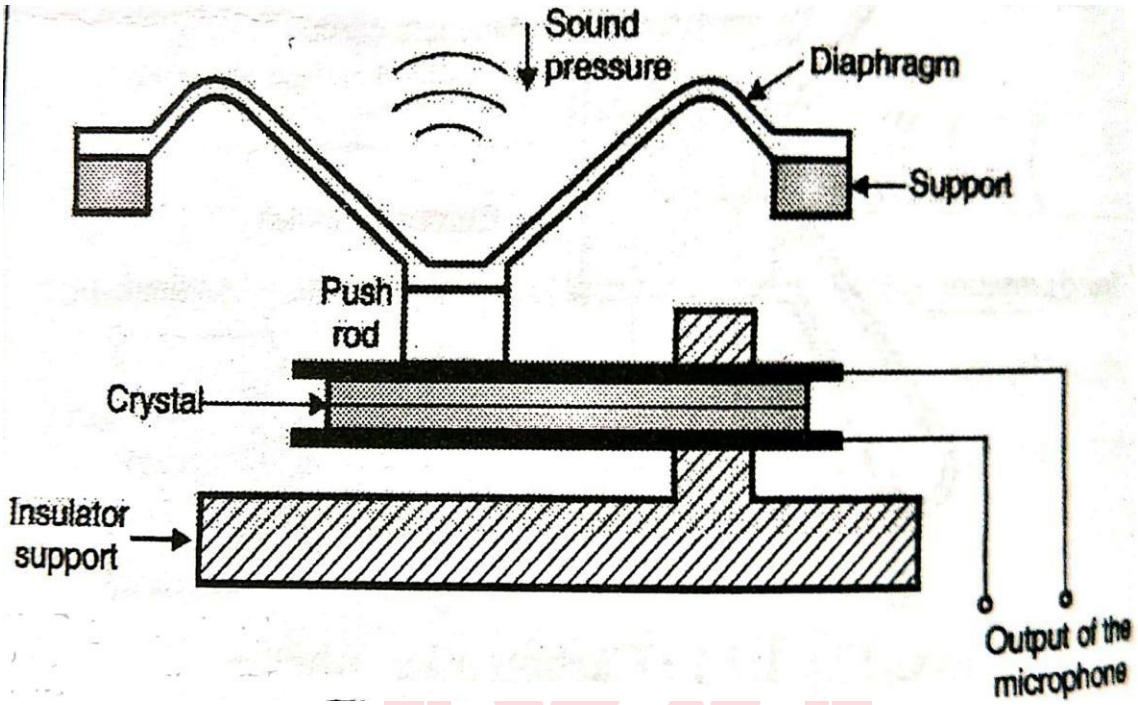
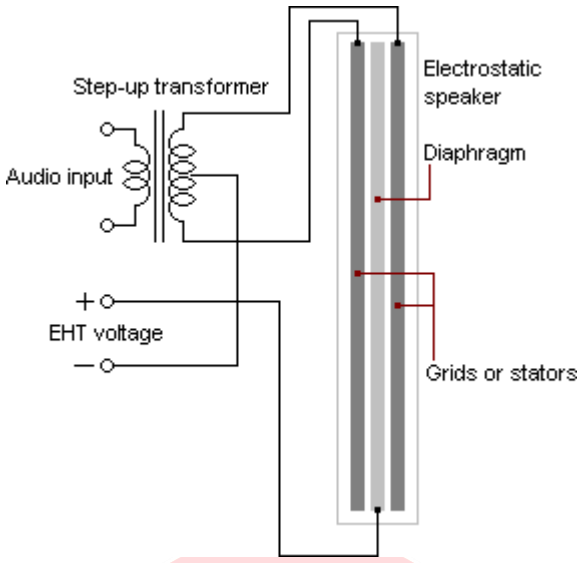


Fig:- Crystal type microphone.

Working:-The crystal microphone works on the principle of piezo electric effect. When pressure is applied to any of these crystals electricity is generated, and if an electric charge is applied to a crystal, it changes shape (Piezoelectric effect).

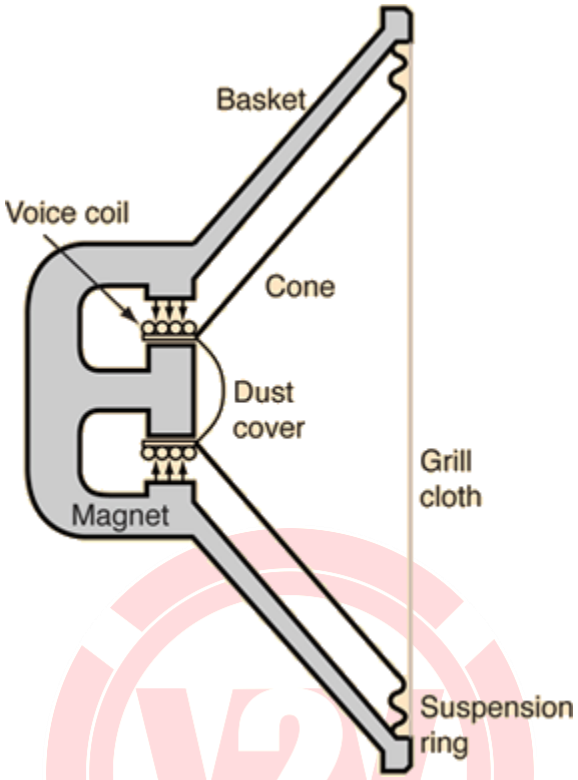
Fig. shows a crystal microphone .An aluminum diaphragm is connected to a crystal unit via push rod, so that the pressure exerted by sound waves on the diaphragm can be passed to crystal unit. Usually two crystal plates are connected ("Bimorph" element) which gives higher output voltage. The crystal unit is well supported by the insulating material rods. The whole unit is enclosed in a protective case. The pressure variations which are passed by the diaphragm to the crystal unit will generate an electric potential which is proportional to applied pressure.

5.Explain the working principle of Electrostatic and permanent magnet speaker. 4M
Ans:
Electrostatic speaker.



The voltage is applied to the central or movable plate, the signal voltage is applied to the two outside plates causes these plates to attract or repel each other. The amount of attraction or repulsion depends on the applied voltage. If one of the plates is flexible metal, it will bend. But the amount of attraction and repulsion is not directly proportional to the applied voltage.

Permanent magnet speaker.



A light voice coil is mounted so that it can move freely inside the magnetic field of a strong permanent magnet. The speaker cone is attached to the voice coil and attached with a flexible mounting to the outer ring of the speaker support. Because there is a definite "home" or equilibrium position for the speaker cone and there is elasticity of the mounting structure, there is inevitably a free cone resonant frequency like that of a mass on a spring.

The frequency can be determined by adjusting the mass and stiffness of the cone and voice coil, and it can be damped and broadened by the nature of the construction, but that natural mechanical frequency of vibration is always there and enhances the frequencies in the frequency range near resonance. Part of the role of a good enclosure is to minimize the impact of this resonant frequency.

6.Compare Woofer and Tweeter.(Any four points) 4M

Ans:

Sr. No	Parameter	Woofer	Tweeter
1	Defination	Produce low frequency audio sound	Produce High frequency audio sound

2	Size	Large	Small
3	Weight	Heavy	Light
4	Frequency Range	16 Hz to 1 KHZ	5Khz to 20 KHz

7.List different types of microphones also List types of loudspeakers.4M
Ans:
Types of Microphones :

1. Carbon
2. Condenser
3. Crystal
4. Electrets
5. Tie clip

Types of Loudspeakers :

1. Electrostatic
2. Dynamic
3. Permanent magnet

UNIT-2 (12 M)

8. Explain impedance matching of PA system. 2M
Ans:
Impedance Matching of PA system:-

(i) It is necessary to match the total loudspeaker impedance with the output impedance of the power amplifier. It will ensure maximum power transfer to the loudspeakers.
(ii)If the output impedance of the output stage of PA system is not matched with total impedance of speaker unit, then it can cause excessive power dissipation, distortion and noise.

9. Draw block diagram of Hi Fi amplifier. 2M
Ans:

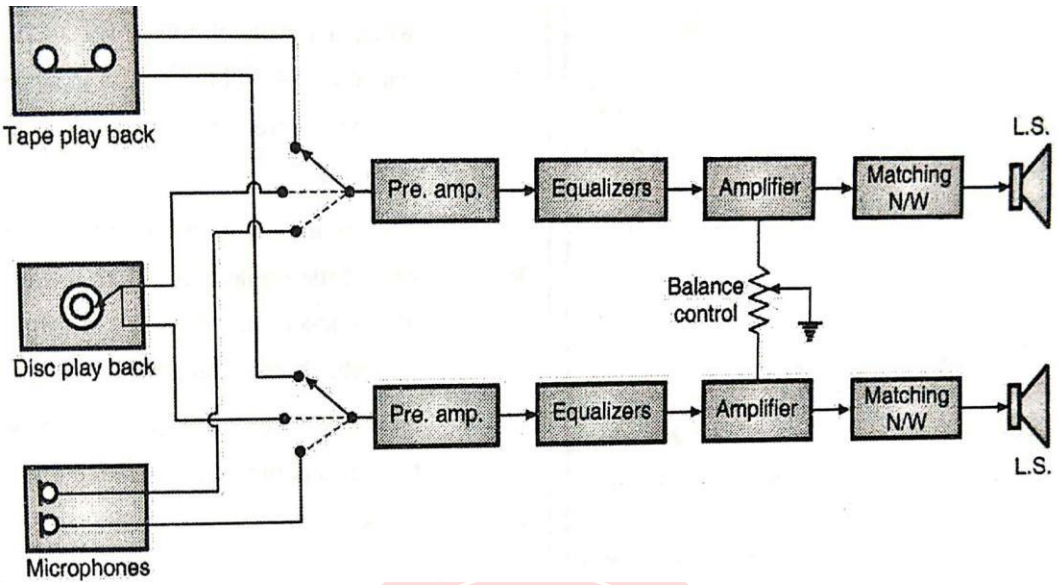
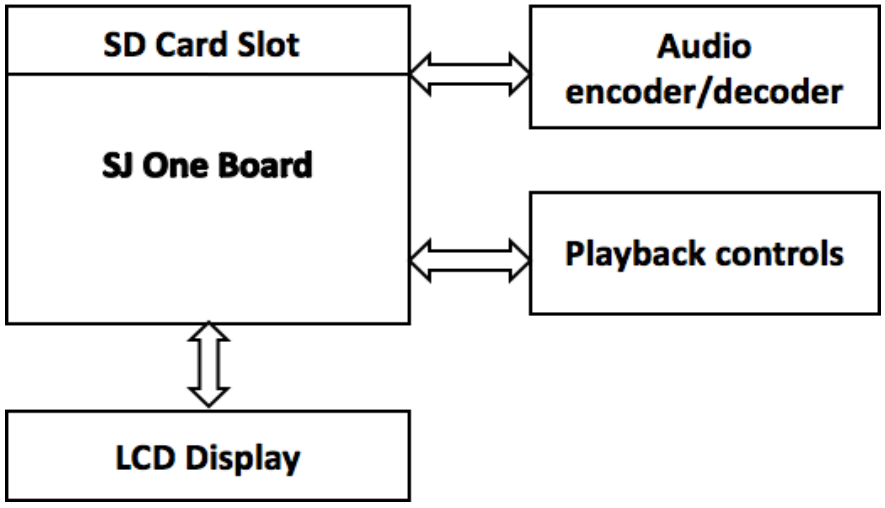


