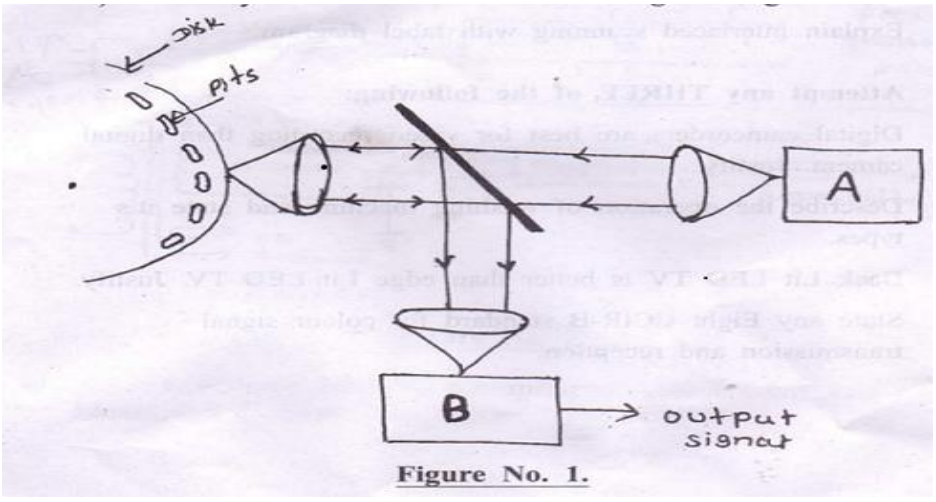
SUMMER – 2022 EXAMINATION

Subject Name: Consumer Electronics **Model Answer** **Subject Code:** 22425

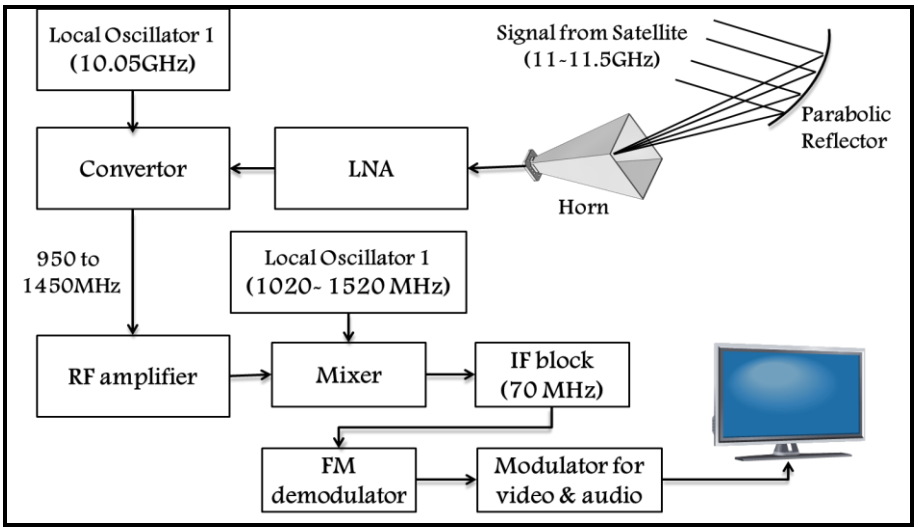
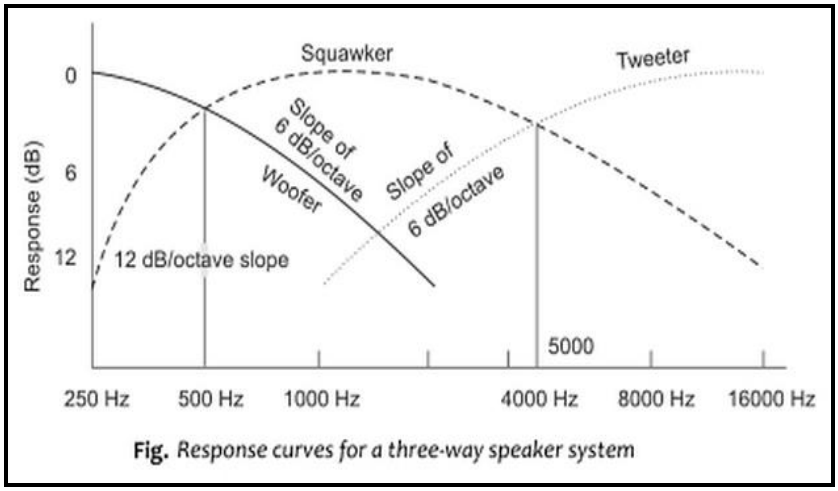
Important Instructions to examiners:

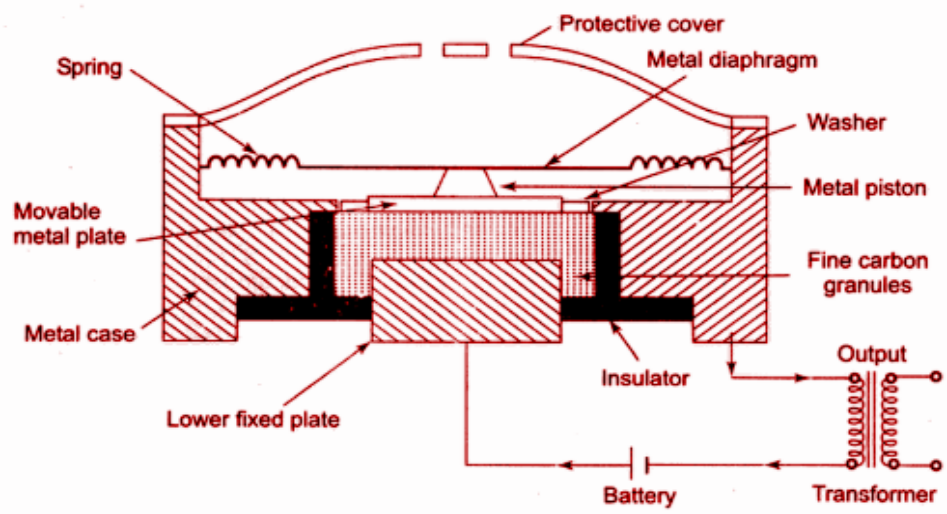
1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
3) The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills.
4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
7) For programming language papers, credit may be given to any other program based on equivalent concept.
8) As per the policy decision of Maharashtra State Government, teaching in English/Marathi and Bilingual (English + Marathi) medium is introduced at first year of AICTE diploma Programme from academic year 2021-2022. Hence if the students in first year (first and second semesters) write answers in Marathi or bilingual language (English +Marathi), the Examiner shall consider the same and assess the answer based on matching of concepts with model answer.

