

# **ELECTRONICS & TELECOMMUNICATION ENGINEERING**

## **SUBJECT: ELECTRONICS COMMUNICATION II**

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### **Short Questions and Answers**

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**1. Mention the major function of the camera tube?**

The major function of the camera tube is to convert an optical image into electrical signals.

**2. Define visual acuity?**

Visual acuity can be defined as the ability of human eye to resolve finer details in a picture

**3. What do you refer by persistence of eye?**

The persistence of eye refers to the storage capability of the human eye

**4. Define luminous intensity?**

It is the measure of light intensity responsible for stimulating visual sensation.

**5. Define aspect ratio?**

Aspect ratio can be defined as the ratio of width to height of the picture frame. For television, it is standardized as 4:3.

**6. Define luminous flux?**

Luminous flux can be defined as the radiated luminous power or power of visible light expressed in terms of its effect on the average or normal human eye.

**7. Define luminance?**

Luminance can be defined as the quantity of light intensity emitted per square centimeter of an illuminated area.

**8. What do you understand by luminance?**

Luminance is the average luminous flux incident on to a surface.

**9. what do you mean by resolving power or resolution?**

It is the ability of the image reproducing system to represent the fine structure of an object.

**10. Mention some important characteristics of human eye?**

Visual acuity, persistence of vision, brightness and color sensation are some of the important characteristics of human eye.

**11. What are rods and cones?**

The retina of the human eye consists of light sensitive cellular structures of two kinds namely rods and cones. The rods sense primarily the brightness levels including very faint impressions. The cones are mainly responsible for color perception. There are 65 lakhs cones and about 10 crores rods connected to the brain through 8 lakhs optic nerve fibres.

**12. Give the relationship between eye parameters?**

The eye parameters are related by the following equation:

$$B = \text{constant} / c^2 \alpha_0^2$$

Where,

c- the constant ratio

b-the scene brightness

$\alpha_0$  - the minimum resolvable angle

**13. Why is scanning necessary in television system?**

Scanning is the important process carried out in a television system in order to obtain continuous frames and provides motion of picture. The scene is scanned both in the horizontal and vertical directions simultaneously in a rapid rate. As a result sufficient number of complete picture of frames per second is obtained to give the illusion of continuous motion.

**14. What do you understand by flicker?**

The result of 24 pictures per second in motion pictures and that of scanning 25 frames per second in television pictures is enough to make an illusion of continuity. But, they are not rapid enough to permit the brightness of one picture or frame to blend smoothly in the next through the time when the screen is blanked between successive frames. This develops in a definite flicker of light that is very irritating to the observer when the screen is made alternately bright and dark.

**15. How will you solve the flickering problem?**

The flickering problem is solved in motion pictures by showing each picture twice. Hence 48 views of the scene are shown per second although they are still the same 24 pictures frames per second. As a result of the increased blanking rate, flicker is removed. In TV, Interlaced scanning is used to avoid flicker

**16. What do you mean by interlaced scanning?**

When the scanning 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. Hence the total number of lines are divided into two groups called fields. Each field is scanned alternately. This way of scanning is called interlaced scanning.

**17. Define vertical resolution?**

The capability of resolving picture details in the vertical direction is called vertical resolution.

**18. What is horizontal resolution?**

The ability of the system to resolve maximum number of picture elements along the scanning lines determines horizontal resolution.

**19. List the contents of a composite video signal?**

Composite video signal consists of a camera signal, blanking pulses and synchronizing pulses.

**20. What do you mean by pedestal?**

The difference between the black level and blanking level is known as the pedestal.

**21. Define peak-white level?**

The peak-white level is defined as the level of the video signal when the picture detail being transmitted corresponds to the maximum whiteness to be handled

**22. Define pedestal height?**

Pedestal height is the distance between the pedestal level and the average value axis of the video signal.

**23. What is the main function of the blanking pulses?**

The composite video signal consist of blanking pulses to make the retrace lines invisible by increasing the signal amplitude little above the black level of 75percent during the time scanning the circuits develop retrace.

**24. What are per the post equalizing pulses?**

To rectify the drawback which occurs on account of half-line discrepancy five narrow pulses are added on either side of the vertical sync pulse. These are called pre-equalising and post-equalising pulses .

**25. Differentiate monochrome and color camera tube.**

In black and white camera only one pickup tube is needed but three such tubes or its equivalent is necessary in color cameras to develop separate signals for red ,green and blue information present in the scene.

