



WINTER – 2022 EXAMINATION

Subject Name: Consumer Electronics

Subject Code:

22425

Model Answer

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.	Answers	Marking Scheme
1	(A)	Attempt any FIVE of the following:	10- Total Marks
	(a)	List the different components used in CD-Player	2M
	Ans:	1)Laser diode 2)lens & prism arrangement 3)photodiode 4) tray or loading motor to move the CD tray in and out,5)The slide, feed or sled motor moves the optical pickup unit from the center to the outer edge of the disc on sliding rods,6)speaker 7)amplifier 8)Digital to analog converter	Any 2 components 1M

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(b)	Draw the block diagram of PA system (public address)	2M
Ans:	<p style="color: red; text-align: center;">OR</p>	2M
(c)	List different types of microphones	2M
Ans:	<ol style="list-style-type: none"> 1. Carbon Microphone 2. Condenser Microphone, 3. Crystal Microphone 4. Electret Microphone 5. Tie-clip Microphone 	Any 1 1M
(d)	Difference between LED and LCD (any 2 points)	2M



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Ans:	Sr no	LED	LCD	1 Point 1M
	1	LED has a better response time than LCD	LCD is slower than LED in terms of response time.	
	2	LED consumes Less power in comparison to LCD.	Whereas it consumes MORE power in comparison to LED.	
	3	LED delivers good picture quality in comparison to the LCD display.	LCD also delivers good picture quality but less than LED.	
	4	LED is costlier than LCD.	While it is less costly than LED.	
	5	LED TVs can be up to 90 inches and they are much similar to LCD TVs.	LCD Screen size comes in the range of 13-57 inches.	
	6	LED uses gallium arsenide phosphide.	LCD uses liquid crystals and glass electrodes.	
	7	The placement of lights in an LED TV differs from product to product. The light-emitting diodes in LEDs may be placed either behind the screen or around the edges	LCD TV uses fluorescent lights, which are placed behind the screen.	
NOTE Answer can be written base on parameter				
e)	List any two wiring and safety instructions of micro oven			2M
	<p><u>Wiring Instructions:</u></p> <ol style="list-style-type: none"> The wires in this mains cord are coloured in accordance with the following code. <ol style="list-style-type: none"> Green : Earth Black : Neutral Red : Live As the colours of the wires of the mains-cord 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. 			Any 2 wiring and safety instructions, 1 M each



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SAFETY INSTRUCTIONS

Listed below are, as with other appliances, certain rules to follow and safeguards to assure best performance from this oven :

3. Do not use the oven for drying clothes, paper or any other non food item.
4. Do not use the oven without food items, this could damage the oven and may cause smoke emission.
5. Do not use the oven for storage of papers, cookbook, cookware, etc.
6. Do not operate the oven without glass tray. Be sure it is properly placed on the rotating base.
7. Ensure removal of caps or lids prior to cooking when you cook food sealed in bottles.
8. Do not put foreign material between the oven surface and door which could result in excessive leakage of harmful microwave energy.
9. Do not use recycled paper products for cooking.
10. Do not cook any food surrounded by a membranes such as egg yolks, potatoes, chicken livers, etc., without piercing them.
11. Should the microwave oven emit smoke indicating a fire, keep the oven door shut, switch the appliance off and disconnect the mains cord from the outlet.
12. When flammable food containers are used in the oven (e.g. packet popcorn) be sure to check the cooking process frequently to check for fire.
13. Always stir and/or shake the containers of baby foods prior to testing their temperature and serving the contents.
14. Always test the temperature of food or drink which has been heated in a microwave oven before serving, especially to children or elderly people. This is important because things which have been heated in a microwave oven keep on getting hotter even though the microwave oven cooking has stopped.

f)

List types of loudspeakers

2M

Ans:

1. Electrostatic (Condenser/Capacitor)Loudspeakers
2. Dynamic Loudspeakers
3. woofer
4. tweeter

**Any
two,
1M**



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		<p>5. squawker/ midrange 6. HORN type 7. Sound column</p>	each																					
	g)	State electric specification of washing machine	2M																					
	Ans:	<p>1. Input voltage:-100V to 240 V/50 HZ supply 2. Input Power Vary as per configuration 200 W to 1200W 3. Output power 100-400 W 4. Maximum Efficiency 31% 5. Single Phase Induction Motor with 1500rpm maximum speed</p>	Any two, 1M each																					
Q. No.	Sub Q. N.	Answers	Marking Scheme																					
2		Attempt any <u>THREE</u> of the following:	12- Total Marks																					
	a)	Compare mono amplifier system with stereo amplifier system	4M																					
	Ans:	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">parameter</th> <th style="width: 35%;">Mono</th> <th style="width: 35%;">Stereo</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Stands for</td> <td style="text-align: center;">Monaural or monophonic sound</td> <td style="text-align: center;">Stereophonic sound</td> </tr> <tr> <td style="text-align: center;">Key feature</td> <td style="text-align: center;">Audio signals are routed through a single channel</td> <td style="text-align: center;">Audio signals are routed through 2 or more channels to simulate depth/direction perception, like in the real world.</td> </tr> <tr> <td style="text-align: center;">Recording</td> <td style="text-align: center;">Easy to record, requires only basic equipment</td> <td style="text-align: center;">Requires technical knowledge and skill to record, apart from equipment. It's important to know the relative position of the objects and events.</td> </tr> <tr> <td style="text-align: center;">Cost</td> <td style="text-align: center;">Less expensive for recording and reproduction</td> <td style="text-align: center;">expensive for recording and reproduction</td> </tr> <tr> <td style="text-align: center;">Circuit Complexity</td> <td style="text-align: center;">Less Complex then</td> <td style="text-align: center;">More Complex</td> </tr> <tr> <td style="text-align: center;">Usage</td> <td style="text-align: center;">Public address system, radio talk shows, hearing aid, telephone</td> <td style="text-align: center;">Movies, Television,</td> </tr> </tbody> </table>	parameter	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	expensive for recording and reproduction	Circuit Complexity	Less Complex then	More Complex	Usage	Public address system, radio talk shows, hearing aid, telephone	Movies, Television,	Any 4 points, 1M each
parameter	Mono	Stereo																						
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		and mobile communication, some AM radio stations	Music players, FM radio stations	
Circuit Diagram	Draw circuit diagram of mono amplifier system	Draw circuit diagram stereo amplifier system		
	<p style="text-align: center;"><i>Basic monophonic system</i></p>	<p style="text-align: center;"><i>Basic stereophonic system</i></p>		
Signal to Noise ratio	Less	Better than 50 dB		
Distortion	Nonlinear distortion occurs.	Nonlinear distortion not more than input/output.		
Use of equalizer	Equalizers are not used	Contains equalizer circuit.		
OR				
SR	Parameter	Mono	Stereo	
1	Input	one	two	
2	Speaker minimum	one	two	
3	Pre Amplifier	one	two	
4	Output Amplifier	one	two	
5	Mixer channel	one	two	