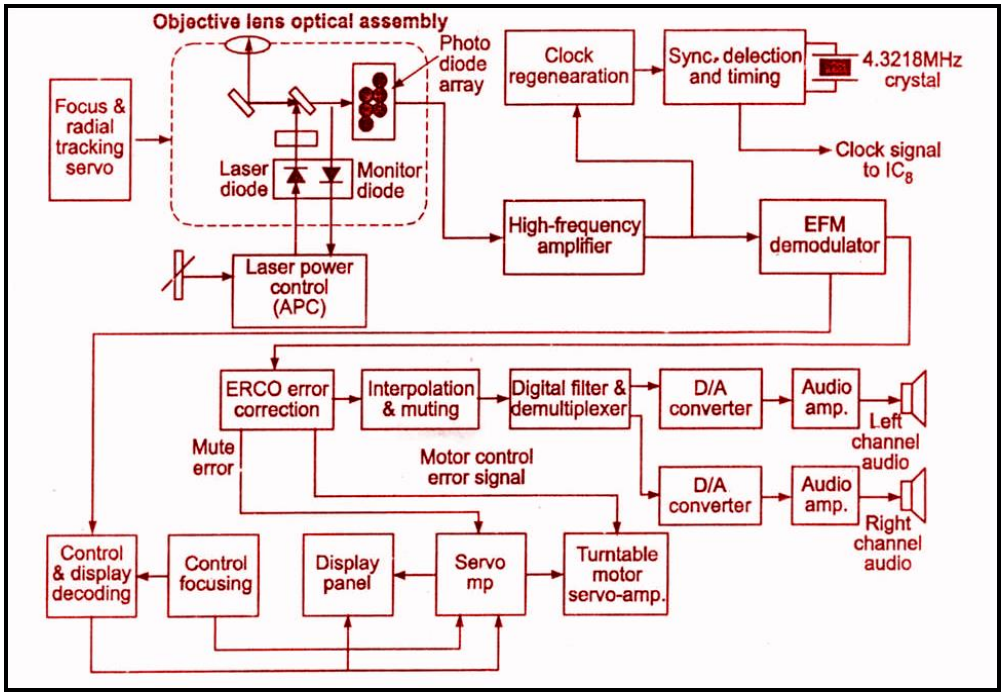
Q. No.	Sub Q.N.	Answer	Marking Scheme
Q.1		**Attempt any FIVE of the following:**	10-Total Marks
	a)	**i) Name the Block diagram.** **ii) Identify the block "A" and "B" in given Figure No.1**  Figure No. 1.	2M
	Ans:	i) Optical pickup assembly (1M) ii) Block A- Laser diode (1/2 M) Block B- Multibeam detector or Photo diode array (1/2 M)	

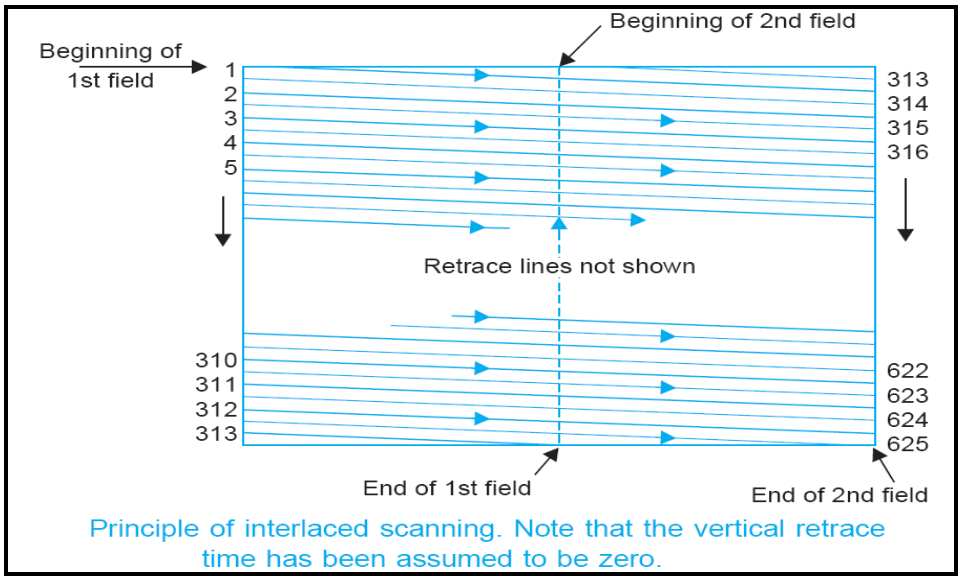
	b)	**List various control of Hi-Fi amplifier.**	**2M**
	Ans:	1) Balance control 2) Master gain control 3) Blend control 4) Bass and trouble control 4)Loudness control 5) Quasi stereo switch	**(any four)½ M each**
	c)	**Compare mono amplifier and stereo amplifier.(Any two point)**	**2M**
	Ans:		**(1 M for each point)**

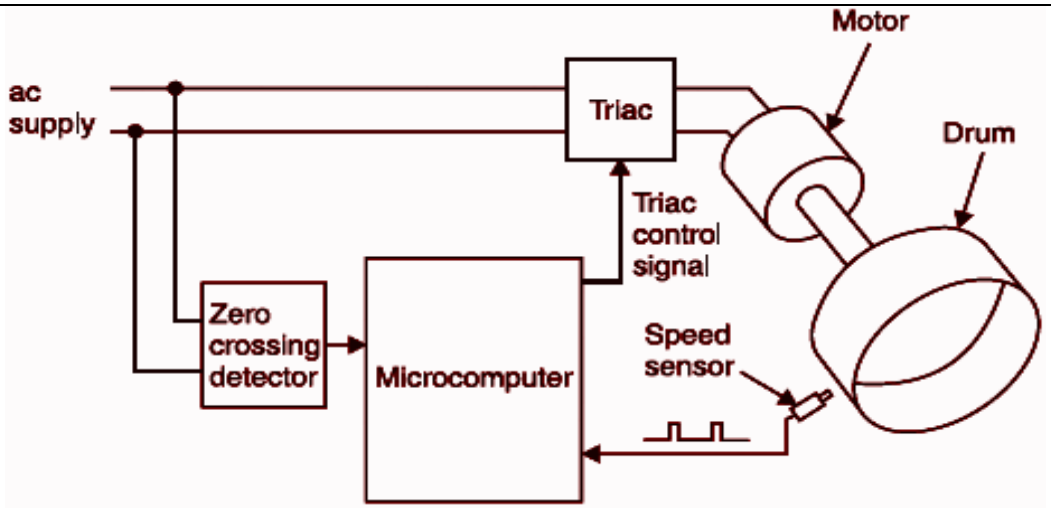
Parameters	**Mono**	**Stereo**
Stands for	Monaural or monophonic sound	Stereophonic sound
Key feature	Audio signals are routed through a single channel	Audio signals are routed through 2 or more channels to simulate depth/direction perception, like in the real world.
Recording	Easy to record, requires only basic equipment	Requires technical knowledge and skill to record, apart from equipment. It's important to know the relative position of the objects and events.
Cost	Less expensive for recording and reproduction	More expensive for recording and reproduction
Circuit Complexity	Less Complex then	More Complex
Usage	Public address system, radio talk shows, hearing aid, telephone and mobile communication, some AM radio stations	Movies, Television, Music players, FM radio stations
Circuit Diagram	Draw circuit diagram of mono amplifier system	Draw circuit diagram stereo amplifier system
Signal to Noise ratio	Less signal to noise ratio	Better than 50 dB is the S/N ratio.
Distortion	Nonlinear distortion occurs.	Nonlinear distortion not more than input/output.
Use of equalizer	Equalizers are not used	Contains equalizer circuit.