**26. Why do we prefer horizontal polarization for television receiving antenna?**

We prefer horizontal polarization for television receiver antenna because it results in more signal strength, less reflection and reduced ghost images.

**27. Where can you employ indoor receiver antennas?**

In strong signal areas it is sometimes feasible to use indoor antennas provided the receiver is sufficiently sensitive.

28. A yagi antenna with a large number of directors is commonly used with success in fringe areas for stations in the vhf band.

**29. What do you understand by diplexer?**

The outputs of both the video and the audio transmitter are combined by the diplexer circuit and given to a common broadcast transmitting antenna.

30. If two stations are operating at the same carrier frequency and located nearby then they will interfere with each other. This is called co-channel interference and it is common in fringe areas.

31. It is the interference due to stations located nearby and allocated as adjacent channels.

**32. Define guard band?**

Guard band can be defined as a small frequency band introduced between two consecutive channels in order to reduce interference.

33. Ghost interference arises as a result of discrete reflections of the signal from the surface of hills, bridges, buildings, towers etc.

**34. Mention the requirements of high level modulation?**

In high level modulation, the video signal has to be modulated by the picture carrier in the final power amplifier which has a high power level. Grid bias modulation is employed.

**38. Why is AM preferred over FM broadcasting the picture signal?**

If FM is adopted for picture transmission, the changing beat frequency between the multiple paths delayed with respect to each other would develop a bar interference in the image with a shimmering effect as the bars continuously change as the beat frequency changes. Therefore, no steady picture is produced. Apart from that, circuit complexity and BW requirements are much less in AM than FM. Hence AM is preferred to FM for broadcasting the picture signal.

**39. What is Dipole array?**

Dipole antenna is used for band I&III transmitters. It consists of dipole panels mounted on the four sides at the top of the antenna tower. Each panel has an array of full wave dipoles mounted in front of reflectors. To get an unidirectional pattern, the four panels mounted on the four sides of the tower are so fed that the current in each lags behind the previous by 90 degrees. This is done by changing

the field cable length by  $\lambda/4$  to the two alternate panels and by reversal of polarity of the current.

**40. Define Image rejection ratio.**

Image rejection ratio is defined as the output due to desired station divided by output due to image signal.

**41. What do you refer by Yagi uda Antenna?**

This is a widely used antenna for television receivers .Generally ,for locations within 40 to 60Km from the transmitter is the folded dipole with one reflector and one director. This is commonly called Yagi antenna or Yagi-Uda antenna.

**42. Name the essential parts of TV transmitter.**

The essential parts of TV transmitter includes a video processing unit . A visual modulator which is a diode bridge modulator, phase compensator or delay equalizer and frequency converter.

**43. What is the main purpose of using VHF tuner?**

The purpose tuner unit is to amplify both picture and sound signals picked up the antenna and to convert the carrier frequencies and their associated side bands into intermediate frequencies.

**44. Name the essential components of RF section.**

RF tuner section consists of RF amplifier ,mixer and local oscillator and is normally mounted on a separate pcb, called the front end.

**45. What are the major tasks to be done by detector?**

The video detector is designed to recover composite video signal and to transform the sound signal to another lower carrier frequency.

**46. Why is video amplifier required?**

The amplitude of the composite video signal at the output of video detector is not enough to drive the picture tube directly . Therefore further amplification is required. This is done by video amplifier.

**47. What are Sync pulses?**

The Synchronizing pulses called 'Sync' are part of the composite video signal as the top 25% of the signal amplitude. The sync pulses include horizontal ,vertical and equalizing pulses. Sync separator separates these signals from the video signal.

**48. Define frequency Distortion.**

The inequality in gain at different frequency components of the received signal is called frequency distortion.

**49. List out the advantages of IF sections.**

The main function of this section is to amplify modulated IF signal over its entire bandwidth with an input of about 0.5mV signal from the mixer to deliver about 4V into the video detector.

IF section is used to equalize amplitudes of sideband components ,because of vestigial side band transmission.

IF section is used to reject the signals from adjacent channels.

**50. What is meant by high level modulation.**

In high level modulation occurs in the output circuit of the final amplifier.

**51. What do you understand by Hue?**

Hue or tint can be defined as the predominant spectral color of the received light. The color of any object is distinguished by its hue or tint.