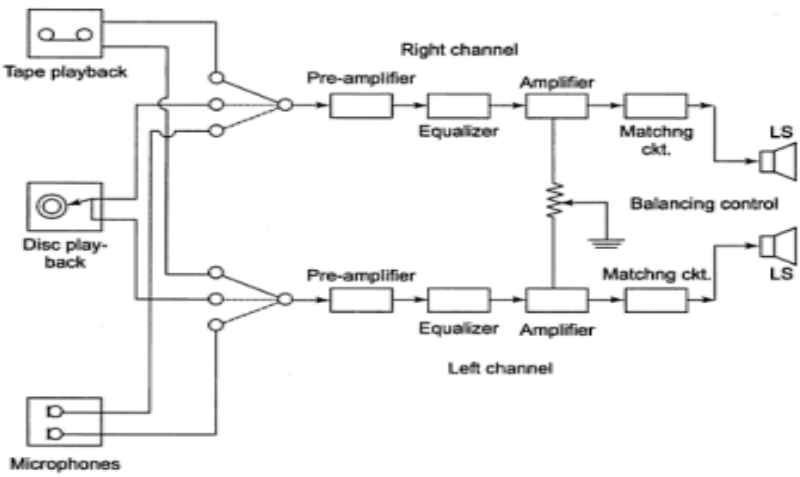
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b)	Draw the block diagram of Hi-fi audio amplifier. State four characteristics of Hi-fi amplifier	4M
Ans:	<p><u>Characteristics of HI-FI amplifier:</u></p> <ol style="list-style-type: none"> 1. Signal to noise ratio should be better than 50dB. 2. Frequency 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. 	<p>Any 2 Characteristics 1M</p> <p>Diagram 2M</p>
c)	State Grassman’s law. Draw the sketch of additive mixing	4M
Ans:	<p>Grassman’s law</p> <ul style="list-style-type: none"> • 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 	<p>Explanation 2M</p>

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	<p>Law.</p> <ul style="list-style-type: none"> 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. <div data-bbox="407 464 1060 936" style="border: 1px solid black; padding: 10px;"> <p style="text-align: center; color: blue;">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.</p> </div>	<p>Diagram m 2M</p>
<p>d)</p>	<p>State any eight CCIR – B standard of color signal transmitter and receiver</p>	<p>4M</p>
<p>Ans:</p>	<p>Parameters CCIR B standard</p> <ol style="list-style-type: none"> 1. Number of scanning lines/frame 625 2. Field (vertical) frequency 50Hz 3. Line(horizontal) frequency 15625Hz 4. Aspect ratio(width/height) 4:3 5. Horizontal trace time 52μs 6. Horizontal retrace time 12μs 7. Total scanning line lost in vertical retrace 64μs 8. Front porch 1.5μs 9. Back porch 5.8μs 10. Horizontal sync pulse 4.7μs 11. Colour sub carrier frequency 4.43MHz 12. Colour system Phase Alteration by Line –Delay (PAL-D) 13. U signal(weighted B-Y) U=0.493 (B-Y) 14. V signal(weighted R-Y) V=0.877(R-Y) 15. Total vertical blanking duration 1280μs or 1.280ms 16. Vertical sync pulse 160μs 17. Pre and post equalizing pulse 5 pulse each 18. Sync pulse top 100% 19. Blanking/pedestal level 75% 20. Black level 72-75% 21. White level 10-12.5% 	<p>Any 2 standar ds 1 M</p>



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		<p>22. Width of video signal 5MHz 23. Chroma signal bandwidth -1.3MHz to +1.57MHz 24. Video IF 38.9MHz 25. Audio IF 33.4MHz 26. Inter carrier frequency 5.5MHz 27. Audio modulation Frequency Modulation(FM) Video modulation Amplitude Modulation (AM) Total channel width in VHF 7MHz 28. Total channel width in UHF 8MHz</p>	
Q. No.	Sub Q. N.	Answers	Marking Scheme
3		Attempt any THREE of the following:	12- Total Marks
	a)	Explain working of digital cam coder	4M
	Ans:	<pre> graph LR A[Optical Lens Assembly] --> B[CCD Imager] B --> C[Camera Processing] C --> D[MPEG CODEC] D --> E[Video Buffer RAM] F[Sound From Microphone] --> G[Audio ADC] G --> H[Audio Processor] H --> I[Audio Buffer RAM] I --> J[MUX/ DEMUX] D --> J E --> J J --> K[PS Buffer] K --> L[Recording Medium] M[Electronic View finder] --> D </pre> <ul style="list-style-type: none"> • 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. 	<p>Diagram 2M Explanation 2M</p>