	d)	**Draw block diagram of Direct to Home receiver.**	**2M**
	Ans:	**Diagram: - Direct to Home receiver.** 	**Dia-2M**
	e)	**State important specification of washing machine (Any four)**	**2M**
	Ans:	**Specification of washing machine:-** 1. Power Consumption: eg. 1700 W 2. Maximum RPM : e.g. 1000 3. In built heater 4. Fuzzy Logic 5. Capacity 6. Weight 7. Stainless steel drum 8. Digital Display	**½ M for each point**
	f)	**Draw frequency response of woofer, midrange tweeter.**	**2M**
	Ans:	**Diagram:--Frequency response of woofer, midrange tweeter**  **Fig.** *Response curves for a three-way speaker system*	**2M**

	g)	**Explain the concept of Bayer's filter**	**2M**
	Ans:	**Explanation:- The concept of Bayer's filter** It is a micro filter overlay for image sensors that allows photo sensors to record light wavelength as well. The Bayer filter is the most common of such filters, and we find it in use in nearly all modern digital cameras. This filter uses a mosaic pattern of two parts green, one part red, and one part blue to interpret the colour information arriving at the sensor. Once recorded, digital algorithms are applied to interpolate or "demosaic" the resulting Bayer pattern and turn it into full-fledged colour data for the image.	**Expl-2M**
Q.2		**Attempt any THREE of the following:**	**12-Total Marks**
	a)	**Describe with the help of the diagram the working principle of carbon type microphone**	**4M**
	Ans:	**Diagram:- The working principle of carbon type microphone**  **Working Principle:** • When fine carbon granules enclosed in a case are subjected to variations of pressure, the resistance of the granules changes. When such a device of carbon granules is connected in series with a load through a dc supply, the current through the load will vary in accordance with pressure variations on the carbon granules. • When sound waves strike the diaphragm, it moves to and fro. During compression condition, it presses the carbon granules and during rarefaction, it loosens them. When carbon granules are pressed, the resistance decreases and hence the current through the circuit increases. • When carbon granules loosen, the resistance increases, decreasing the current through the circuit. In the absence of sound, a steady current flows. Thus, sound waves superimpose a varying current or audio current on the steady dc current.	**Dia-2M** **Working -2M**

	b)	**Draw block diagram of CD player.**	**4M**
	Ans:	**Diagram: CD Player** 	**Dia-4M**
	c)	**Define the following terms:** **i) Contrast** **ii) Luminance** **iii) Hue** **iv) Saturation**	**4M**
	Ans:	**i) Contrast:** It is the difference in light intensity between black and white parts of the picture over and above the average brightness level. **ii) Luminance:** It is define as the amount of light intensity as perceived by the eye regardless of the color. **iii) Hue** It is the predominant spectral colour of the received light **iv) Saturation** Saturation is the original spectral purity of the colour light. It shows how little the colour is diluted by white.	**1 M for each definati on**

	d)	**Explain interlaced scanning with label diagram.**	**4M**
	Ans:	**Diagram: - Interlaced scanning**  Principle of interlaced scanning. Note that the vertical retrace time has been assumed to be zero. **Explanation:** • In television pictures an effective rate of 50 vertical scans per second is utilized to reduce the flicker. This is accomplished by increasing the downward rate of travel of the scanning electron beam, so that every alternate line gets scanned instead of successive line. • Then when the beam reaches the bottom of the picture frame it quickly returns to the top to scan those lines that were missed in the previous scanning. • Thus, 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'***. • In the 625 line TV system, for successful interlaced scanning, the 625 lines of each frame or picture are divided into sets of 312.5 lines and each set is scanned alternately to cover the entire picture area.	**Diagram: 2M, Explanation: 2M**
Q.3		**Attempt any THREE of the following:**	**12-Total Marks**
	a)	**Digital camcorders are best for video recording than digital camera. Justify.**	**4M**
	Ans:	• A camera section, consisting of a CCD, lens and motors to handle the zoom, focus and aperture. A VCR section, in which a typical TV VCR is shrunk down to fit in a much smaller space. • The camera component's function is to receive visual information and interpret it as an electronic video signal. The VCR component is exactly like the VCR connected to your television: It receives an electronic video signal and records it on video tape as magnetic patterns. • The digital camera has good shutter speed and which is suitable for capturing still images or portrait images.	**Justification- 4M**

	b)	**Describe the operation of washing machine and state it's types.**	**4M**
	Ans:	 **Fig :** Block Diagram of Washing Machine Fig. Washing machine control At any time in the washing cycle the program determines at what speed the drum should rotate. From a knowledge of the required speed and the actual speed as obtained above, the controller can determine whether to increase or decrease the power dissipated in the motor. The motor power is determined by the timing of the triac firing pulse. If the triac is fired at the beginning of each half of mains cycle it will remain on for the remainder of the half cycle and the motor will operate at full power. The longer the processor waits before firing the triac, the less will be the motor power. The processor thus varies the delay time with respect to the zero crossing point of the mains by an appropriate amount to increase or decrease the power in the motor as determined by the difference between the actual and required speeds.This method of controlling the motor speed is very processor intensive. It consumes a large amount of processor time and will require a considerable amount of effort in writing and developing the software. However, this approach uses very little hardware and is thus very attractive for such a high-volume application. **Types of Washing Machine:** i) Washers ii) Semi-automatic iii) Automatic	**2M Block Diagram** **1M Explanation** **1M Types**