**52 Define Brightness.**

Brightness can be defined as the amount of light intensity as perceived by the eye regardless of the color.

**53. What do you mean by saturation?**

Saturation refers to the spectral purity of the color light. It indicates the degree by which the color is diluted by white.

**54. List any three requirements to be satisfied for compatibility in television systems.**

- a. It should has the same bandwidth as the corresponding monochrome signal.
- b. The color signal should have the same brightness information as that of monochrome signal.
- c. The location and spacing of the picture and sound carrier frequencies should remain the same.

**55. What is additive mixing?**

All light sensations to the eye are splitted in to three main color groups namely red, blue and green. The optic nerve system integrates the different color impressions in accordance with the curve to perceive the actual color of the object.

**56. State grassman's law.**

The brightness impression produced by the three primaries that constitute the single light. This property of the eye of generating a response which depends on the algebraic sum of the blue ,red and green inputs is called grassman's law.

**57. Explain the significance of generating color difference signals.**

Color difference signals are generated to avoid the separate transmission of R,G,B signals.

**58. Why is (G-y) not suitable for transmission?**

The proportion of G is large in luminance signal, hence magnitude of (G- Y) is relatively small so it requires amplifiers at the receiving end. It affect the signal to noise ratio at the transmitting end.

**59. What is gamma correction.**

A color camera is used develop three voltages proportional to red, green and blue color contents of the picture. These voltages are represented as R,G,B. a correction is applied to these voltages to compensate for any nonlinearity of the system and that of the picture tube. This is called gamma correction .i.e. the camera tube output voltage amplitudes are normalized to I V p-p level.

**60. what do you mean by compatibility?**

Compatibility means that a color TV signal can produce a black and white picture on a monochrome receiver and signals from a black and white system can provide a monochrome picture on a color receiver.

**61. What do you mean by color burst?**

In PAL system the two carrier components are suppressed in the balanced quadrature modulator it is necessary to regenerate at the receiver for demodulation .For this ,8 to 10 cycles of the color subcarrier oscillator output at the encoder are transmitted along with other sync pulses. This sample of the color subcarrier called color burst, is placed at the back porch of each horizontal blanking pulse pedestal.

**62. What is swinging burst?**

The PAL burst phase actually swings 45 about the  $-U$  axis from line to line and indicates the same sign as that of the V signal; thus the switching mode information is the swinging burst. this is known as swinging burst.

**63. Merits of SECAM system.**

SECAM system has several advantages because of frequency modulation of the subcarrier and transmission of one line at a time.

SECAM receivers are immune to phase distortion.

Both the luminance and chrominance signals are not present at the same time ,there is no possibility of cross talk between the color difference signals.

There is no need for the use of QAM at the transmitter and synchronous detectors at the receiver.

The receiver does not need Automatic tuning control and Automatic color control

**64. Demerits of SECAM system.**

In SECAM system luminance is represented by the amplitude of voltage but hue and saturation are represented by deviation of the subcarrier. when a composite signal involving luminance and chrominance is faded out in studio operation, it is the luminance signal that is readily attenuated and not6 the chrominance. This makes the color more saturated during fade to black.

**65. Limitations of the NTSC system.**

The NTSC system is sensitive to transmission path differences which introduces phase errors that result in color changes in the picture. At the transmitter, phase changes in the chroma signal take place when change over between programmes of local and television network systems takes place

and when video tape recorders are switched on .The phase angle is also affected by the level of the signal while passing through various circuits .In addition cross talk between demodulator outputs at the receiver causes color distortion.



**66. Mention some features of PAL system.**

- a. The weighted (B-Y) and (R-Y) signals are modulated without being given a phase shift of  $33^\circ$  as is done in the NTSC system.
- b. On modulation both the color difference signals are allowed the same bandwidth of about 1.3MHz.
- c. The color subcarrier frequency is chosen to be 4.43MHz.
- d. The weighted color difference signals are quadrature modulated with the subcarrier.

**67. Write notes on NTSC system.**

NTSC system is compatible with 525 line American system. In order to maintain compatibility two new color difference signals are generated and they are represented as I and Q. Since eye is capable of resolving finer details in the regions around I, it is allowed to have a maximum bandwidth of 1.5MHz. The bandwidth of Q signal is restricted to 0.5MHz.