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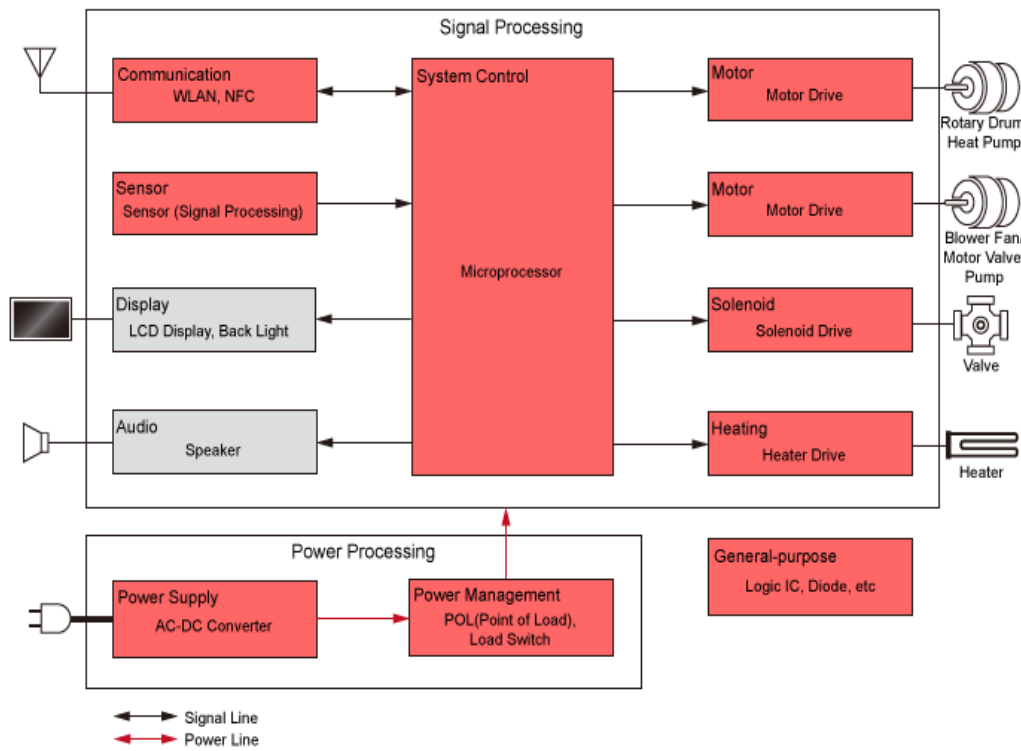
Model Answer

- 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.

b) Draw block diagram of washing machine and state types of washing machine

4M

Ans:



Block Diagram 2M
Types 2M

OR

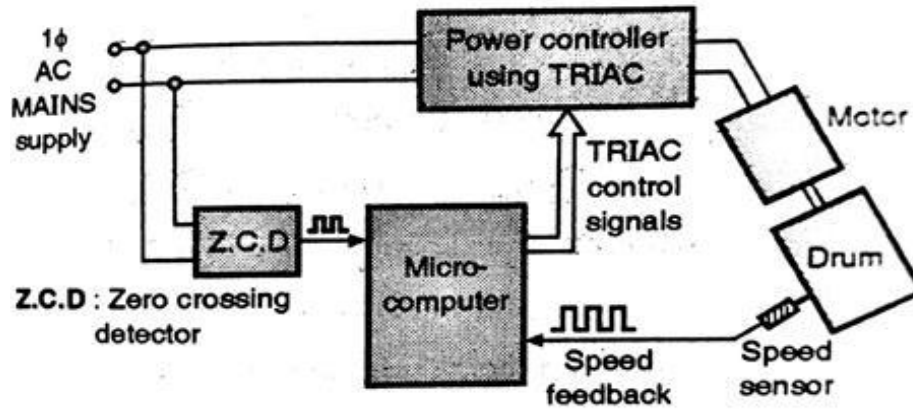
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Model Answer



Speed control of drum

OR

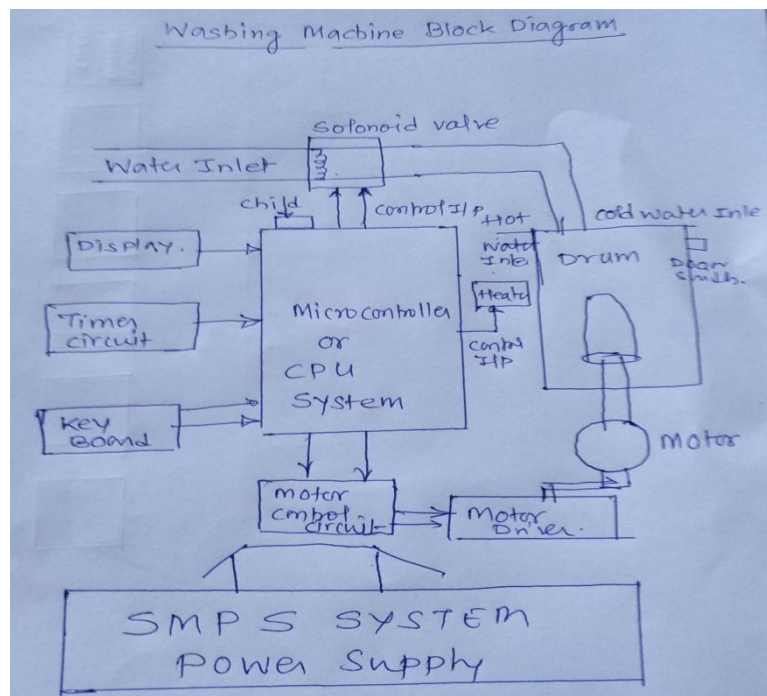


Fig : Block Diagram of Washing Machine

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

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	<p>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.</p> <p><u>Types of Washing Machine:</u></p> <ul style="list-style-type: none"> i) Washers ii) Semi-automatic iii) Automatic 	
c)	Draw the block diagram of PAL – D – decoder	4M
Ans:	<p>(NOTE: any other relevant diagram can be considered like chroma amplifier with u amplifier and with RGB amplifier included then mark will be given)</p> <p style="text-align: center;"> <ul style="list-style-type: none"> • In the block diagram there are 64us delay line, a switch operated by colour </p>	<p>Diagram 2M</p> <p>Explanation 2M</p>