Fig:- Block diagram of Hi-Fi Amplifier

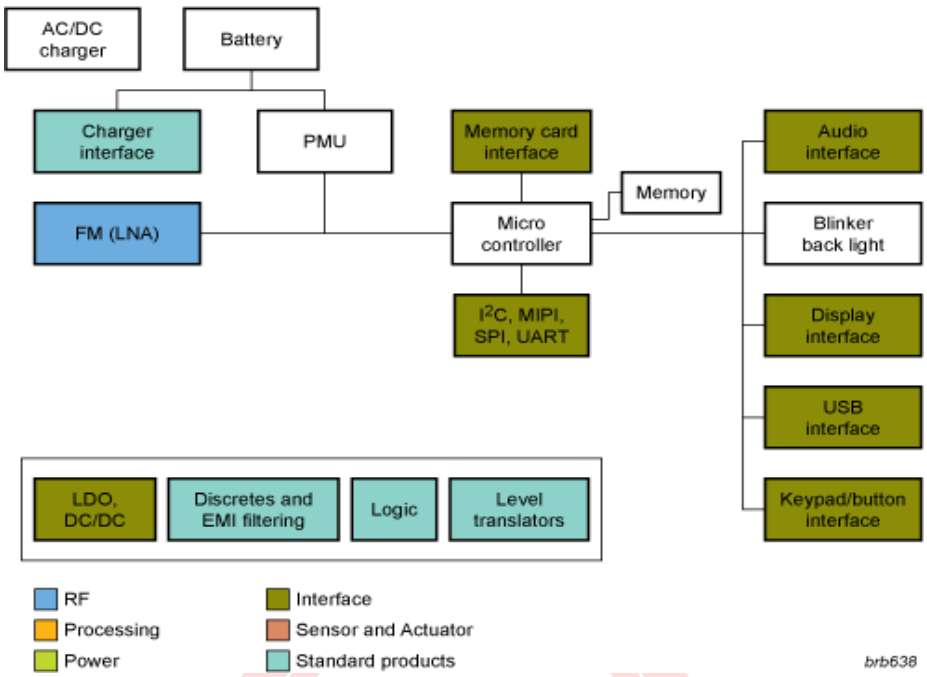
10. Draw and explain the working of MP3 player. 4M

Ans: **Block diagram: (Consider any other relevant diagram)**

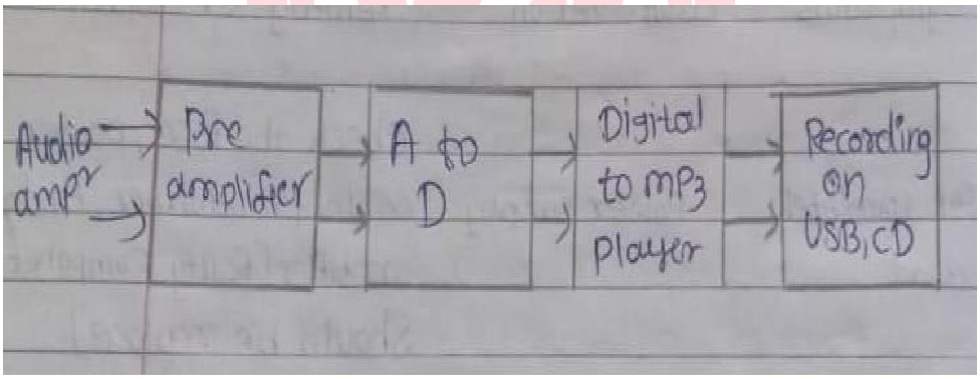
MP3 Player Block Diagram



OR



OR



Explanation:

1) Audio:

Our digital audio amplifier family is built to simplify audio architecture by lowering the system cost and enabling easy interfacing. Using a digital interface eliminates the need for a D/A converter in the host processor, and the PDM or I2S format guarantees an ultra small IC footprint.

2) Charger interface:

Whether your device is charged via the USB port or a separate charger, it is exposed to incorrect polarity or abnormally high voltages. Any of these two occurrences poses a threat to the charger

circuit and the PMU of the mobile device. In addition, the USB/charger port can be subject to ESD strikes and other transient discharges.

3) Memory Card Interface:

According the IEC61000-4-2 standard, SD host interfaces require additional high-level ESD protection, in addition to the integrated ESD protection which is typically very weak. Other strict EMI regulations and system requirements, as specified in GSM mobile phones, strongly request filters that reduce the radiated/conducted EMI. However, they must still comply with the electrical requirements of the interface specification.

11. State any four characteristics of Hi-Fi amplifier system. 4M

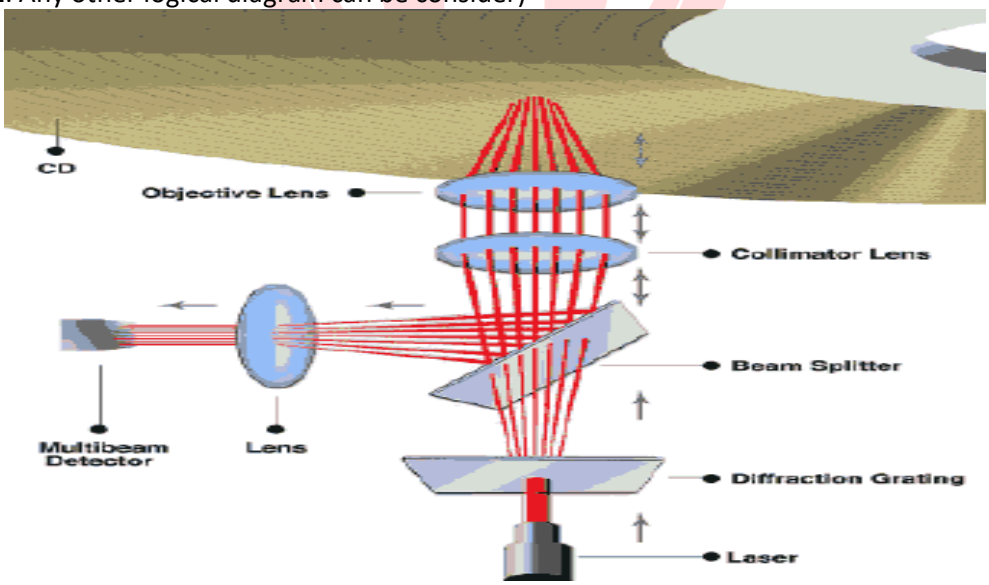
Ans: (NOTE: any other relevant logical point mark should be given)

Characteristics of HI-FI amplifier:

1. Signal to noise ratio should be better than 50dB.
2. Frequency response should be flat within +-1dB.
3. Nonlinear distortion should not be more than 1%.
4. The system should possess dynamic range of at least 8dB.
5. Stereophonic effect should be provided.
6. Environmental conditions should be such as to eliminate the external noise in listening room.

12. Describe the working of pick-up assembly of CD player with the help of neat sketch. 6M

Ans: (NOTE: Any other logical diagram can be consider)



Explanation:

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.
- Optical arrangement in a single-beam radial tracking pick-up assembly :
- In the optical pickup unit, the laser diode emits laser beam from a small point into an elliptical or conical distribution. This beam is passed through various prism and lens to form a very small diameter light beam on the disc surface at the ce77nter of the track.
- The objective lens is controlled by the tracking and focusing coil to keep the beam focused on the CD and to keep the condensed beam at the center of the track.
- This laser beam is reflected back by the flat area and the pits on the disc surface. This reflected beam is applied to a group of photodiodes through objectives lens, collamination lens and some prism arrangement.