**68. What is the difference between NTSC, PAL and SECAM?**

The difference between the SECAM system on one hand and NTSC and PAL on the other is that the later transmit and receive two chrominance signals simultaneously while in the SECAM system only one of the two color difference signal is transmitted at a time.

**69. What do you mean by high frequency pre emphasis?**

In SECAM system, the chrominance signals are pre-emphasized before modulation. After modulating the carrier with the pre-emphasized and weighted color difference signals, another form of pre emphasis is carried out on the signals. This takes the form of increasing amplitude of the sub carrier as its deviation increases. Such a pre emphasis is called high frequency pre emphasis.

**70. What is the use of line identification pulses?**

In SECAM system, the switching of  $D_r$  and  $D_b$  signals line by line takes place during the line sync pulse period. The sequence of switching continues without interruption from one field to the next and is maintained through the field blanking interval. However it is necessary for the receiver to be able to deduce as to which line is being transmitted. Such an identification of the proper sequence of color lines in each field is accomplished by identification pulses.

**71. Write notes on luminance channel.**

The video amplifier in the luminance channel is Dc coupled and has the same bandwidth as in the monochrome receiver. It is followed by a delay line to compensate for the additional delay the color signal suffers because of limited bandpass of the chrominance amplifier. This ensures time coincidence of the luminance and chrominance signals. The channel also includes a notch filter which attenuates the subcarrier by about 10db. This helps to suppress the appearance of any dot structure on the screen along with the color picture.

**72. What is the use of chrominance band pass amplifier?**

The chroma band pass amplifier selects the chrominance signal and rejects other unwanted components of the composite signal.

**73. What do you mean by automatic color control?**

The ACC circuit is similar to the AGC circuit used for automatic gain control of RF and IF stages of the receiver. It develops a dc control voltage that is proportional to the amplitude of the color burst.

**74. Write short notes on color killer circuit.**

When a monochrome transmission is received there is no input to the color killer and no positive voltage is developed. Therefore no input is given to the second chroma amplifier from the color killer circuit, it blocks the second chroma amplifier. Thus it prevents the color noise on black and white picture.

**75. Merits of PAL system.**

The problem of differential phase errors has been successfully overcome in the PAL system.

**76. Demerits of PAL system.**

The use of phase alteration by line technique and associated control circuitry together with the need of a delay line in the receiver makes the PAL system more complicated and expensive. The receiver cost is higher for the PAL color system.

**77. What do you mean by automatic frequency tuning?**

AFT is used to improve the stability of the oscillator circuit, some drift does occur on account of ambient temperature changes, component aging, power supply voltage fluctuation and so on. The fine tuning control is adjusted to get a sharp picture.

**78. Write short notes on burst separator.**

The burst separator circuit has the function of extracting 8 to 10 cycles of reference color burst which are transmitted on the back porch of every horizontal pulse. The circuit is tuned to the subcarrier frequency and is keyed on during the flyback time by pulses derived from the horizontal output stage.

**79. What is the use of color subcarrier oscillator?**

The function of subcarrier oscillator is to generate a carrier wave output at 3.57MHz and feed it to the demodulators. The subcarrier frequency is maintained at its correct value and phase by the APC circuit.

**80. How the phase error is cancelled in the PAL system.**

In PAL system phase shift error is cancelled by reversing the phase angle of v signal on alternate lines.

**81. Give the abbreviation for NTSC, SECAM ,and PAL.**

NTSC -National Television systems committee

SECAM –Sequential –a-Memoire

PAL - Phase Alteration by Line

**82. What do you understand by PAL –D Color system.**

The use of eye as the averaging mechanism for the correct hue is the basic concept of simple ‘PAL’ system. Beyond a certain limit , the human eye see the effect of color changes on alternate lines hence the system needs modification. Considerable improvement found in the system of a delay line is used to do the averaging first and then present the color to the eye. This is called PAL-D or delay line PAL method and is most commonly employee in PAL receivers.

**83. Write short notes on color subcarrier frequency of PAL D system.**

The color sub carrier frequency of 4.43MHz is produced with a crystal controlled oscillator .To accomplish minimum raster disturbance through the color subcarrier it is important to maintain correct frequency relationship between the scanning frequencies and subcarrier frequency .Therefore ,it is usual to count down from the subcarrier frequency to twice the line frequency pulses .