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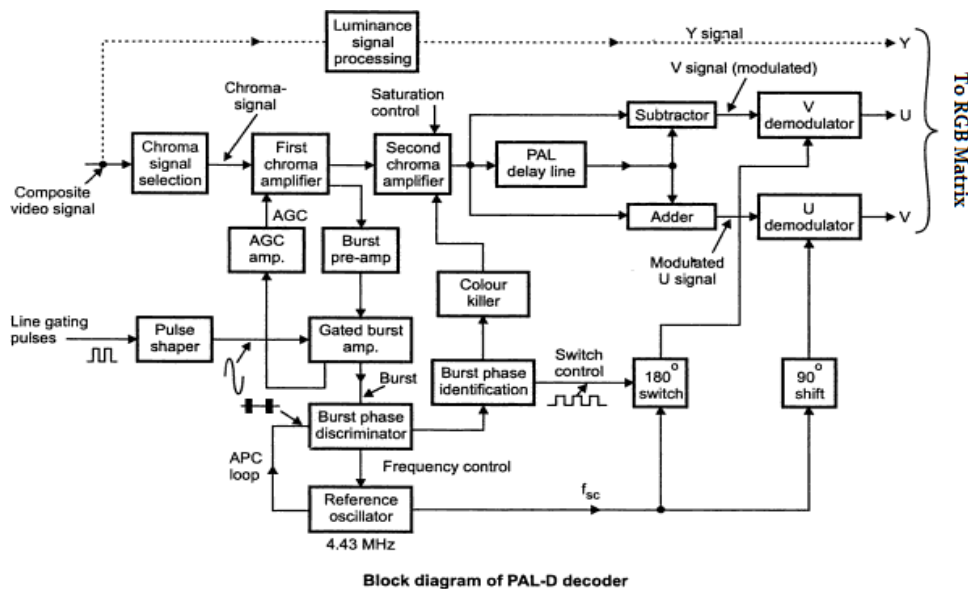
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burst signal, add and subtract network and RGB matrix

- 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 signal which will further connected to RGB amplifier.
- Weighted factor $U=B-Y$ and $V=R-Y$
- Switch will reverse subcarrier signal with phase Y signal has Bandwidth of 5Mhz

OR



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.



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	<p><u>PAL delay line (separation of U and V colourphasors):</u></p> <p>This network separated U and V signals with are then fed to respective demodulator.</p> <p><u>Gated burst amplifier:</u></p> <p>The gated burst amplifier separates the burst pulses and amplifies them a level suitable to operate the burst phase discriminator.</p> <p><u>Automatic Chroma Control (ACC):</u></p> <p>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 stageof Chroma amplifier in such way to ensure constant Chroma signal amplitude</p> <p><u>Burst phase discriminator:</u></p> <p>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.</p> <p><u>Burst phase identifier:</u></p> <p>This circuit is able to identify the phase relationship of the colour burst.</p> <p><u>180° switch:</u></p> <p>This switch is used to periodically invert the waveform fed to the v-signal demodulator.</p> <p><u>Colour killer control:</u></p> <p>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.</p>	
d)	<p>Define the following w.r.t. Television</p> <p>i) Contrast ii) Luminance iii) Hue iv) Saturation</p>	4M



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	Ans:	<ul style="list-style-type: none"> i) Contrast: It is the difference in light intensity between black and white parts of the picture over and above the 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 bywhite. 	Each definati on 1M
Q. No.	Sub Q. N.	Answers	Marking Scheme
4		Attempt any <u>THREE</u> of the following:	12- Total Marks
	(a)	Describe vertical resolution and horizontal resolution in brief	4M
	Ans:	<p>Resolution: The scanning and reproduction of the finest details of the picture is known as resolution of TV system.</p> <p>Vertical Resolution:</p> <p>The ability of the scanning system to resolve picture details in vertical direction is known as</p> <p>vertical resolution:</p> <ol style="list-style-type: none"> Vertical resolution is a function of scanning lines into which the picture is divided in the vertical plane. 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 Thus ,vertical resolution can be expressed as, $V_r = N_a * K$ <p>V_r = Vertical resolution</p> <p>N_a = Active number of lines K- kell factor or resolution factor</p> <p>Horizontal Resolution:</p>	vertical resoluti on 2M horizo ntal resoluti on 2M



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	<p>The ability of the scanning system to resolve the picture details in the horizontal direction is known as horizontal resolution.</p> <p>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-</p> <p>$N = N_a * \text{Aspect Ratio} * K$</p>	
(b)	Draw block diagram of monochrome TV receiver	4M

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Ans:

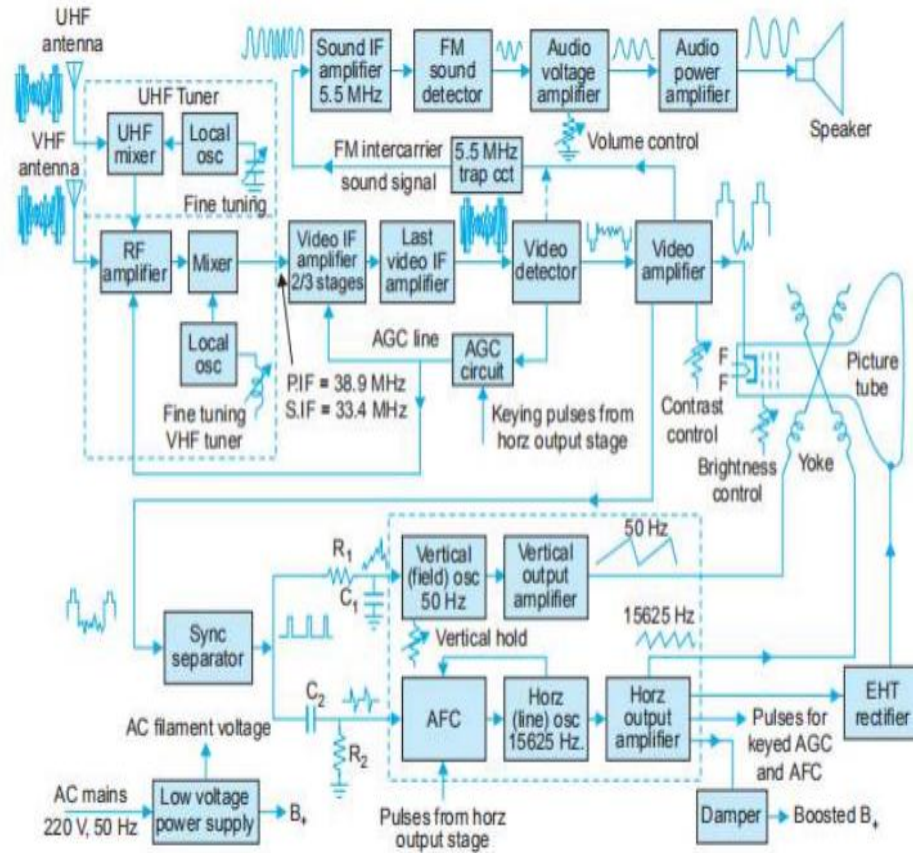
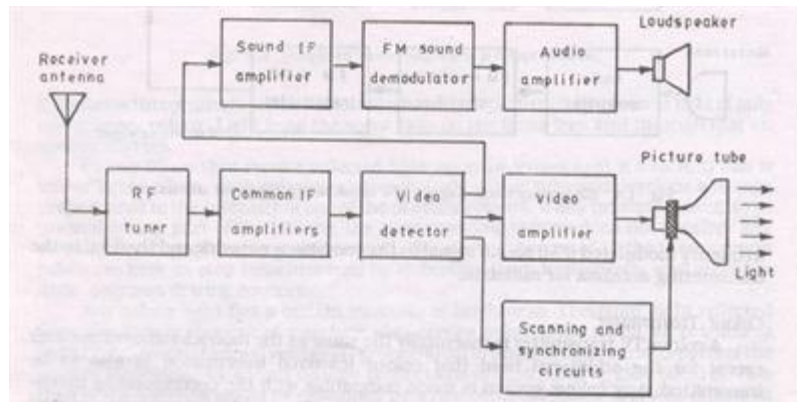


Figure 1: Block diagram of a monochrome television receiver

OR



(c)

Explain working of micro wave oven with neat block diagram

4M

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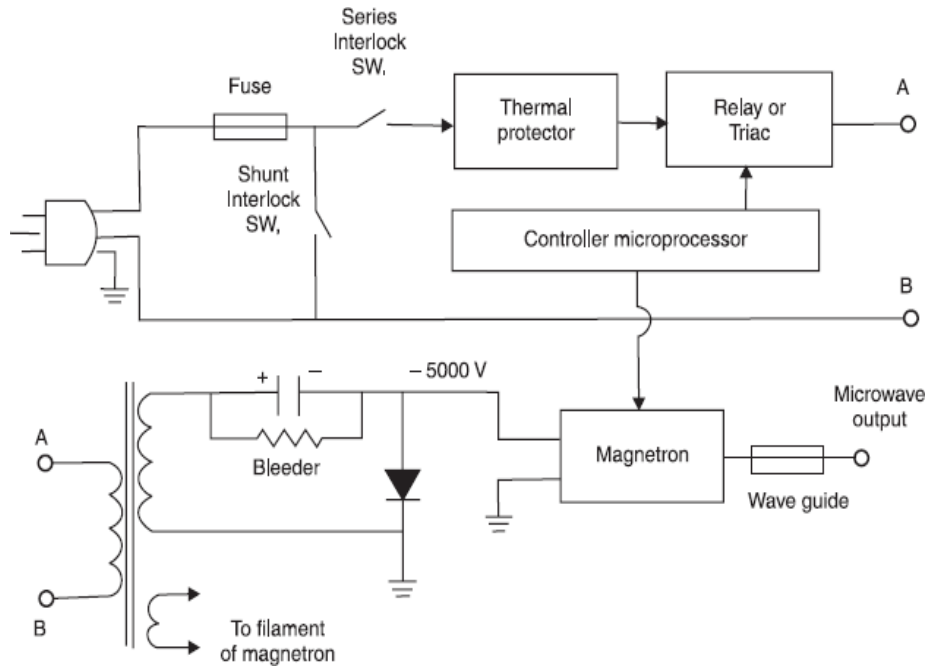
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Ans:



**Diagram
2M**

**Explanation
2M**

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.

(d) Compare woofer, midrange and tweeter (any four points)

4M

Ans:

Sr. No	PARAMETER	Woofer	Midrange (Squawker)	Tweeter	

1 Point

1 Mark



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	1.	Defination	It covers the low audio frequencies.	It covers the mid-frequency range of audio.	It covers high audio frequencies.	
	2.	Size	Large	Medium	Small	
	3.	Weight	Heavy	Medium	Light	
	4.	Frequency range	16 Hz to 1 kHz	500 Hz to 5 kHz	5 kHz to 16 kHz	
(e)	Describe the working of pick up unit of CD player with neat sketch					4M
Ans:	<p>Pick up assemble: The pick-up assemble consist of -</p> <ul style="list-style-type: none"> • 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 ell 					<p>Diagram 2M</p> <p>Explanation 2M</p>