13. Explain the working of CD player with block diagram. 4M
Ans: (for any other relevant diagram mark should given)

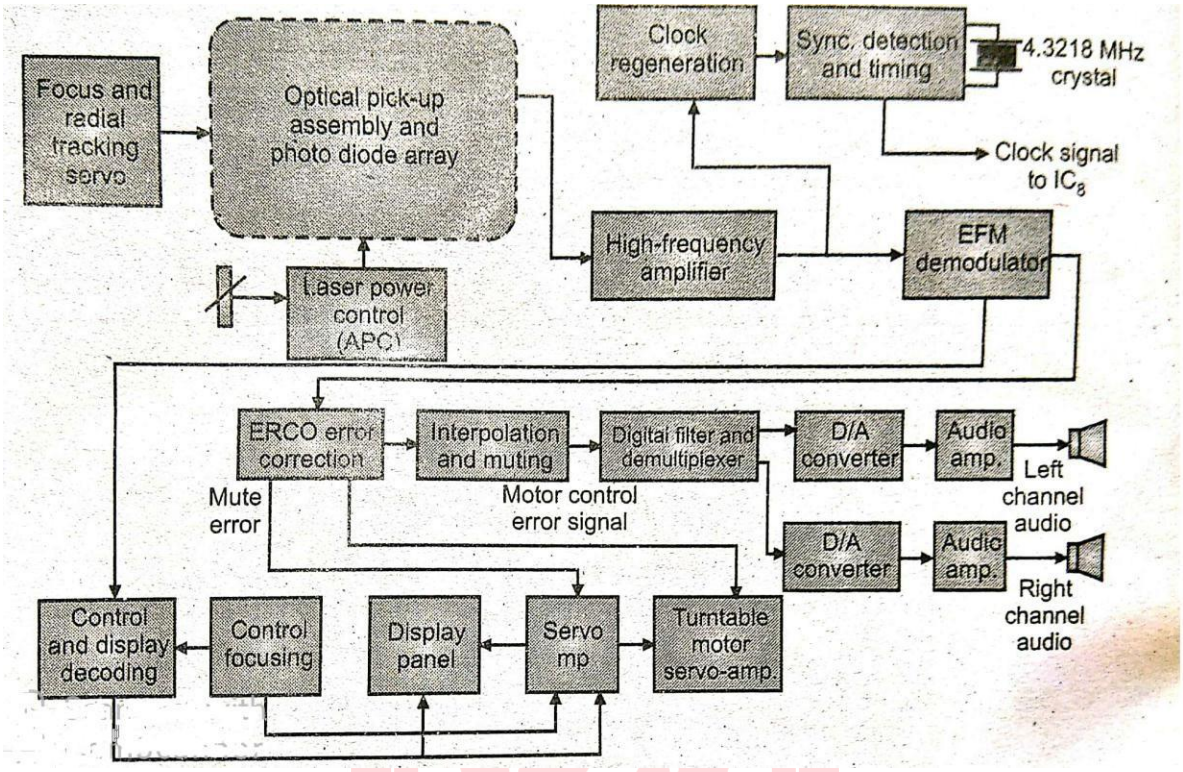


Fig: Block diagram of CD Player

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 modulation)format , this signal is sent to an EFM demodulator circuit.

EFM Demodulator: The EFM modulator separates the modulated data and the timing signal from the signal received at its input. It also removes the additional coupling bits and converts the 14-bit EFM symbol to actual 8-bit data. The amplified and filtered EFM signal from high frequency amplifier is also given to clock generation circuit to synchronize detecting and timing circuit. These circuits are used to recover the bit clock and sync pattern data .The timing separated by this system is used to provide timing signal to the system.

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. The ERCO circuit mainly used for the error correction & detection. The ERCO circuit will communicate with servo microprocessor to reduce the error generated during CD scanning.

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 . The interpolation and muting section uses the following methods to correct error found in data stream read from the disc.

CLV using the Clock Signal: The ERCO also responsible for maintaining constant linear velocity of CD rotation motor , For this , The ERCO 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.

Oversampling: During digital filtering oversampling method is used to remove both problems of aliasing noise and quantization error .

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.

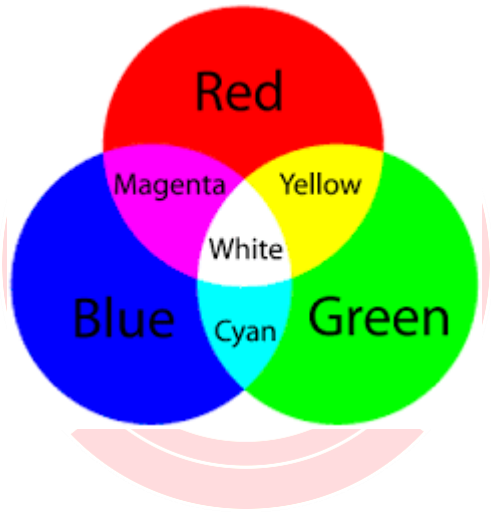
Stereo Amplifier: The analog output from converter is passed through a sample & hold circuit & a LPF circuit to obtain a smooth noise free output at the speakers. These signals are next fed to a stereo audio amplifier to raise left & right audio channel signal.

UNIT-3 (16 M)

14. State Grassman's law. Draw the sketch of additive mixing. 4M

Ans: Grassman's law

- The eye is not able to distinguish each of the colours that mix to form a new colour but instead perceives only the resultant colour.
- The subjective impression which is gained when green, blue and red lights reach the eye simultaneously may be matched by a single light source having the same colour.
- In addition to this, the brightness (luminance) impression created by the combined light source is numerically equal to the sum of the brightness (luminance) of the three primaries that constitute the single light.
- This property of the eye of producing a response which depends on the algebraic sum of the red, green and blue inputs is known as Grassman's Law.
- White has been seen to be reproduced by adding red, green and blue lights. The intensity of each colour may be varied. This enables simple rules of addition and subtraction.



15. State any four CCIR-B standard for colour signal transmission and four CCIRB standards for reception in TV. 4M

Ans:

Reception	
Camera output	R, G, and B video signals
Luminance signals	Y=0.30R+0.59G +0.11B
Colour difference signals chosen for transmission	(B-Y) and(R-Y)

Type of colour signal modulation	Suppressed carrier amplitude modulation Of two subcarriers in quadrature having same numerical value.
Colour difference signals	U=0.493(B-Y) V=0.877(R-Y)
Composite colour signal	Y+U sin ωm t+-Vcosωmt
Amplitude of modulated Chroma signal	u2+v2
Colour subcarrier frequency	4.433185 MHz
Duration of burst	10+1
Chroma encoding	Phase and amplitude modulation
Bandwidth for colour signals (u and v)	Fsc-1.3 MHz to fsc+0.6 MHz
Transmission	
No. of lines per picture (frame)	625
Field frequency (Fields/second)	50
Interlace ratio, i.e., No. of fields/picture	2/1
Picture (frame) frequency, i.e.,Pictures/second	25
Line frequency and tolerance in lines/second,(when operated non-synchronously)	15625 ± 0.1%
Aspect Ratio (width/height)	4/3

Scanning sequence	(i) Line: Left to right (ii) Field: Top to bottom
System capable of operating independently of power supply frequency	YES
Approximate gamma of picture signal	0.5
Nominal video bandwidth, i.e., highest video modulating frequency (MHz)	5
Nominal Radio frequency bandwidth, i.e., channel bandwidth (MHz)	7
Sound carrier relative to vision carrier (MHz)	+5.5
Sound carrier relative to nearest edge of channel (MHz)	– 0.25
Nearest edge of channel relative to picture carrier (MHz)	–1.25
Fully radiated sideband	Upper
Nominal width of main sideband (upper) (MHz)	5
Width of end-slope of full (Main) sideband (MHz)	0.5
Nominal width of vestigial sideband	0.75 MHz
Vestigial (attenuated) sideband	Lower
Peak white level as a percentage of peak carrier	10 to 12.5
Type of sound modulation	FM, ± 50 KHz
Pre-emphasis	50 µs
Resolution	400 max

16. Explain VSB transmission. State it's any four advantages. 4M

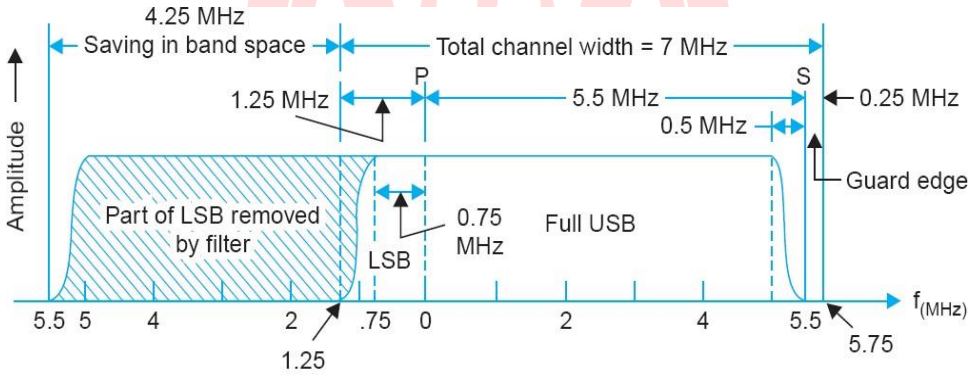
Ans: (Note: diagram is not mandatory, however marks can be credited for correct diagram.)

- VSB AM is used to transmit the video information in TV transmission.

- AM has carrier frequency with two sidebands.
- Since both sidebands contain the same information only one side band is transmitted with suppressed carrier which save the power and reduce the bandwidth.
- Filter design is become easy.
- Number of channel are increase.

OR

- The low video frequencies contain the most important information of the picture and any effort to completely suppress the LSB would result in phase distortion at these frequencies. This distortion will be seen by the eye as "smear" in reproduced picture.
- Therefore as a compromise, only a part of the lower sideband, is suppresses, and the radiated signal then consists of a full upper side band and a carrier signal and vestige (remaining part) of the partially suppresses lower sideband.
- This pattern of transmission of the modulated signal is known as Vestigial Sideband transmission.(VSB).
- In 625 line system, frequencies up to 0.75MHz in the lower sideband are dully radiated.
- Because of filter design difficulties it is not possible to terminate the B.W. of a signal abruptly at edges of the sidebands. As shown in figure saving of band space which results from vestigial sideband transmission. The picture signal is seen to occupy a bandwidth of 6.75MHz instead of 11MHz.