**84. write short notes on AGC circuit.**

AGC circuit is used to control the gain of RF and IF amplifiers. The change in gain is achieved by shifting the operating point of transistors used in the amplifiers. The operating point is changed by a bias voltage that is developed in the AGC circuit.

**85. What do you mean by Peak AGC system?**

The system based on sampling the sync tip levels is known as “peak” AGC system. The Peak AGC system is also called as non-keyed AGC system.

**86. What are the two types of AGC control?**

Forward AGC control

Reverse AGC control

**87. What is Forward AGC control?**

In any transistor amplifier ,gain is varied by shifting the operating point either towards collector current cutoff or saturation. This actually varies beta of the transistor and hence the stage gain changes. When gain is changed by shifting the operating point towards current cutoff ,then it is called “Reverse AGC”.

**88. What is forward AGC?**

In any transistor amplifier ,gain is varied by shifting the operating point either towards collector current cutoff or saturation. This actually varies beta of the

transistor and hence the stage gain changes. When gain is changed by shifting the operating point towards collector current saturation, then it is called "Forward AGC".

**89. List the draw backs of non keyed AGC.**

The AGC voltage developed across the peak rectifier load tends to increase during vertical sync pulse periods because the video signal amplitude remains almost at the peak value every time vertical sync pulses occur. This results in a 50Hz ripple over the negative AGC voltage and reduces gain of the receiver during these intervals. The reduced gain results in weak vertical sync pulse which in turn can put the vertical deflection oscillator out of synchronism causing rolling of the picture.

**90. Merits of Keyed AGC system.**

AGC voltage developed is a true representation of the peak of fixed sync level and thus corresponds to the actual incoming signal strength.

Noise effects are minimized because conduction is restricted to a small fraction of the total line period.

**91. Write short notes on CATV.**

CATV stands for community antenna television systems. The CATV system is a cable system distributes good quality television signal to a very large number of receivers throughout an entire community. Generally this system gives increased TV programmes to subscribers who pay a fee for this service. A cable system may have many more active VHF and UHF channels than a receiver tuner can directly select.

**92. What do you understand by satellite TV?**

Satellite TV is a TV from space. Broadcasters from earth transmit their programmes to specified satellites. Then, the transmissions are returned to receiving equipment on the ground. Therefore, the better the receiving equipment, the higher the quality of the reception.

**96. Give the applications of video tape recorders.**

Smaller and lower priced video tape recorders using 1/2 inch tape are available for closed type circuit TV or for use in the home. They can record and playback programs on a television receiver in color and monochrome. In addition to that small portable cameras are provided for a complete television system with the recorder. These portable systems are also employed for taping television programs from a remote are also employed for taping television programs from a remote location for away from the TV broadcast studio.

**98. What do you mean by Longitudinal video recording?**

A method in which video signals are recorded on atleast several tracks along the length of the tape.

**99. What do you mean by Quadruplex (Transverse) scan recording?**

In transverse scan recording, four recording heads are spaced 90° apart and are mounted on a rotating drum and the tape moves past it, transversely. Each head comes in contact with the tape as the previous one leaves it.

**100. What do you mean by helical scan recording ?**

In helical scan recording, the two recording heads 'look at' the tape surface as it is drawn past them through two tiny rectangular slits mounted on opposite sides of the drum. The heads thus trace out diagonal tracks across the tape, one track per head.

**101. What are two types of video disc system? Laser or optical disc system  
Capacitance disc system**

**102. List the fundamental components of DVD player.**

A drive motor to spin the disc.

A laser and lens system to focus in on the bumps and read them.

Tracking mechanism that can move the laser assembly so that the laser beam can follow the spiral track.

Electronic circuitry

**103. What are the advantages of DVD players over VCR's.**

The quality of picture and sound in a DVD is better than on a video tape, and DVD's maintain their high quality over time, because there is no physical contact with the disc as it revolves.

**104. List 4 merits of digital TV receivers.**

- Reduced Ghosts
- Reduction of 50Hz flicker
- High resolution pictures
- Slow motion action

**PART B**

**1. Describe how the flicker is solved by interlaced scanning?**

**Interlaced Scanning**

Effective rate of 50 vertical scans per second is utilized to reduce the flicker.

Increase the downward rate of travel of the scanning electron beam.

Every alternate line gets scanned instead of every successive line.