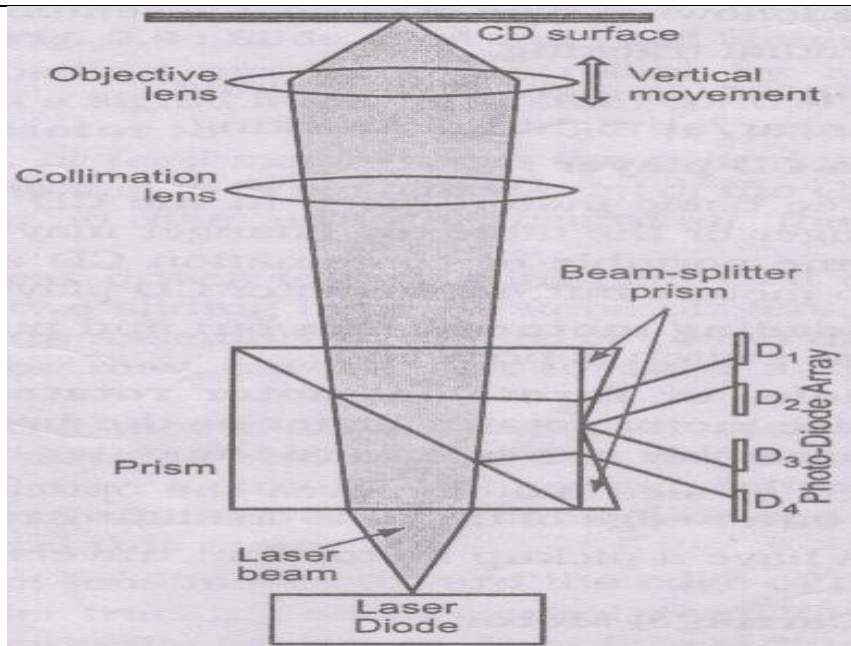
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- Elliptical or conical distribution. This beam is passed through various prism and lens to form a very small diameter light beam on the disc surface at the center of the track.
- The objective lens is controlled by the tracking and focusing coil to 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, collimation Lens and some prism arrangement.

Q. No.	Sub Q. N.	Answers	Marking Scheme
5.		Attempt any <u>TWO</u> of the following:	12- Total Marks
	a)	State with suitable diagram the function of each block of OLED TV	6M
	Ans:	Note: Any other equivalent diagram can be considered. Construction: As shown in Fig. any type of OLED is made of the following components 1. An emissive layer. 2. A conducting layer. 3. A substrate. 4. Anode and cathode terminals.	Relevant diagram -3

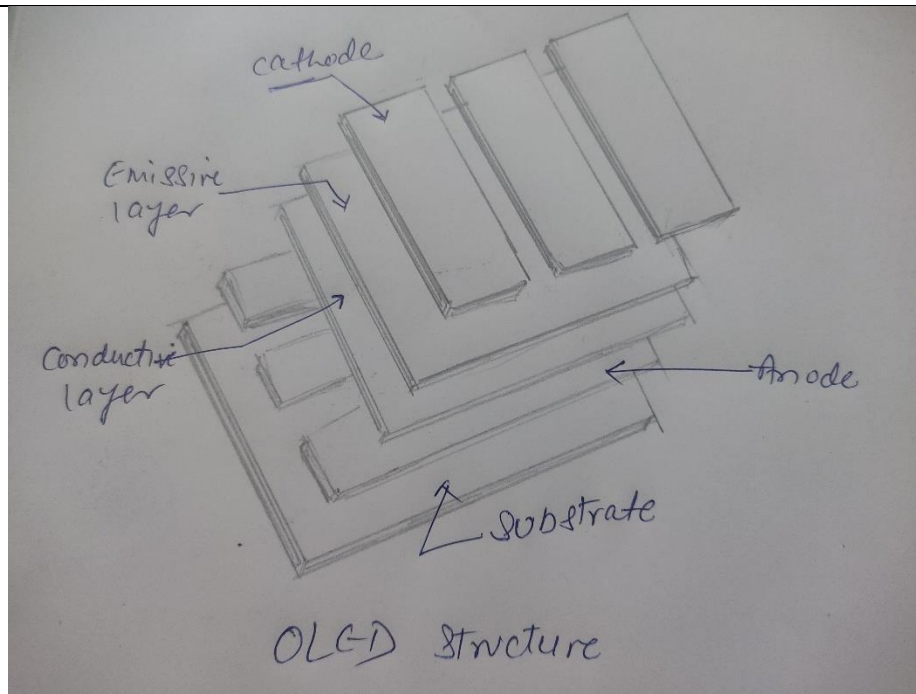
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Model Answer



mks,
detailed
function- 3
mks

- The emissive layer and the conducting layer both are made up of organic molecules of different 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 Indium Tin 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:

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

Operation: A positive voltage is applied to the anode with respect to cathode. Hence an electron produced by the cathode flows to anode.

- This electron is captured by the emissive layer due to which the anode withdraws an electron from the conductive layer. Thus a hole is created in the conductive layer.

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	<ul style="list-style-type: none"> As this process continues, the conductive layer becomes positively charged (full of holes) and the emissive layer is negatively charged (full of electrons) Due to electrostatic forces, these electrons and holes combine together very close to the emissive 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. 	
b)	Explain the picture processing with CCD sensor for DIGICAM	6M
Ans:	<div style="border: 2px solid black; padding: 10px; margin: 10px 0;"> </div> <p>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.</p> <ul style="list-style-type: none"> The charge is then converted into a continuous analogue voltage when the CCD 	<p>3 mks relevant diagram,</p> <p>3 mks explanation</p>



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	<p>charged elements are scanned line by line.</p> <ul style="list-style-type: none">• 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.• Digitized 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, packetizes 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 be a 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 and decompressed and fed into the EVF for display.	
c)	Draw the composite video signal label each section and define pedestal height and colour burst	6M