Total channel bandwidth using vestigial lower sideband.

Figure: VSB

Merits of VSB: (Any 4)

- Bandwidth is reduced so that more number of channels can be accommodated in a given frequency spectrum.
- Power saving of 50% is possible.
- Filter design becomes practicable.
- More efficient.
- Noise reduction.

17. Describe why equalizing pulses are needed. Draw the vertical synchronizing pulse structure. 6M

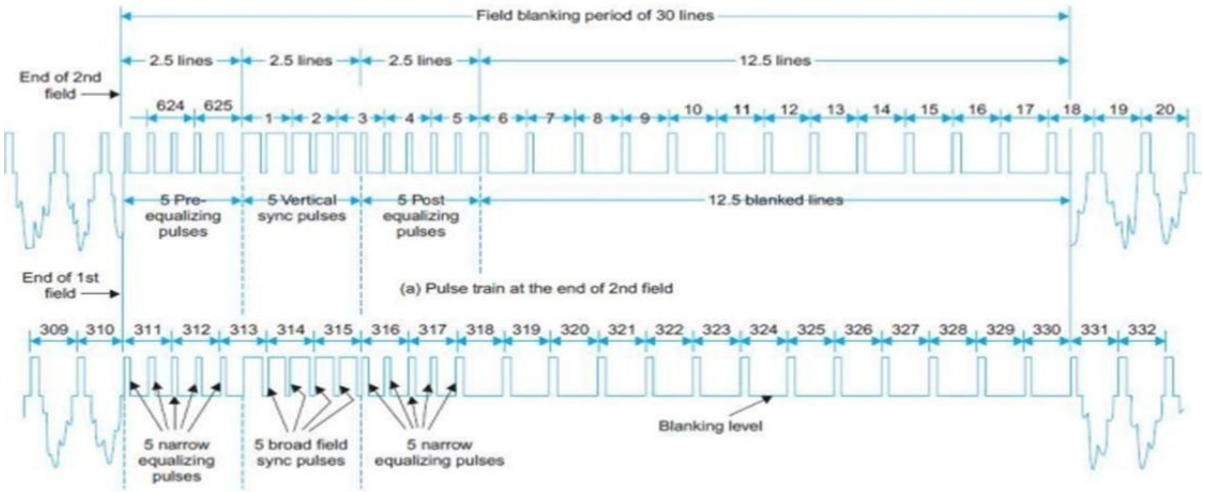
Ans: Description:

- To take care of the drawback which occurs on account of the half line discrepancy, five narrow pulses are added on either side of vertical sync pulses. These are known as pre equalizing and post-equalizing pulses.
- The effect of these pulses is to shift the half line discrepancy away both from the beginning and end of vertical sync pulses.
- Post equalizing pulses are necessary for fast discharge of the capacitor to ensure triggering of the vertical oscillator at proper time.

OR

- The ½ line difference just prior to the start of serrated vertical pulse does not affect the horizontal deflection synchronization but it does affect the vertical synchronization and the interlaced scanning. The effect of uneven line period can be reduced by increasing the interval between the preceding line pulse and the field sync pulses.
- To ensure that the vertical deflection oscillator receives the necessary triggering voltage at the same time after every field, a series of five narrow pulses 2.3 µs each, occurring at half line rhythm, are inserted before the field sync pulse.
- These are called pre equalizing pulses. The width of equalizing pulse is normally half the width of horizontal sync pulses, roughly half of 4.7 µs or (2.3 µs).
- The equalizing pulses inserted after the vertical synchronizing pulses are post equalizing pulses. These equalizing pulses do not disturb the operation of either oscillator, yet they permit the vertical sync pulse to occur at the correct time after every field.

Diagram:



18. Describe vertical and horizontal resolution in brief. 6M

Ans:

Resolution: The scanning and reproduction of the finest details of the picture is known as resolution of TV system.

Vertical Resolution:

The ability of the scanning system to resolve picture details in vertical direction is known as vertical resolution:

1. Vertical resolution is a function of scanning lines into which the picture is divided in the vertical plane.
2. The maximum number of dark and white elements which can be resolved by the human eye in the vertical direction in a screen of height H decided by the number of horizontal lines into which picture is split while scanning.
3. Thus ,vertical resolution can be expressed as, Vr = Na*K

Vr = Vertical resolution

Na = Active number of lines K- kell factor or resolution factor

Horizontal Resolution:

The ability of the scanning system to resolve the picture details in the horizontal direction is known as horizontal resolution.

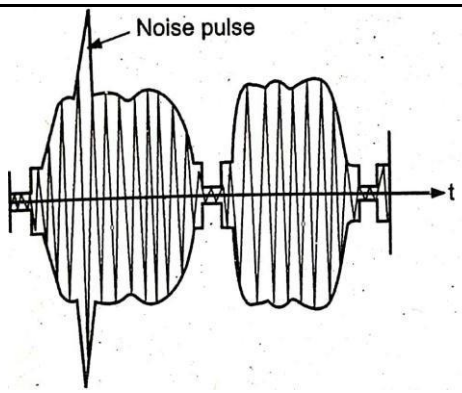
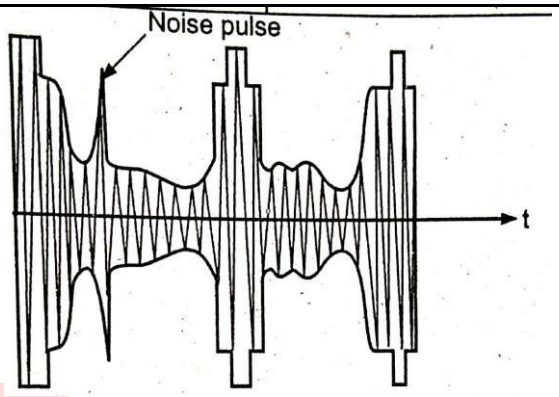
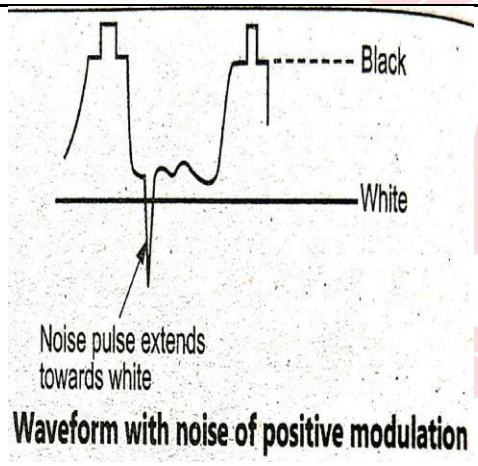
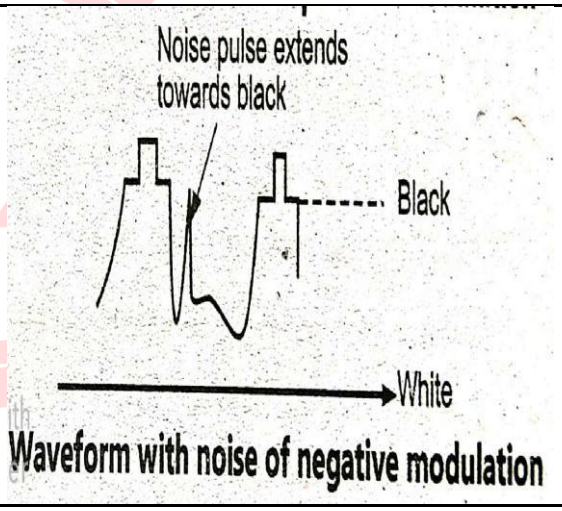
1. While aiming at equal vertical and horizontal resolutions and assuming the same Kell factors the effective number of alternate black and white segments (N) that get scanned in one horizontal line are-

N = Na * Aspect Ratio *K

19. Differentiate between positive modulation and negative modulation. 2M

Ans:

	Positive Modulation		Negative Modulation
1.	When increase in brightness of that picture results in an increase of the amplitud of modulated envelope.it is called positive modulation.	1.	When increase in brightness reduces amplitude of the modulated envelope, it is called negative modulation.
2.	White level of video signal corresponds to 100% total magnitude.	2.	White level of video signal correspondence to 12.5% of the total amplitude.
3.	Noise pulses do not affect synchronization but cause white spot in the picture	3.	Noise pulses are seen as less annoying black spot.
4.	More power is required with less efficiency	4.	If peak power available from transmitter is considered them less power is required for more efficiency.

5.	Black level of video signal correspondence to 25% of total magnitude.	5.	Blanking level starts at 75%
6.	 Waveform of positive modulation	6.	 Waveform of Negative modulation
7.	 Waveform with noise of positive modulation	7.	 Waveform with noise of negative modulation

20. Define following with respect to television:
(i) Aspect ratio
(ii) Vertical & Horizontal Resolution
(iii) Interlace scanning
(iv) Image continuity
Ans:

(i) Aspect ratio: The aspect ratio of an image describes the proportional relationship between its width and its height. The frame adopted in all television systems is rectangular with width/height ratio, i.e., aspect ratio = 4/3.