**Scanning Periods**

Duration of one horizontal line is 64μs

Duration of one vertical trace is 20ms

**2. Explain the structure and the generation of video output from a vidicon camera.**

- it functions on the principle of photo conductivity
- in photoconductive method where the conductivity or resistivity of the photoconductive surface varies with in proportion to the intensity of light focused on it.
- With a B+ source of 40V ,an area with high illumination may attain a potential of about +39V on the beam side.
- Dark areas may attain a potential of about +35 on the beam side.
- As the beam scans the target plate, it encounters different positive potentials on the side of photo layer that faces the gun.
- Number of electrons from the beam is then deposited on the photo layer surface to reduce to reduce the potential of each element.
- Sudden change in potential on each element causes a current flow in the signal electrode circuit producing a varying voltage across the load resistance.

**3. Give the constructional details of a monochrome picture tube and explain the beam landing**

Employs electrostatic focusing and electro magnetic deflection

Composite video signal that is injected either at the grid or cathode of the tube

Electron Gun:-emits the electron beam with proper energy to cause it to fluoresce, another anode called final anode is included within the tube.

Low Voltage Focusing: It needs less voltage at the focusing electrodes. High

Voltage Focusing: It requires high voltage at the focusing electrode. This focus system is called 'uni potential lens' system.

Picture Tube Screen: Screen phosphor: -light metals such as zinc and cadmium in the form of sulphide, sulphate, and phosphor compounds are used.

Screen Brightness:-picture tubes employ a very thin coating of aluminum on the back surface of the screen .This improves the screen brightness.

**4. Explain in detail the silicon diode array vidicon camera tube.**

It uses photovoltaic type where the target is prepared from a thin n-type silicon wafer instead of deposited layers on the glass faceplate.

Oxidation:-to form a film of silicon dioxide( $\text{SiO}_2$ )which is an insulator.

Photo masking and etching: - an array of fine openings is made in the Oxide layer.

Boron is vaporized through the array of holes.

Thin layer of gold is deposited on each p type opening to form contacts for signal output.

The silicon target plate thus formed is typically 0.003cm thick,1.5 cm square having an array of 540x540 photodiodes.

The Target plate is mounted in a vidicon type of camera tube.

**5. Write notes on composite video signal.**

Composite video signal consists of a camera signal, blanking pulses and synchronizing pulses.

The difference between the black level and blanking level is known as the pedestal.

The peak-white level is defined as the level of the video signal when the picture detail being transmitted corresponds to the maximum whiteness to be handled

Pedestal height is the distance between the pedestal level and the average value axis of the video signal.

The composite video signal consist of blanking pulses to make the retrace lines invisible by increasing the signal amplitude little above the black level of 75percent during the time scanning the circuits develop retrace.

To rectify the drawback which occurs on account of half-line discrepancy five narrow pulses are added on either side of the vertical sync pulse. These are called pre-equalising and post-equalising pulses .

**6. Draw Block Diagram of RF Tuner and explain how incoming signals from different sections are translated to common picture IF and sound IF frequencies.**

RF tuner section consists of RF amplifier ,mixer and local oscillator and is normally mounted on a separate PCB, called the front end.

The purpose tuner unit is to amplify both picture and sound signals picked up the antenna and to convert the carrier frequencies and their associated side bands into intermediate frequencies.

The receiver uses super heterodyne principle. The signal voltage or information from various stations modulated over different carrier frequencies is heterodyned in the mixer with the output from a local oscillator to transfer original information on a common fixed carrier frequency called intermediate frequency(IF)

The setting of local oscillator frequency enables selection of desired station.

**7. Describe briefly the factors that influenced the choice of picture IF =38.9 and sound IF =33.4MHz in the 625 line system.**

The factors that influence the choice of intermediate frequencies in TV receivers are:

Image Rejection Ratio: Image rejection ratio is defined as the output due to desired station divided by output due to image signal.

Pickup due to local oscillator radiation from TV receivers

Image Frequencies should not lie in the FM band

Interference or direct pickup from bands assigned for other services

Gain

**8. Explain how composite video signal is detected ?How is the polarity of video output signal decided?**

Modulated IF signals after due amplification in the IF section are fed to the video detector .

The video detector is designed to recover composite video signal and to transform the sound signal to another lower carrier frequency.

This is done by rectifying the input signal and filtering out unwanted frequency components.



A diode is used, which is suitably polarized to rectify either positive or negative peaks of the input signal.