	c)	**Back Lit LED TV is better than edge Lit LED TV .Justify.**	**4M**
	Ans:	• There are two primary forms of LED lighting technology that LED TVs can utilize: full-array LED backlighting and edge-lit LED backlighting. Also known as local-dimming technology, full-array technology employs arrays or banks of LEDs that cover the entire back surfaces of LED TV screens. • In contrast, edge-lit technology employs LEDs only around the edges of LED TV screens. Unlike an edge-lit LED TV, an LED TV with full-array technology can selectively dim specific groups of LEDs, allowing for superior contrast ratio and superior overall picture quality. **Hence Back Lit LED TV is better than edge Lit LED TV**	**Justification - 4M**
	d)	**State any Eight CCIR-B standard for colour signal transmission and reception.**	**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	**2M colour signal transmission** **2M CCIR B standards for reception**

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	0.75MHz

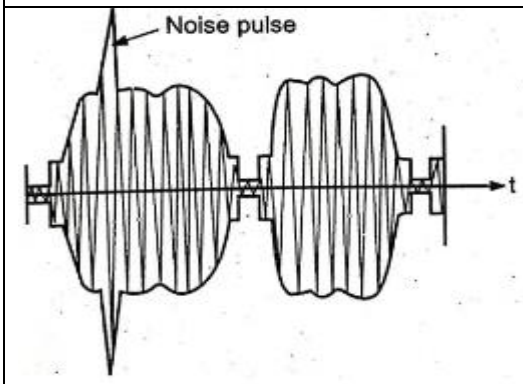
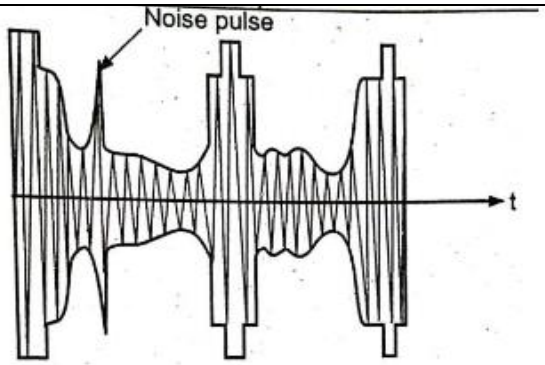
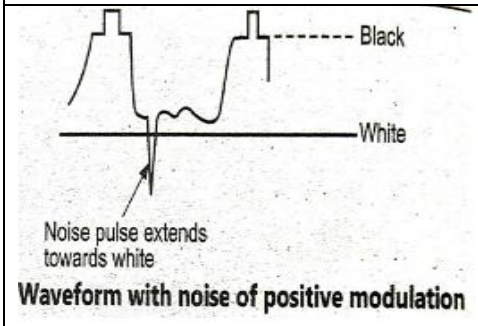
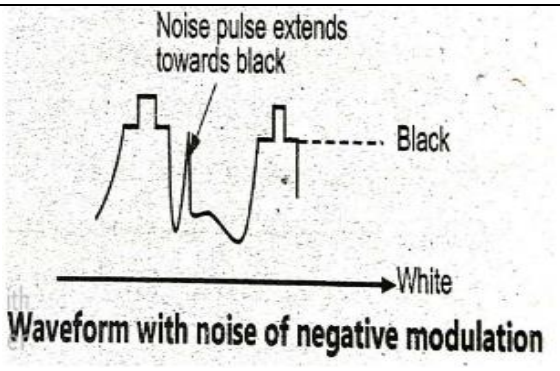
Q.4 **Attempt any THREE of the following:** **12-Total Marks**

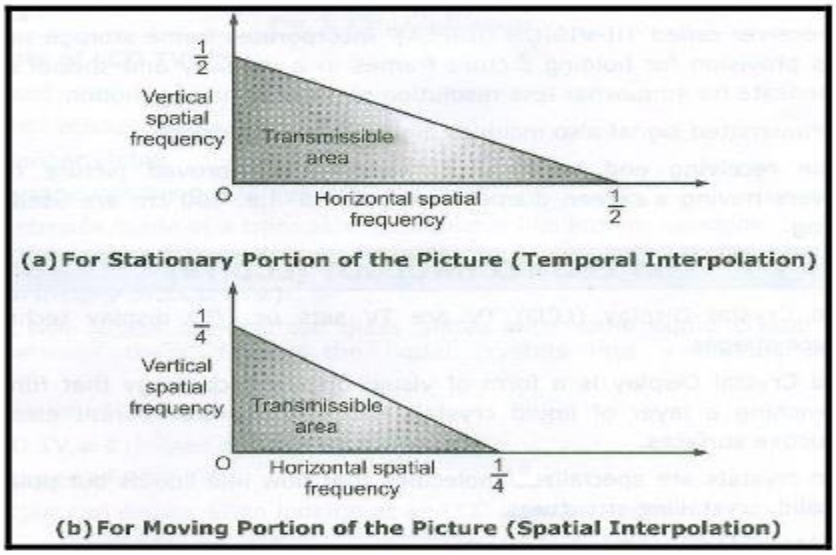
a) **Distinguish between positive and negative modulation(Any four)** **4M**

Ans:

Positive Modulation	Negative Modulation
When increase in brightness of that picture results in an increase of the amplitude of modulated envelope.it is called positive modulation.	When increase in brightness reduces amplitude of the modulated envelope, it is called negative modulation
White level of video signal corresponds to 100% total magnitude.	White level of video signal correspondence to 12.5% of the total amplitude.
Noise pulses do not affect synchronization but cause white spot in the picture.	Noise pulses are seen as less annoying black spot.