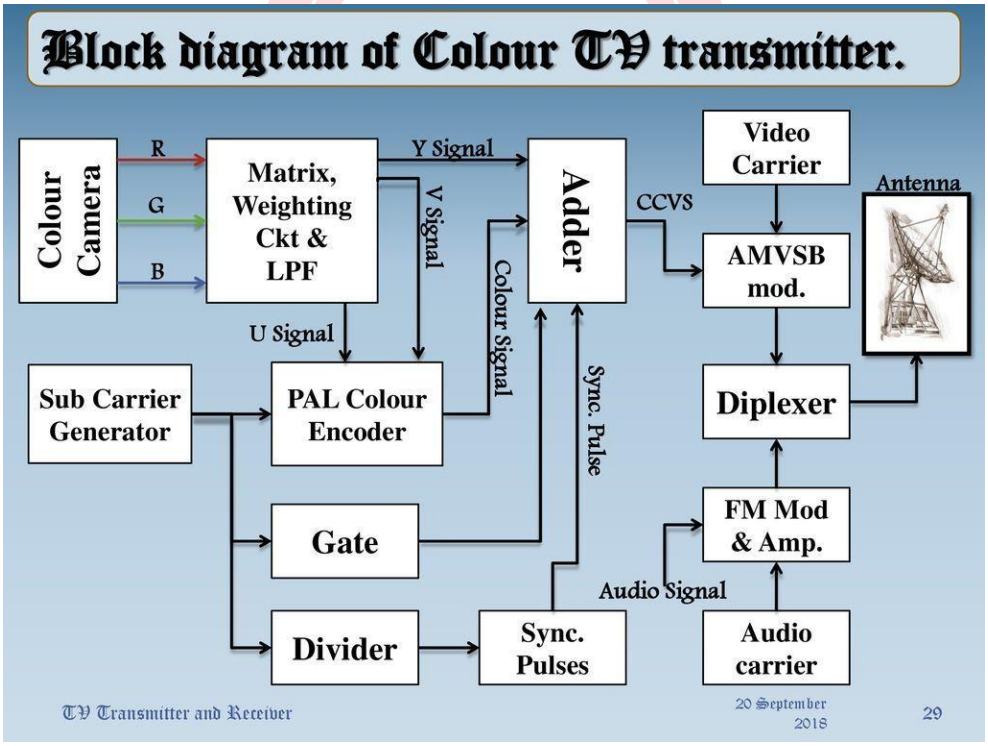
(ii) Vertical & Horizontal Resolution: The ability of the scanning system to resolve picture details in vertical direction is known as vertical resolution. The ability of the scanning system to resolve the picture details in the horizontal direction is known as horizontal resolution.

(iii) Interlace scanning: The total numbers of lines are divided into two groups called 'fields'. Each field is scanned alternately. This method of scanning is called 'interlaced scanning'.

(iv) Image continuity: As per the persistence of vision, if the scanning rate per second is made greater than sixteen, or the number of pictures shown per second is more than sixteen, the eye is able to integrate(mix) the changing levels of brightness in the scene. This is called as Image Continuity.

21. Draw and explain the block diagram of colour TV transmitter. 6M

Ans:



A PAL colour TV transmitter consists of following three main sections.

1. Production of Luminance (Y) and Chrominance (U and V) signals
2. PAL encoder
3. Video and Audio modulators and transmitting antenna

Production of Luminance (Y) and Chrominance (U and V) signals:

- Colour camera tube produces R, G and B voltages pertaining to the intensity of red, green and blue colours respectively in pixels. The luminance signal Y is obtained by a resistive matrix, using grassman's law. Y=0.3R+0.59G+0.11B.
- For colour section Y is inverted colours R&B obtained from the colour camera tubes are added to it to get (R-Y) and (B-Y) colour difference signal. These signals are weighted by two resistive matrix network which gives U & V signals as U=0.493 (B-Y) & V=0.877(R-Y)

PAL encoder:

- PAL switch which operates electronically at 7812.5Hz with the help of bistable multivibrator and feeds the sub-carrier to balanced modulator with phase difference of +90 degree on one line and -90 degree on the next line.
- The PAL encoder consists of a subcarrier generator and two balanced modulator with filters to produce modulated subcarrier signal. These signals are added vertically to give Chroma signal (C). Then Chroma signal is mixed with Y signal along with sync. And blanking pulses to produce Colour Composite Video Signal (CCVS).

Video and Audio modulators and transmitting antenna:

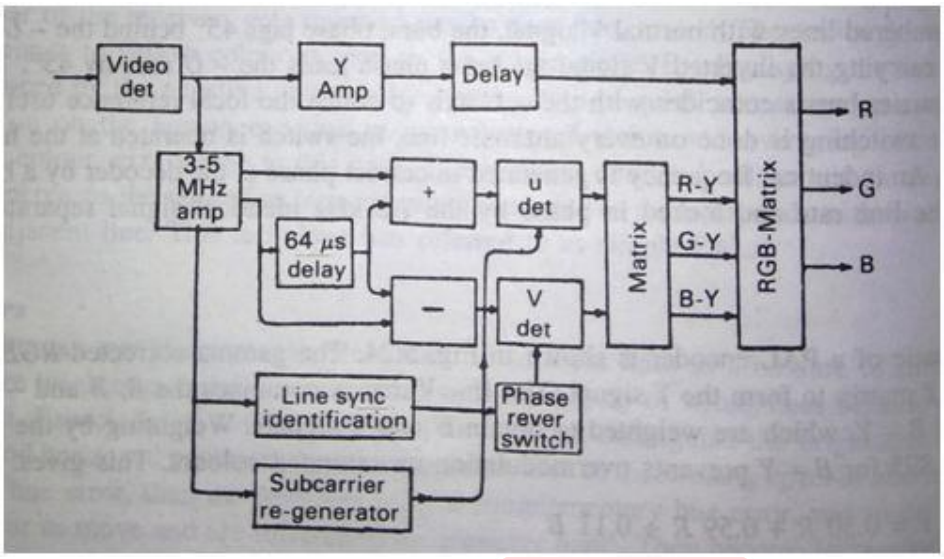
- CCVS amplitude modulates the main video carrier. It is followed by a sharp VSB filter to attenuate the LSB to give AMVSB signal for transmitter. Audio signal modulates separate carrier. This modulation is FM type.
- AMVSB video signal along with audio signal passes to the transmitting antenna through Diplexer Bridge which is a wheatstone's bridge.

UNIT-4 (14 M)

22. Draw the block diagram of PAL-D decoder and write function of each block. 4M

Ans: Diagram:

(NOTE: any other relevent diagram can be consider like croma amplifier with u v amplifier and with RGB amplifier included then mark will be given)



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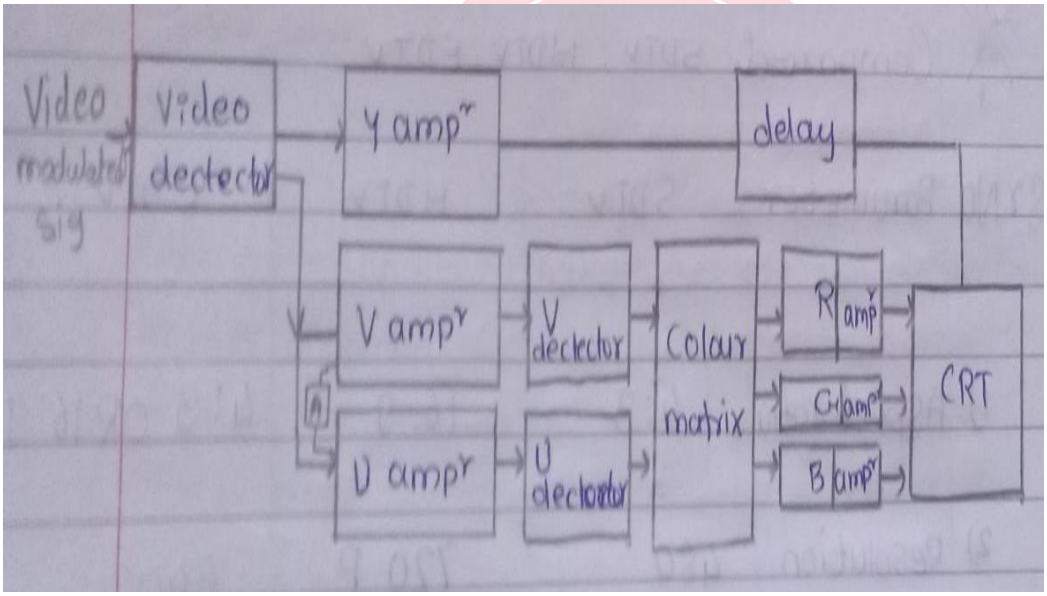
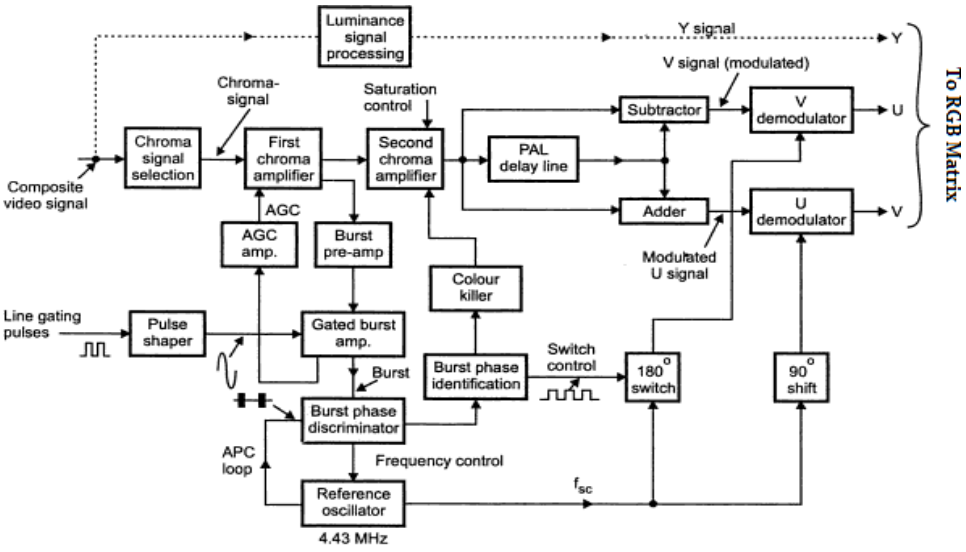


- In the block diagram there are 64us delay line, a switch operated by colour burst signal,add and subtract network and RGB matrix
- Separate U and V obtained then mixed with Y signal through delay line
- Matrix output will separated R, G, and B depend on voltage level content in video signalwhich will further connected to RGB amplifier.
- Weighted factor U=B-Y and V=R-Y
- Switch will reverse subcarrier signal with phaseY signal has Bandwidth of 5Mhz

OR



Block diagram of PAL-D decoder

Explanation:

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 colourphasors):

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 ofthe 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.