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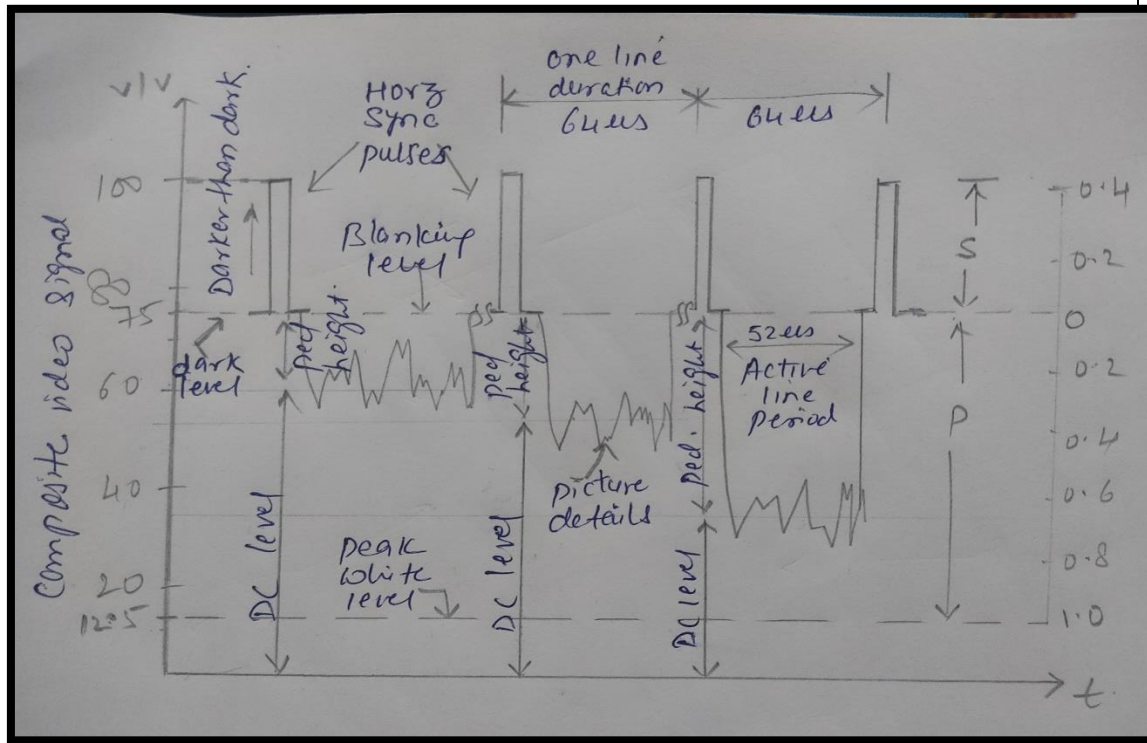
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Ans:



3 mks sketch,
1 ½ mks each for definition

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.

The output signal from TV camera is of very small amplitude. Hence, it is amplified by multistage high gain amplifiers. Sync and blanking pulses are added to it and then signal is clipped at proper value to form pedestal.

Pedestal height determines brightness of scene. Large pedestal height makes picture brighter and vice versa. Operator who observes the picture in studio adjust level for desired brightness by adding dc component to ac signal.

Colour burst signal -The subcarrier is suppressed in the modulated signal (at transmitter), it is necessary to generate it in the receiver for demodulation of the colour signal. This signal generated must be of exactly same frequency and phase as that of the transmitter.

To ensure this, short wave of 8 to 10 pulse called the colour burst is sent to the receiver along with the sync. signals. The colour subcarrier burst is placed or gated

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		<p>onto the back porch of the blanking pulse of the composite video signal. The burst signal acts as Pilot carrier. Burst signal in conjunction with the phase comparator circuit in the receiver is used to lock the local sub-carrier oscillator to frequency as well as the phase of the colour sub-carrier at the transmitter.</p>	
Q. No.	Sub Q. N.	Answers	Marking Scheme
6.		Attempt any <u>TWO</u> of the following :	12- Total Marks
	a)	Draw block diagram of color TV transmitter and label it	6M
	Ans:		Proper , relevant block diagram and label 6 mks
	b)	Draw block diagram of photo copier and explain it's principle of working	6M

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Ans:

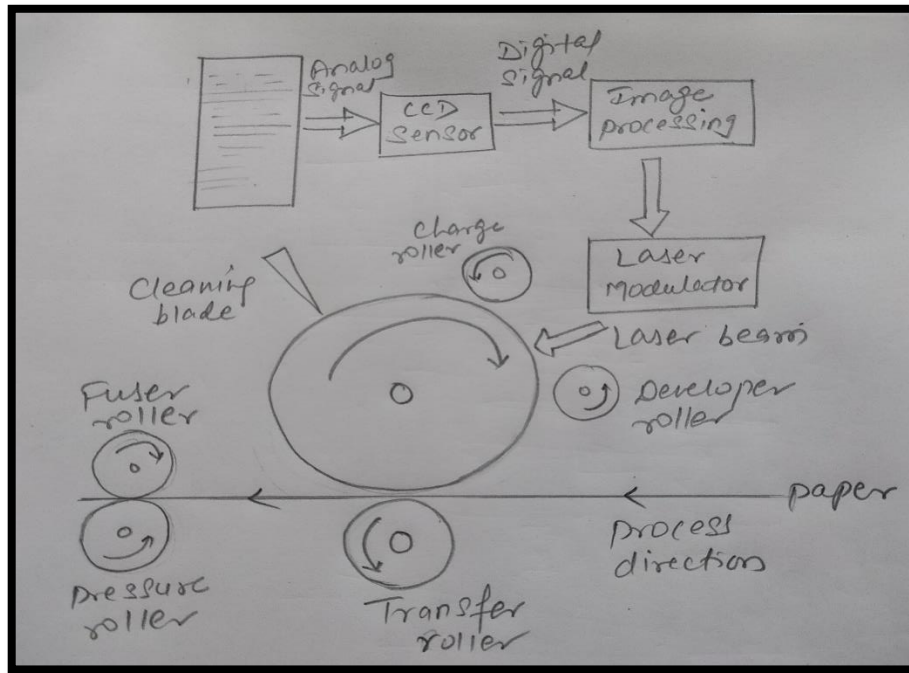


Diagram
3
mks,
working
principle
3
mks

Working principle- The typical photocopying process of a digital photocopier. Firstly, the analog optical image signal of a document is transformed into the digital signal by a CCD sensor. After the image processing step which includes image scaling, image rotating and image overlapping, the processed signal is inputted into a laser modulator. Then a latent image can be acquired by scanning the OPC drum with the modulated laser beam and discharging specific locations on the surface. The discharged locations on the drum attract toner particles which are then transferred onto the output paper through a transfer roller. The toner image on the paper is then fused to the paper through heat and pressure by a fuser. Finally a cleaning blade cleans any residual toner from the drum surface. The photocopy quality is influenced by the imperfections of the corresponding mechanism component in each step and the photocopied output presents the individual photocopying style caused by the source photocopier. Since a document is mainly made up of text characters, thus the photocopied text characters can be considered as an intrinsic signature or fingerprint of the photocopier, which builds the foundation of photocopied text character based photocopier forensics.