1 M each point (any 4 points)

Positive Modulation	**Negative Modulation**
More power is required with less efficiency	If peak power available from transmitter is considered them less power is required for more efficiency.
Black level of video signal correspondence to 25% of total magnitude	Blanking level starts at 75%
 Waveform of positive modulation	 Waveform of Negative modulation
 **Waveform with noise of positive modulation**	 **Waveform with noise of negative modulation**

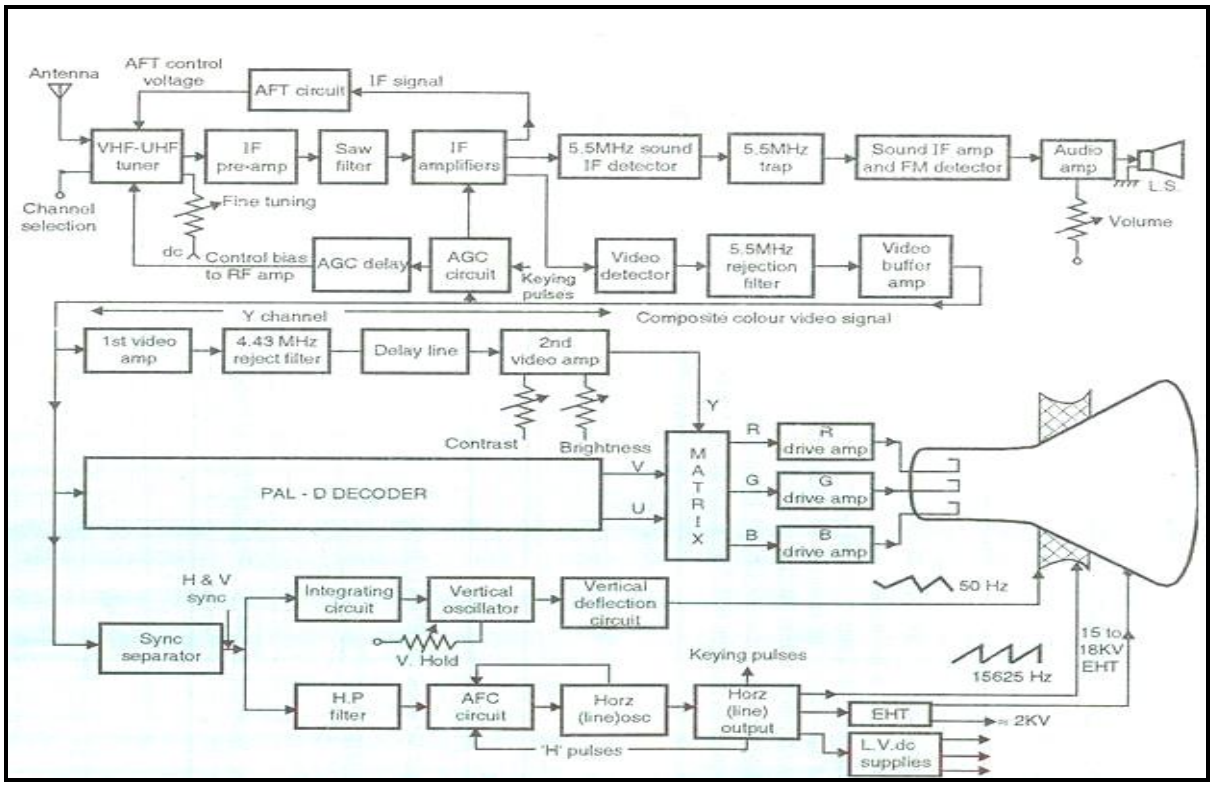
	b)	**Explain the NHK MUSE encoding system**	**4M**
	Ans:	**NHK MUSE encoding system:** MUSE stands for Multiple Sub-Nyquist Sampling Encoding and is an HDTV bandwidth compression scheme developed by NHK. • It uses fundamental concepts for performance exchange in the spatio – temporal (transitory transformation) 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. • 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. • 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.  • Figure: Interpolation	**Diagram : 2M** **Explanation :2M**

	c)	**Explain the writing and safety instruction for a microwave oven.**	**4M**
	Ans:	**Wiring Instructions:** • The wires in this mains cord are coloured in accordance with the following code. o Green : Earth o Black : Neutral o Red : Live • As the colours of the wires of the mainscord of this appliance may not correspond with the coloured marking identifying the terminals in your plug, proceed as follows : The wire which is coloured *green* must be connected to the terminal in the plug which is marked with the 'E' or by the earth symbol or green. The wire which is coloured *black* must be connected to the terminal which is marked with the letter 'N' or coloured black. The wire which is coloured red must be connected to terminal which is marked with the letter 'L' or coloured red. • **SAFETY INSTRUCTIONS:** Listed below are, as with other appliances, certain rules to follow and safeguards to assure best performance from this oven : 1. Do not use the oven for drying clothes, paper or any other *non food item.* 2. Do not use the oven *without* food items, this could damage the oven and may cause smoke emission. 3. Do not use the oven for *storage* of papers, cookbook, cookware, etc. 4. Do not operate the oven without glass tray. *Be sure it is properly placed on the rotating base.* 5. Ensure *removal* of caps or lids prior to cooking when you cook food sealed in bottles. 6. Do not put *foreign material* between the oven surface and door which could result in excessive leakage of harmful microwave energy. 7. Do not use *recycled paper products* for cooking. **OR** **Wiring Instructions:-** (i) Red, Black and Green wires should be connected to live, neutral and earth points of three point plug in correct manner. (ii)The three way socket should be wired properly to have a capacity of 15 A. Safety Instructions:- (i)The oven should never be used for drying any non-food item like clothes, paper etc. (ii)Never use oven without food items.	**2M each for wiring and safety Instructions**

	d)	**State and explain characteristics of microphone.**	**4M**
	Ans:	**Characteristics of a Carbon Microphone:** ***Sensitivity*** Very high. The output of a carbon microphone is about 20 dB below IV (i.e., about 100 mV). ***signal-to-noise Ratio*** Poor. Random variation of resistance of carbon granules generates a continuous hiss. ***Frequency Response*** Carbon microphones have a frequency response of 200 to 5000 Hz, and therefore are unsuitable for high fidelity work. The resonance peak is at 2000 Hz and overall frequency bandwidth is usually up to 5 kHz. ***Distortion*** High. The content is rich in harmonics unless variation in resistance (or) is a very small percentage of steady resistance R. Distortion is of the order of 10%. Also, carbon granules have a tendency to stick to each other which further increases the distortion. ***Directivity*** A carbon microphone is substantially omnidirectional. However, high frequency response over 300 Hz falls beyond an angle of 40° from the front of the microphone. ***Output Impedance*** It is about 100ohm. **Other Features:** • It is mechanically very rigid. • It is prone to moisture and heat. • It is small in dimensions. • Cost of the microphone is the lowest of all other microphones. **Characteristics of Capacitor Microphone:** ***sensitivity*** The output is very low and an amplifier is built-in inside the micro-phone case. The amplifier output is about 3 mV (about 50 dB below I V) at a sound pressure of 0.1 Pa or 1 pa bar. ***Signal-to-noise*** Ratio High, about 40 dB. ***Frequency Response*** Excellent, 40 Hz to 15 kHz for ±1 dB. Its frequency response is so good that it is used as standard microphone against which other microphones are calibrated and loudspeakers are tested. It is therefore used in sound level meters. Its natural resonant frequency is about 6000 Hz. ***Distortion*** Low, about 1% ***Directivity*** Omnidirectional ***Output Impedance*** High, about 100 Mega ohm. **Other Features** It needs an external dc bias supply. It is delicate because of the narrow separation between the moving plate (diaphragm) and the fixed back plate. It cannot withstand excessive heat. Moisture is also harmful as the condensation causes a crackling sound. It is costly because of the necessity of a dc bias.	**1M each for correct characteristics** **(Any 4)**