23. Describe Troubleshooting procedure of colour TV receiver system. 4M

Ans:

(Note: any other relevant procedure can be considered.)

1. Check the complete TV for any physical damage before connecting to mains.
2. Observe Mains connection chord for damage and continuity.
3. Clean TV set with DRY nylon brush.
4. Check out any dead animal like lizard, cockroach, Rat etc.
5. Identify symptoms of faults.
6. Identify the probable faulty area by symptom in given TV receiver
7. Examine the physical faults in the section (Wire/ track open or Component broken)
8. Check condition of fuse.

9. Observe resistance of each active component on section.
10. Turn on the TV and measure the voltage or current across the component
11. Compare the reading with actual value
12. Find the faulty component.
13. De-solder the component
14. Replace the old component with new component

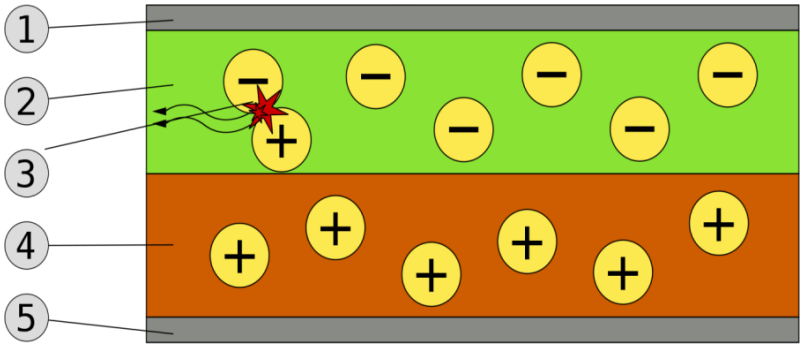
OR

1. Observe given equipment vigorously
2. Clean the equipment.
3. Check the mains chord for wear and tear.
4. Check the external knob for wear and tear.
5. Open the set check for burning smell.
6. Check for live insect, lizard, cockroach
7. Check inside wiring and damage component,
8. Clean the set from inside
9. Identify fault area.
10. Do the dry test using multimeter like fuse for open or resistor on so on.
11. Measure corresponding voltage.

Replace faulty component.

24. Explain OLED TV with neat labeled diagram. 6M

Ans:

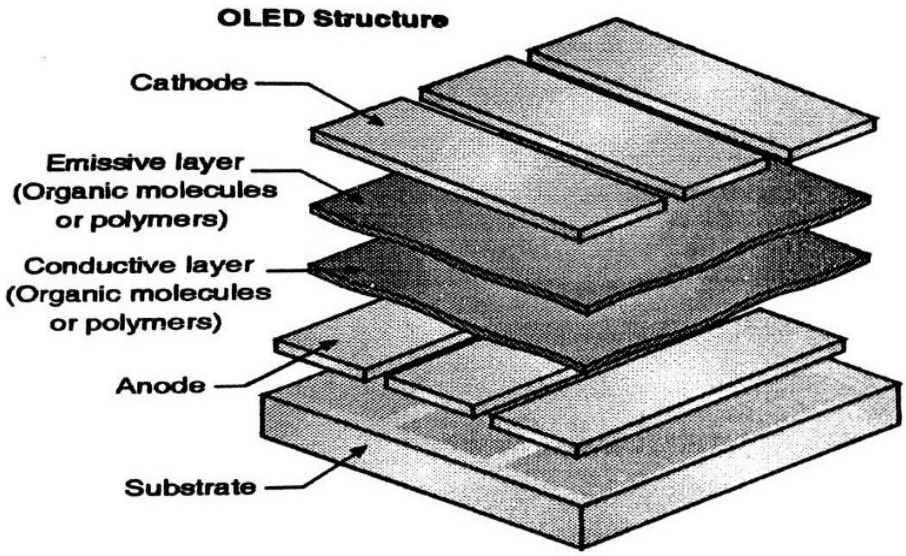


1. Cathode (−),
2. Emissive Layer,
3. Emission of radiation,

4. Conductive Layer,
5. Anode (+)

- An organic light-emitting diode (OLED) is a light-emitting diode (LED) in which the emissive electroluminescent layer is a film of organic compound that emits light in response to an electric current.
- This organic layer is situated between two electrodes; typically, at least one of these electrodes is transparent. OLEDs are used to create digital displays in devices such as television.

OR



Construction:
As shown in Fig. any type of OLED is made ofthe
following components
1. An emissive layer.
2. A conducting layer.
3. A substrate.
4. Anode and cathode terminals.

- The emissive layer and the conducting layer both are made up of organic molecules ofdifferent materials.
- These molecules has a property of conducting electricity and their conduction level can be varied substantially.

- The emissive layer is made up of organic plastic material (typically polyfluorene)
- The conducting layer is also made up of organic molecules (typically polyaniline)
- The substrate is made of plastic, foil or glass.The material used for the anode is IndiumTin Oxide, because this material is transparent to visible light.
- The cathode component is made from metals like Calcium or Aluminium and the cathode also can be transparent.
- The purpose of using various component of OLED have been listed below:

Substrate:To support the OLED
Anode:To inject more holes
Conducting layer :To carry holes from the anode
Cathode:To produce electrons
Emissive layer:To produce light.

Operation:

- A positive voltage is applied to the anode with respect to cathode. Hence an electronproduced by the cathode flows to anode.
- This electron is captured by the emissive layer due to which the anode withdraws anelectron from the conductive layer. Thus a hole is created in the conductive layer.
- As this process continues, the conductive layer becomes positively charged (full ofholes) and the emissive layer is negatively charged (full of electrons)
- Due to electrostatic forces, these electrons and holes combine together very close to theemissive layer to produce light in the emissive region.
- This is a visible light, the colour of which depends on the type of organic molecules used. A colour display can be obtained by using a number of organic layers.

The intensity of an OLED display increases with increase in current.

25. Give the troubleshooting procedure of colour TV receiver system. 4M
Ans:

1. Check the complete TV for any physical damage before connecting to mains.
2. Observe Mains connection chord for damage and continuity.
3. Clean TV set with DRY nylon brush.
4. Check out any dead animal like lizard, cockroach, Rat etc.
5. Identify symptoms of faults.
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7. Examine the physical faults in the section (Wire/ track open or Component broken)
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OR

1. Observe given equipment vigorously
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3. Check the mains chord for wear and tear.
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5. Open the set check for burning smell.
6. Check for live insect, lizard, cockroach
7. Check inside wiring and damage component,
8. Clean the set from inside
9. Identify fault area.
10. Do the dry test using multimeter like fuse for open or resistor on so on.
11. Measure corresponding voltage.
12. Replace faulty component.

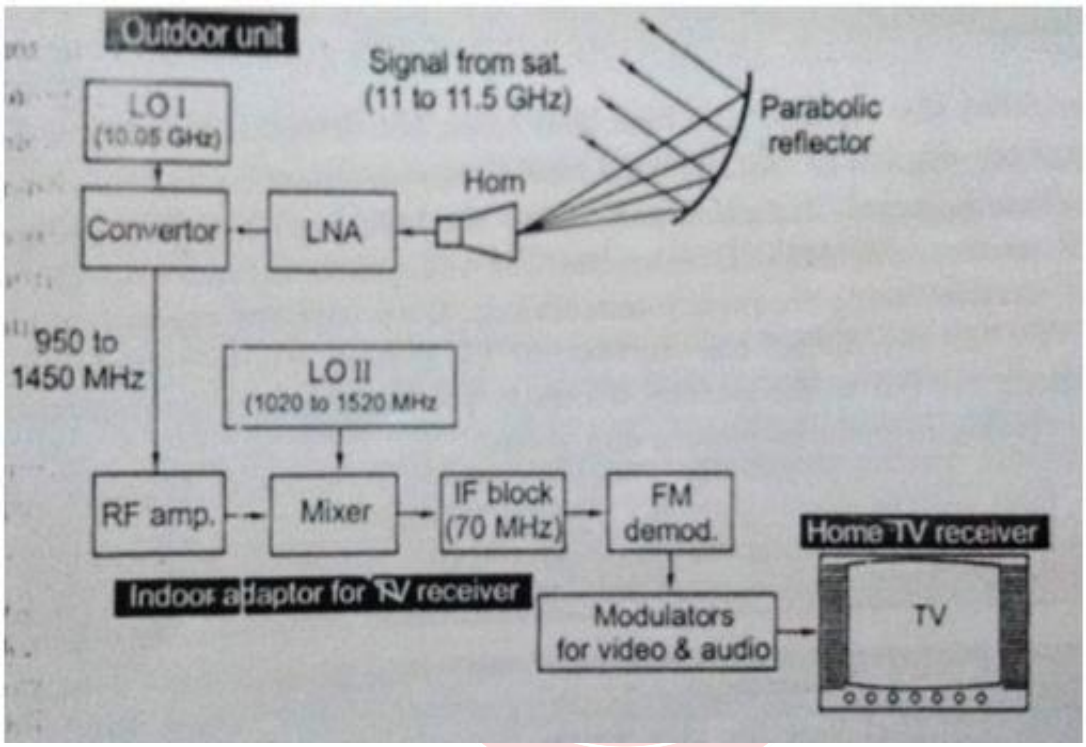
26. Differentiate between LCD and LED TV. 4M

Ans:

Parameter	LED	LCD
Full Form	light emitting diodes	liquid crystal display
Backlight	light emitting diodes	fluorescent lights
Backlight position	either behind the screen or around its edges	behind the screen
Size	Thinner then LCD	Thicker then
Efficiency	More Compare to LCD	Less Compare to LED

27. Explain the working of Direct to Home Receiver (DTH) with its indoor and outdoor unit. 6M

Ans: **Block diagram:**



Outdoor unit:

- It consists of a receiving antenna, low noise amplifier & converter the receiving antenna is parabolic reflector with a horn as the active element. The horn can be directly in front of reflector, or it may use an offset feed as shown in fig. The reflector diameter may be 0.6m for 11GHz & still smaller for K &Ka bands.
- The low noise block consists of a low noise wide band amplifier followed by a convertor. The output of convertor consists of a signal of UHF frequency ranging from 950-1450MHz.
- The advantage of using UHF frequency is that a low cost coaxial cable can be used as feeder from the outdoor unit to the indoor unit.
- LNB cannot be kept indoor because long cable between horn & the first amplifier will cause substantial degradation of the overall noise figure of the set.