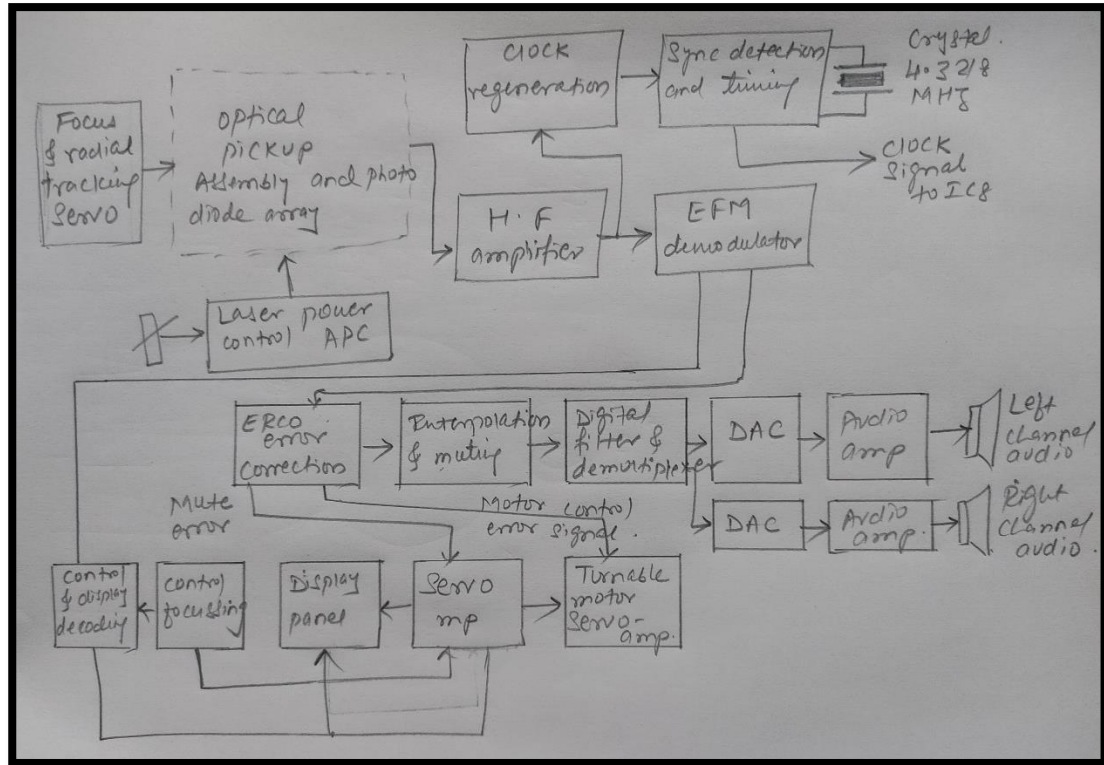
c)

Draw and explain block diagram of CD player state advantages of CD

6M

Model Answer

Ans:



2 1/2
mks
block
diagram,
functions- 2 1/2
mks,
any 2
advantages-1
mks

Functions of block in CD player

• **Focus and Tracking Coil :**

Focus and tracking coils focus the laser beam to the CD surface and to move the assembly to proper track across the disc surface.

• **Optical Pick-up :**

The audio signal stored on the CD surface as pits and flat areas are first picked-up by the optical pick-up made of lens assembly prism, photo detectors and laser diodes assembly in the optical pick-up unit.

• **Photo-diode array converts light rays into electrical signal.**

• **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 (HF) signal contains audio signal as well as synchronization signals in 14-bit EFM (eight to fourteen modulated) format, this signal is sent to an EFM demodulator circuit.

• **EFM Demodulator :**

The EFM demodulator separates the modulated data and the timing signal from



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the signal received at its input. It also removes the additional coupling bits and convert the 14-bit EFM symbol to actual 8-bit data.

The amplified and filtered EFM signal from the high-frequency amplifier is also given to the clock generation circuit to the synchronization detecting and timing circuit.

These circuits are used to recover the bit clock and the sync pattern from the data. The timing signal separated by this circuit is used to provide timing signal to the system.

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

• **Interpolation and Muting :**

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

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

Muting, Last word held, Linear interpolation :

• **Muting :**

In muting, when an error is detected in the data stream, the player will mute (silence) the sound is not send to the speaker.

• **CLV using the Clock Signal :**

The ERCO also responsible for maintaining constant linear velocity of CD rotation motor. For this, the ERCO circuit compares the clock signal derived from the incoming data with a reference clock frequency.

• **De-interleaving :**

Signal from the ERCO contains the audio signal in the interleaved format. Before doing any further operation on this signal, it must be de-interleaved.

This signal is then de-interleaved in the interpolation and muting section to restore the original sequence of the information.

• **Digital Filter and De-multiplexer :**

The de-interleaved and regenerated signal is then send to digital filter and de-



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multiplexer, where it is filtered and separated into 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 output circuit.

- **Oversampling :**

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

- **D/A Converter :**

The output from digital filter and de-multiplexer circuit is send to a D/A converter. The right and left channel signals are processed by separate D/A converters.

These converters convert the 16-bit digital signal into the original analog audio signal. Because of the oversampling, done in the digital filter and de-multiplexer circuit a simple low-pass filter is used.

- **Loudspeaker :**

Converts audio signal into sound signals.

Advantages- (Any two)

1. The CDs can store data/information of about 650 MB to 700 MB.
2. They can store data like images, pictures, videos, games, software, etc.
3. The data stored in the CDs are stored almost permanently.
4. It is very easy to transfer data from CDs to another storage medium with ease.