	e)	**State troubleshooting procedure of audio system**	**4M**
	Ans:	**Troubleshooting procedure of audio system:** • Shut down and restart the system. Surprisingly often, this solves the problem. • Verify that all cables are connected, that the speakers have power and are switched on, that the volume control is set to an audible level, that you haven't muted audio in Windows, and so on. Determine the scope of the problem. • If the problem occurs with only one program, visit the web sites for Microsoft, the software company, and the audio adapter maker to determine if there is a known problem with that program and audio adapter combination. If the problem occurs globally, continue with the following steps. • Verify that the audio adapter is selected as the default playback device. If you have more than one audio adapter installed, verify that the default playback device is the audio adapter to which the speakers are connected. If your audio adapter includes a testing utility, run it to verify that all components of the audio adapter are operating properly. • If you have another set of speakers and /or a spare audio cable, substitute them temporarily to eliminate the speakers as a possible cause. If you have a set of headphones, connect them directly to Line-out on the audio adapter to isolate the problem to the system itself. Alternatively, connect the questionable speakers to another system with a known good audio adapter, or even an MP3 player or portable CD player.	**Trouble shooting procedure: 4 M**
Q.5		**Attempt any TWO of the following:**	**12- Total Marks**
	a)	**Describe with the help of block diagram the operation of colour TV receiver.**	**6M**

Diagram:- The operation of colour TV receiver



Ans:

- A colour TV receiver contains all the necessary circuits of a monochrome receiver plus additional circuits required for the reproduction of a colored picture. Basically a colour TV receiver is a black-and-white receiver with a decoder for the colour signals and a colour picture tube.
- The figure is the functional block diagram of a colour TV receiver. The block diagram shows that the circuits like the RF tuner, VIF amplifier, the video amplifier, the deflection sync, the sweep circuits and the EHT sections are virtually the same as in black-and-white receiver.
- The tuning of a colour TV is critical. To avoid any mistuning of the receiver, an arrangement called AFT (Automatic Fine Tuning) is used in most cases. This arrangement is similar to the AFC and can be switched off whenever manual tuning is required. The colour TV uses the inter carrier sound system with one difference.
- The sound take-off point is at the last VIF stage immediately before the video detector. This is done to avoid interference between the sound IF and the Chroma signal. A separate diode detector is used to produce the sound IF but the rest of the audio circuits are the same as in a monochrome receiver.
- The two main circuits which distinguish a colour TV from a monochrome TV are the colour picture tube and the Chroma section containing the colour circuits.

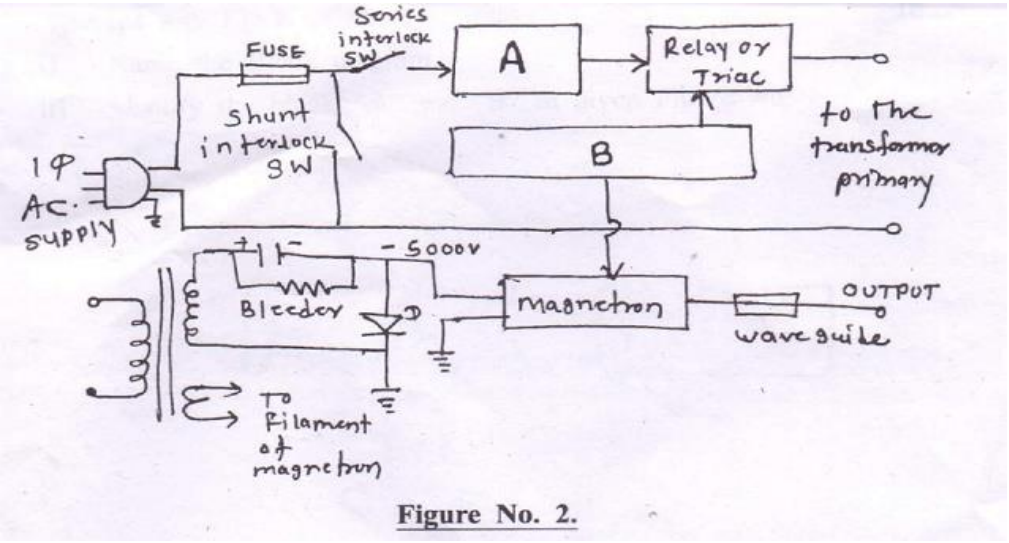
OR

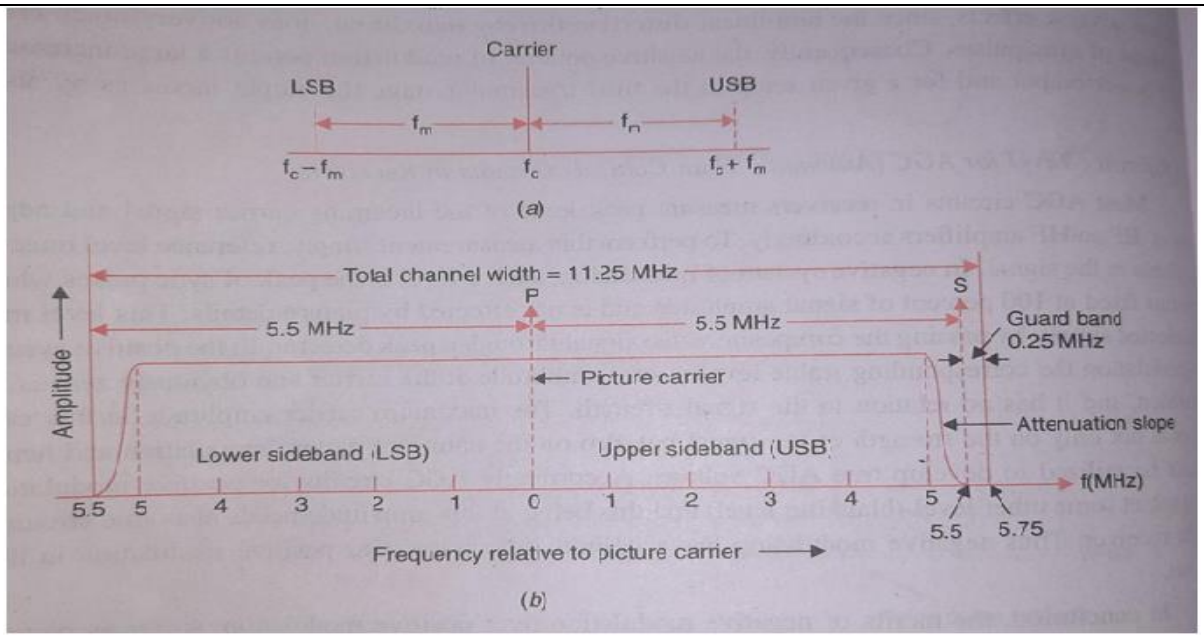
A colour TV receiver contains all the necessary circuits of a monochrome receiver plus additional circuits required for the reproduction of a colored picture. Basically a colour TV receiver is a black-and-white receiver with a decoder for the colour signals and a colour picture tube.