Indoor unit:

- The wideband signal from the LNB is fed to an RF amplifier. The amplified signal is fed to a channel selector circuit which selects the wanted band.

- The selected channel is down converted to a fixed IF of 70MHz by local oscillator & mixer. IF amplifier amplifies the signal which then goes to FM detector.

- The detector recovers original baseband signal, consisting of CVS & audio signal. These modulated signals are fed to the normal domestic TV receiver, which after due processing reproduces picture & sound.

UNIT-5 (20 M)

28. Explain working of Digital camcorder. 4M

Ans:

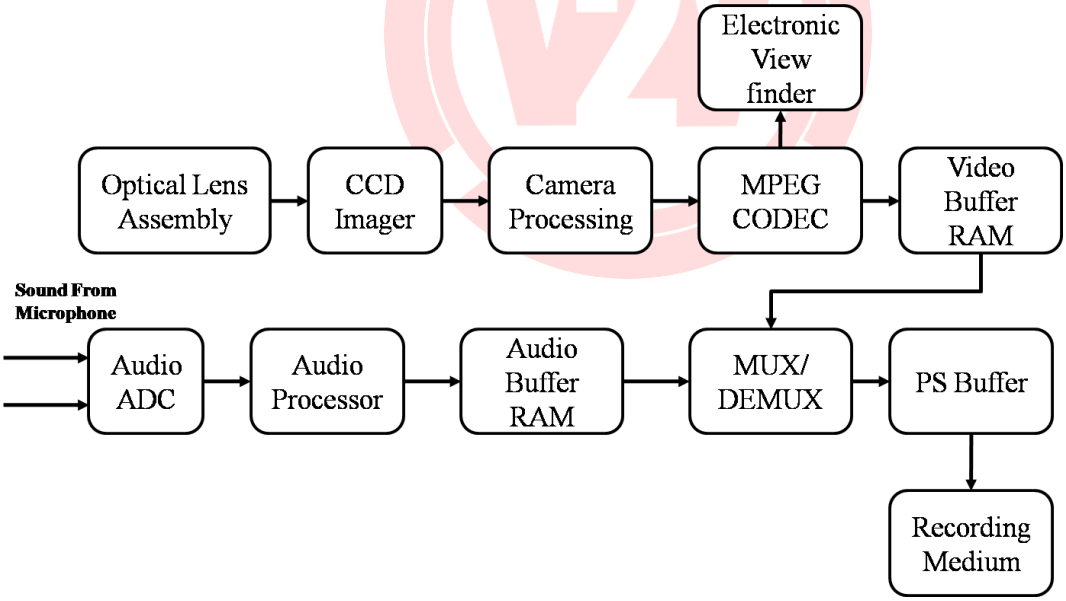


Fig: Block diagram of Camcorder

Explanation:

- Figure shows the functional block diagram of a digital camcorder system. Light from

the optical lens assembly projects an image onto the *charged coupled device* (*CCD*) imager. The CCD is a photosensitive array which is charged by the light falling on it.

- The charge is then converted into a continuous analogue voltage when the CCD charged elements are scanned line by line.
- After the scan is completed, the CCD elements are reset to start the exposure process for the next video frame. Embedded within the CCD is an analogue-to-digital converter to produce a digital output for further processing by the camera processing block ready for data compression by the MPEG codec.
- The camera processing chip carries out such functions as „*steady shot*", zoom and focus motor control and digital picture effects. The MPEG-coded data are fed into a video buffer.
- Digitised Y/C data are also fed into the *electronic viewfinder* (*EVF*) for monitoring by the user. Stereo sound from audio microphones are A/D converted and the PCM audio data placed into an audio buffer.
- The MUX/DEMUX receives the compressed video and PCM audio streams from the corresponding buffers, packetises and multiplexes them into a standard MPEG-2 program stream (PS) to be stored in a PS buffer.
- Data in the PS buffer are then used to write on the recording medium which could bea DVD disc, an HDD or a magnetic tape.
  In the playback mode, the process is reversed and this is the reason for using an MPEG codec chip instead of just a coder and MUX/DEMUX instead of just a MUX.In the playback mode, data from the recording medium are demultiplexed anddecompressed and fed into the EVF for display.

29. State four Electrical specifications with values for washing machine. 4M

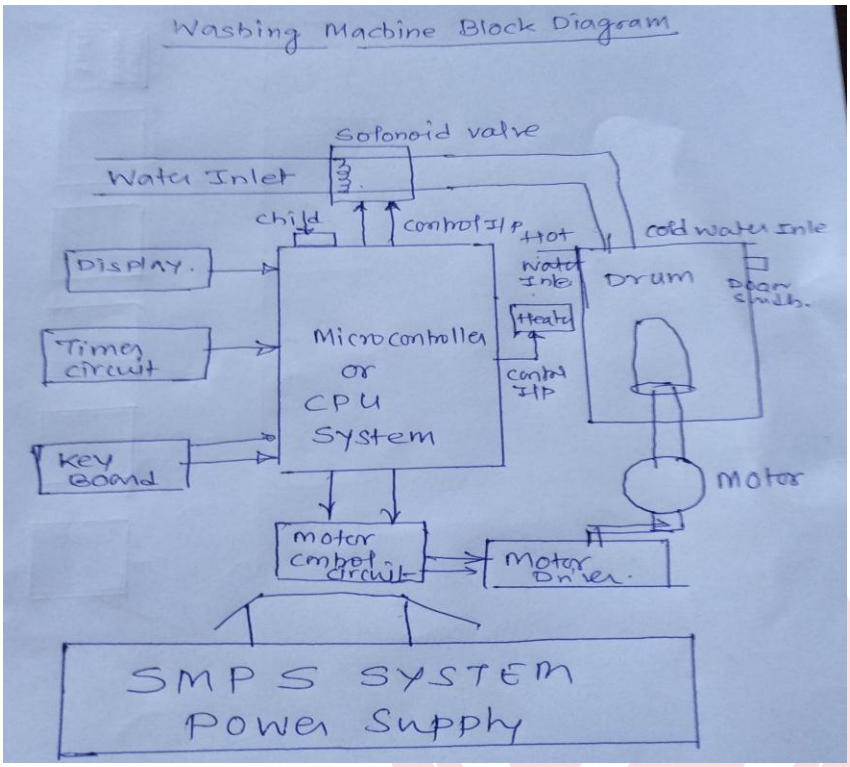
Ans:

(Note: any other relevant specifications can be considered)

1. Type: Top loading / Front loading type
2. Capacity range: 6kg to 15kg
3. Motor Used: Induction motor
4. Input voltage: 100V- 240V
5. Power: in 1200W / Output power 100–400W{can go upto 1000W)
6. Efficiency: Max efficiency 31%
7. Wattage: 2.100-2.400 W
8. Current: 13A
9. Frequency: 50hz

30. Draw block diagram of washing machine and state types of washing machine. 6M

Ans:



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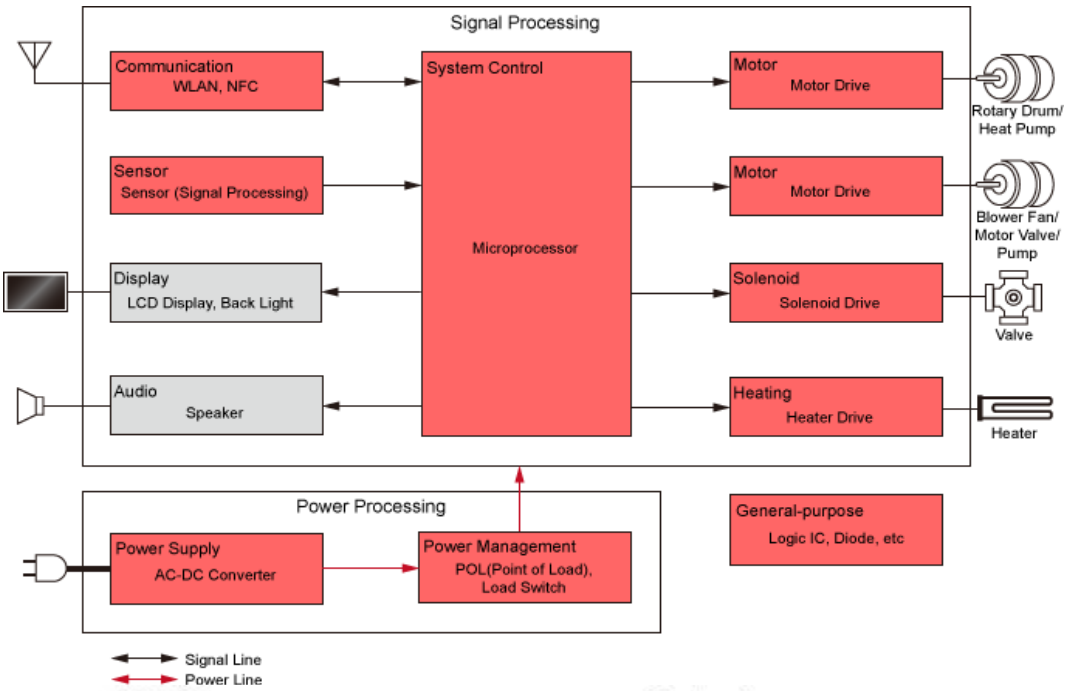
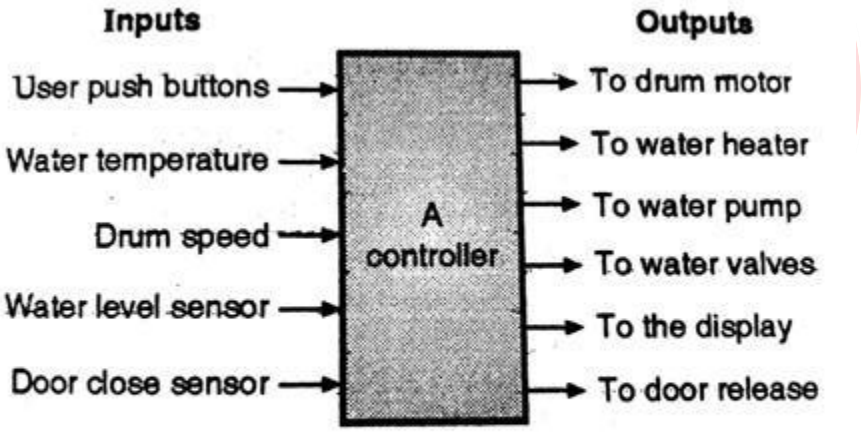
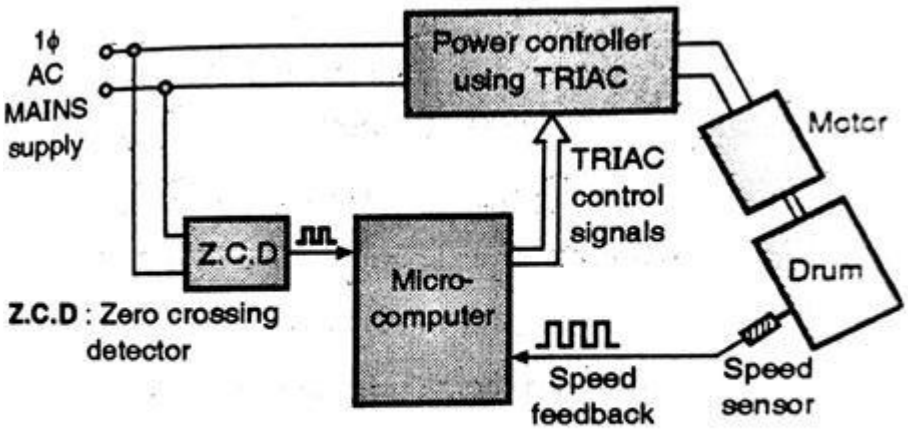




Basic block diagram of washing machine showing different inputs and outputs

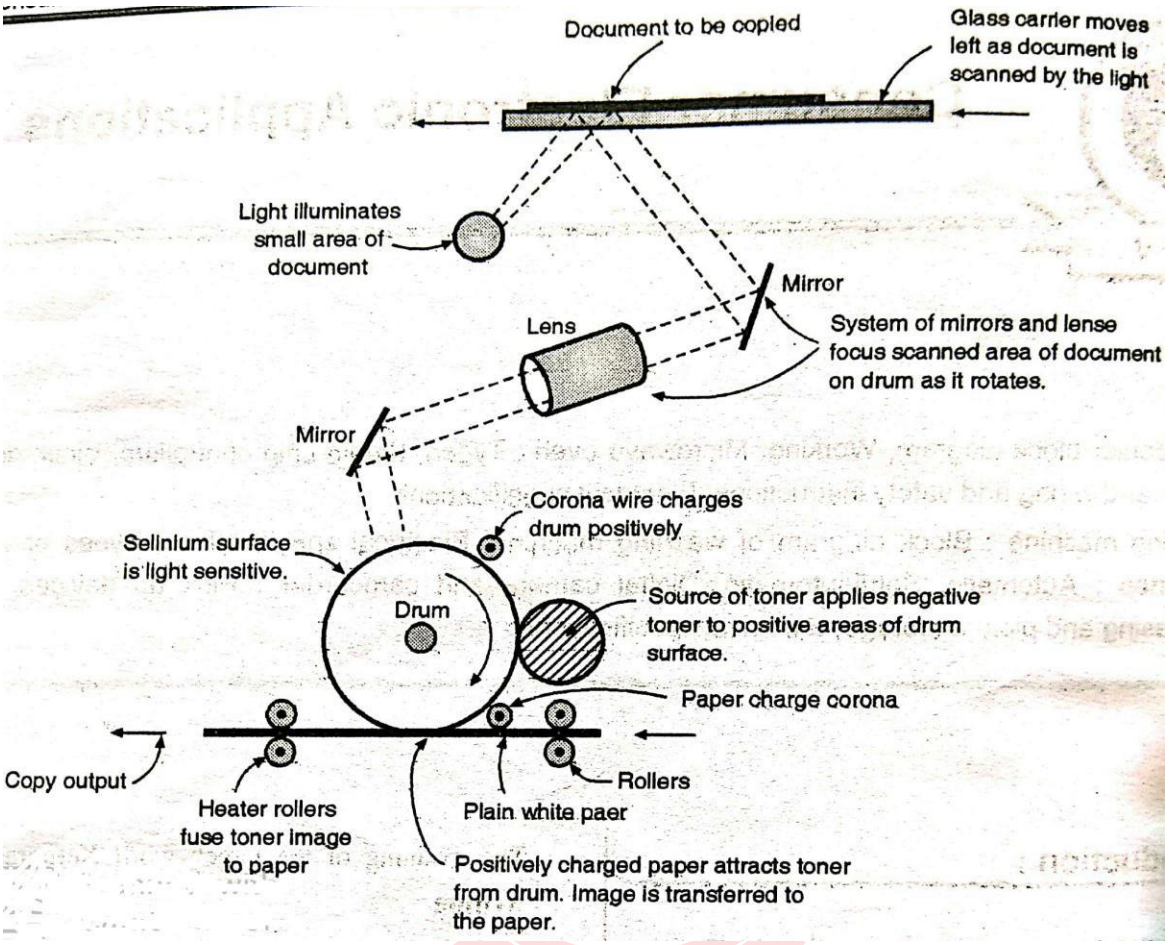


Speed control of drum

Types of Washing Machine:

i) Washers
ii) Semi-automatic
iii) Automatic

31. Draw the block diagram and explain the working of photocopier. 4M
Ans:



Working:- (i)A photocopy machine is an aluminium drum whose surface is coated with light sensitive material such as selenium.

(ii)A positive electric charge is given to drum by rotating it adjacent to fine wire (corona)which is spaced closely to the drum surface and connected to high voltage of 6kV to 7kV.

(iii)Due to high applied voltage air around corona is ionized which produces a positive electric charge and transferred to drum.

(iii) In this situation if drum is exposed to light, it becomes a good conductor to transfer positive charge to aluminium base of drum.

(iv) Once drum is positively charged, the page is scanned by optical lens and mirror and focus light reflected on drum where information is distributed.

(v) A toner which is powdered dry ink is applied to drum .Negative charge is given to toner. Due to force of attraction, the negative toner is picked up by positively charged portions of drum surface. Thus image to be copied is present on drum surface.

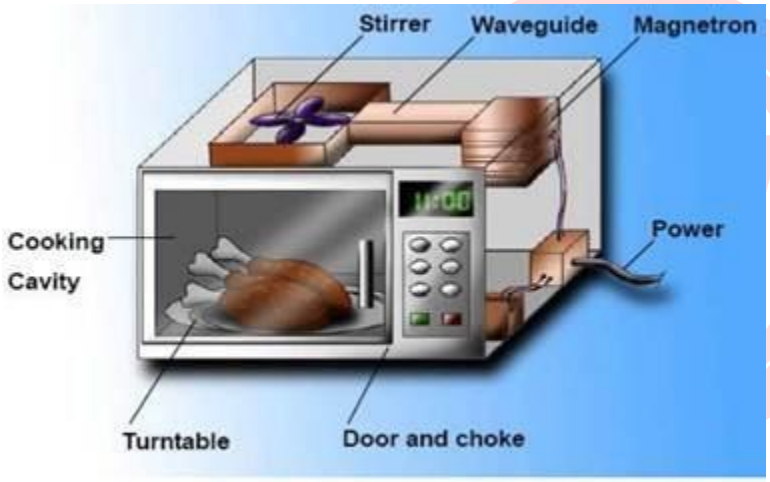
(vi) A positive charge is given to plain white paper in copier mechanism and then passes through heated rollers.

(vii) The toner ink melts due to heat and print the image on the paper.

(viii) Thus a very high quality copy of the original is produced by the photocopier machine.

32. Explain the working of microwave oven and give its four electrical specifications. 6M

Ans:



Working of Microwave oven

I. Microwave is used to cook the food. In it, microwaves, are passed through the molecules of the food.

ii. These microwaves are produced by a device called a magnetron within the microwave oven.

iii. All food items contain water. The frequency of microwaves, causes the water molecules to vibrate, as a result, this movement generates heat.

iv. When the temperature rises, the molecules of water travel or vibrate or rotate with higher energies. The frequency of rotation of water molecules is about 3 gigahertz (300 crore hertz).

v. If water receives microwaves of this frequency, its molecules absorb this radiation and water gets heated up. In this way the food gets heated up in a microwave oven.

Electrical specifications.

- Supply voltage: 220 volts,50 Hz. Single phase A.C.
- Power consumption: 1300 W approx.(power consumption vary as manufacturer
- from500W to 1500W)
- Microwave power: 700 w-850 W
- Microwave frequency: 2450 Mhz (1000Mhz to 3000Mhz)
- Timer: 60 min. – 90 min(timer can also varied)
- Control: Soft/one touch control