The block diagram shows that the circuits like the RF tuner, VIF amplifier, the video amplifier, the deflection sync, the sweep

Block diagram -4 M,

operation of TV receiver - 2 M

	b)	**i) Name the block diagram shown in Figure No.2** **ii) Identify the block "A" and "B" in given block diagram.** **iii) State the functions of block "A" and "B".**  **Figure No. 2.**	**6M**
	Ans:	i)**Block diagram of Microwave Oven** ii)**Block A** is of Thermal Protector & Block B is of Controller Microprocessor iii)Block A:-The thermal protector is a PTC thermistor. The primary current decreases when the temperature rises abnormally. It senses the temperature of the magnetron as it is bolted to the magnetron case and is so connected electrically that its resistance comes in series with the primary circuit. **Block B**:-The controller is a microprocessor chip with a clock. It is activated by key-pad switches and sets the cooking time. It senses the temperature and moisture, sets the power levels and runs the display. There are three power levels. For HIGH the microwave generator remains on continuously; for MEDIUM it remains on for 10 seconds and off for 10 seconds; for LOW it remains on for 5 seconds and off for 15 seconds. The controller activates the microwave generator using either a relay or a triac.	**i)Name-1M** **ii)Block A -1M Block B -1M** **iii)Function of A block and B block-3M**
	c)	**Explain vestigial sideband transmission. State it's any two merits and demerits**	**6M**



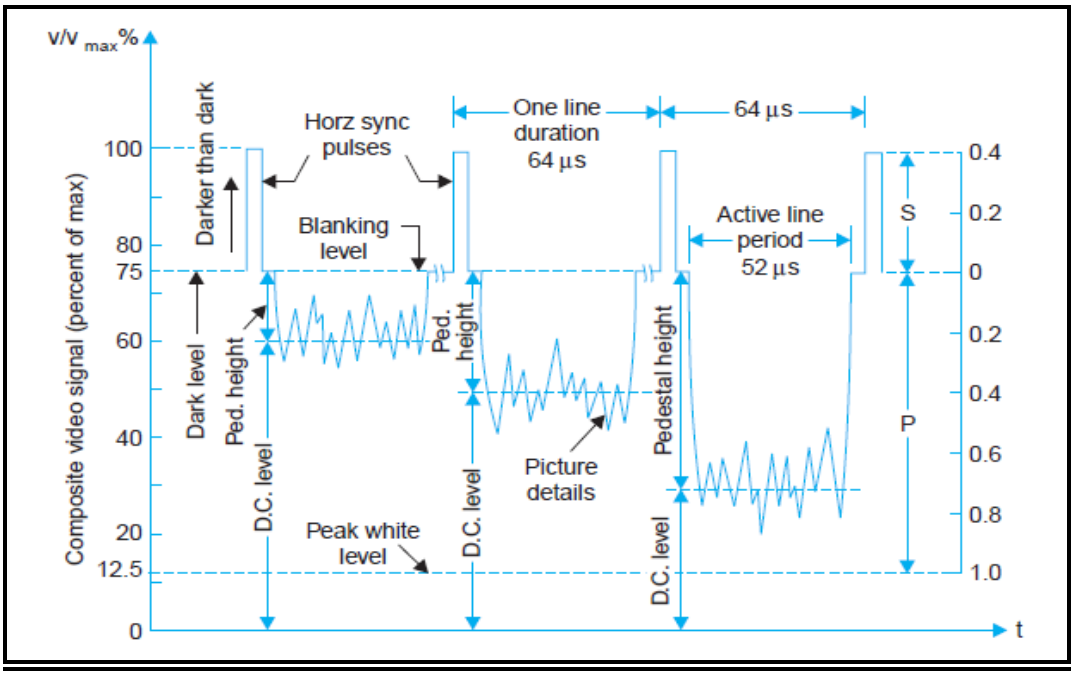
Ans:

- 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 above 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.

Merits of VSB modulation: · 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.

Demerits of Vestigial sideband (VSB) modulation
Its bandwidth requirement is somewhat higher than that of SSB modulation, due to the presence of vestige.
Vestigial sideband modulation leads to a complex demodulation process at the receiver end.

Diagram- 2 M , Explanation- 2 M, Merits & Demerits- 1M each

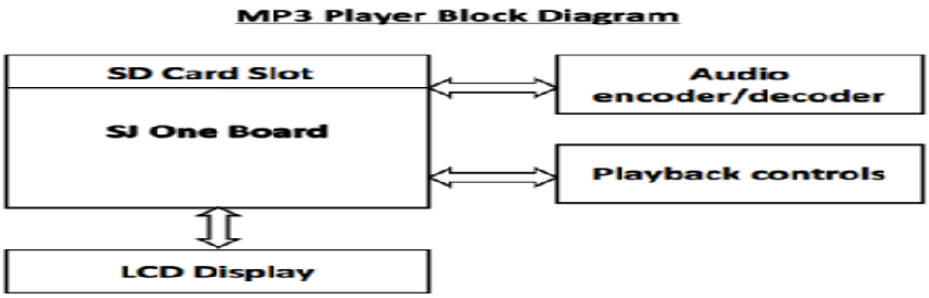
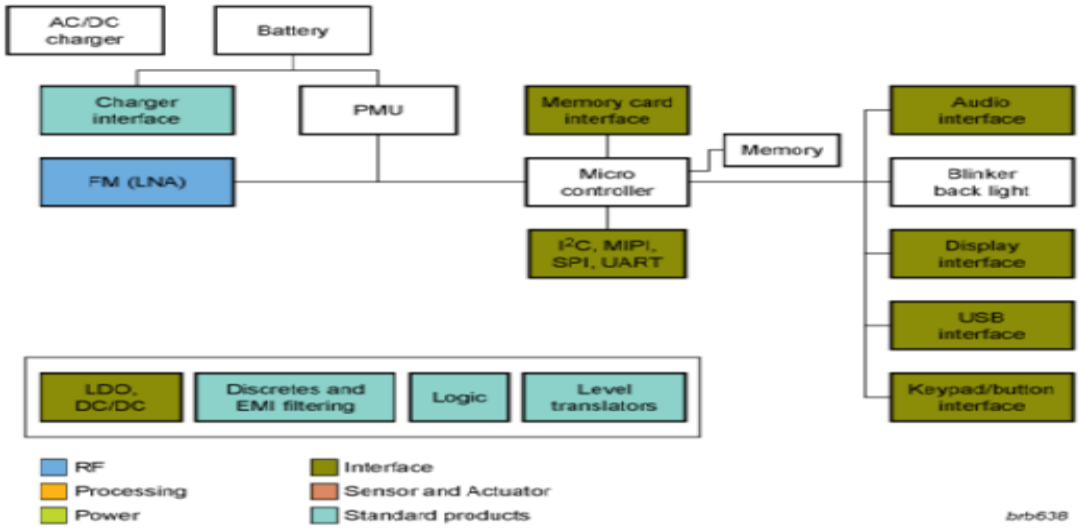
Q.6		Attempt any TWO of the following:	12- Total Marks
	a)	**Draw labeled diagram of composite video signal and state the function of following** **i. Blanking level** **ii. Pedestal height**	6M
	Ans:	**i) Blanking level:** Blanking pulses to make retrace invisible.This is done by increasing the signal amplitude slightly more than the black level during retrace period **ii) Pedestal height:** • Pedestal height is the distance between the pedestal level and average value (dc level) of the video signal. This **indicates average brightness** since it measures how much the average value differs from black level. • Pedestal height determines brightness of scene. Large pedestal height makes picture brighter and vice versa. Operator who observes the picture in studio adjusts level for desired brightness by adding dc component to ac signal. **Diagram:-composite video signal**  	**Diagram -4M , Blanking level- 1 M, Pedestal Height 1 M**

	b)	**i) State the important features of CMOS devices** **ii) Compare CCD and CMOS sensor**	**6M**
	Ans:	**i) Important features of CMOS devices:** 1)Each pixel on the CMOS has its own amplifier. Not only that, but each column has its own ADC: once a pixel detects light, it will amplify it and then connect to the ADC for that column. 2)CMOS devices have lower power consumption than CCDs, the price of manufacturing is lower than CCDs, and they are faster in processing signals than CCDs. They are therefore ideal for fast image acquisition. 3)CMOS sensors can be fabricated using semiconductors besides silicon (like gallium arsenide, silicon germanium, indium gallium arsenide). These materials allow for CMOS to be sensitive to wavelengths beside the visible spectrum. All these are great advantages, especially if you are designing consumer electronic devices like digital cameras, or cell phones where battery life and cost are quite important. 4)CMOS devices tend to have a higher dynamic range than CCD (although not always). **OR** 1. Because each pixel on a CMOS sensor has several transistors located next to it, the light sensitivity of a CMOS chip tends to be lower. Many of the photons hitting the chip hit the transistors instead of the photodiode. 2. CMOS traditionally consumes little power. Implementing a sensor in CMOS yields a low-power sensor. 3. CCDs consume as much as 100 times more power than an equivalent CMOS sensor. 4. CMOS chips can be fabricated on just about any standard silicon production line, so they tend to be extremely inexpensive compared to CCD sensors. **OR** CMOS sensors traditionally have lower quality, lower resolution and lower sensitivity. CMOS cameras are usually less expensive and have great battery life. i) **Comparison of CCD and CMOS sensor:**	**1 feature -1M (any 3 points)**

	CCD	**CMOS**
	Charged Couple Device	Complementary Metal Oxide Semiconductor
Cost	More expensive	Cheaper
Vertical Smear	Yes	No
Power efficiency	less efficient	more efficient
Noise	less	more
Partial exposure	No	Yes

OR

1)CCD sensors, as mentioned above, create high-quality, low-noise images. CMOS sensors, traditionally, are more susceptible to noise.

		2)Because each pixel on a CMOS sensor has several transistors located next to it, the light sensitivity of a CMOS chip tends to be lower. Many of the photons hitting the chip hit the transistors instead of the photodiode. 3)CMOS traditionally consumes little power. Implementing a sensor in CMOS yields a low-power sensor. CCDs use a process that consumes lots of power. CCDs consume as much as 100 times more power than an equivalent CMOS sensor. 4)CMOS chips can be fabricated on just about any standard silicon production line, so they tend to be extremely inexpensive compared to CCD sensors. CCD sensors have been mass produced for a longer period of time, so they are more mature. They tend to have higher quality and more pixels.	
	c)	**Draw and explain working of MP3 player.**	**6M**
	Ans:	 **OR** 	**Diagram-3M** **Explanation - 3M**

MP3 media player is a coding format for digital audio.It is defined as MPEG1 (Moving picture Expert group)Standard .It was retained & further extened to provide additional bit rate & more audio channels .MP3 is file containing elementary stream of MPEG1 audio & video encoded data.It will be played on any MP3 player.
MP3 players require energy efficient solutions, such as class D audio amplifiers and the latest interface components.

Audio

The 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.

The digital interface assures low RF susceptibility in the device and the total system, and low sensitivity to input clock jitter. In addition, the digital interface eliminates the need for couple capacitors and safeguard speakers by eliminating problems coming from DC offsets due to leakage currents of an analog design.

Charger interface

Whether the 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.

Memory Card Interfaces

According the IEC 61000-4-2 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.
The continuing trend of miniaturization of portable appliances implies that interface devices offering ESD protection and EMI filtering should also integrate biasing circuits/resistors into a single small-sized package. NXP's memory card interface solutions fully support this continuing trend and offer interface conditioning functions such as high-level ESD protection according the IEC 61000-4-2 standard. They also support EMI filtering, integrated biasing resistor networks, regulated power supply to supply SD- memory cards directly from a battery, and voltage level translation to enable the use of low-voltage host processors to communicate with 2.7 V to 3.6 V compliant SD-memory card devices.

Protocols

- Universal Asynchronous Reception and Transmission (UART)
- Inter-integrated-circuit (I2C)
- Serial Peripheral Interface (SPI)