**9. Draw block diagram of a monochrome TV receiver and briefly explain the operation of TV receiver.**

A black and white receiver has six main sections:-

Tuner section, IF sub system, Video section, Audio section, Deflection and power supply.

Tuner section:

This section consists of RF amplifier, mixer and local oscillator. It selects the desired channel signal from those picked up by the antenna and converts it into the IF band.

IF subsystem:

The IF subsystem includes IF section, AGC circuit and video detector. The IF section provides large amplification to the weak IF signals and the video detector that follows IF amplifiers produces composite video and intercarrier FM sound signals.

Video section:

The Video signal is accorded large amplification and fed to the picture tube.

Audio section:

The sound associated with the picture is transmitted as an FM signal with a center frequency 5.5MHz above the station picture carrier frequency. The sound signal BW is only about 150Khz as compared to the large bandwidth of 5MHz for the picture signal.

Sync separation and processing:

The horizontal and vertical sync pulses that form part of the composite video signal are separated in the sync separator. The composite video signal is either taken from the video detector output or after one stage of video amplification.

DC power supplies:

All the active devices, ICs and picture tube need a dc source for their operation. Rectifiers are used to convert ac to dc and filters provided to eliminate ac ripple in the dc output.

**10. Explain briefly the operation of IF subsystem.**

The IF subsystem includes IF section, AGC circuit and video detector. The IF section provides large amplification to the weak IF signals and the video detector that follows IF amplifiers produces composite video and intercarrier FM sound signals.

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IF section :

The main function of this section is to amplify modulated IF signal over its bandwidth with an input of about 0.5mV signal from the mixer to deliver about 4V into the video detector.

IF section is used to equalize amplitudes of sideband components ,because of vestigial side band transmission.

IF section is used to reject the signals from adjacent channels.

**11. Explain in detail the NTSC color receiver system.**

NTSC system is compatible with 525 line American system. In order to maintain compatibility two new color difference signals are generated and they are represented as I and Q. Since eye is capable of resolving finer details in the regions around I, it is allowed to have a maximum bandwidth of 1.5MHz. The bandwidth of Q signal is restricted to 0.5MHz.

Limitations of the NTSC system.

The NTSC system is sensitive to transmission path differences which introduces phase errors that result in color changes in the picture. At the transmitter, phase changes in the chroma signal take place when change over between programmes of local and television network systems takes place and when video tape recorders are switched on. The phase angle is also affected by the level of the signal while passing through various circuits. In addition cross talk between demodulator outputs at the receiver causes color distortion.

**12. Explain working of a pAL system.**

The weighted (B-Y) and (R-Y) signals are modulated without being given a phase shift of 33° as is done in the NTSC system.

On modulation both the color difference signals are allowed the same bandwidth of about 1.3MHz.

The color subcarrier frequency is chosen to be 4.43MHz.

The weighted color difference signals are quadrature modulated with the subcarrier.

**13. Describe with necessary diagrams the encoding of color difference signal.**

**Quadrature modulation:**

It is used to combine two color difference signals into a single variable.

**Frequency interleaving:**

The technique of combining two distinct signals within the same bandwidth is known as frequency interleaving.

**Color burst:**

Sample of color subcarrier output at the encoder are transmitted along with other sync pulses.

**14. Describe the generation of Y signal and color difference signals.**

In a color camera, the luminance or Y signal is obtained by adding R, G and B in the following proportions

$$Y=0.30R+0.59G+0.11B.$$

**15.Explain in detail about SECAM system.**

SECAM color system is compatible with 819 line monochrome system.

The difference between the SECAM system on one hand and NTSC and PAL on the other is that the latter transmit and receive two chrominance signals simultaneously while in the SECAM system only one of the two color difference signals is transmitted at a time.

In SECAM system, the chrominance signals are pre-emphasized before modulation. After modulating the carrier with the pre-emphasized and weighted color difference signals, another form of preemphasis is carried out on the signals. This takes the form of increasing amplitude of the sub carrier as its deviation increases. Such a preemphasis is called high frequency preemphasis.

**16.Explain the working of U and V demodulators.**

The chrominance available at the output of delay line circuitry consists of two suppressed carrier amplitude modulated components designated as U and V.

These correspond to the two color difference signals and bear information about their amplitude and polarity.

Because of quadrature modulation, the two modulation product signals have a phase difference of 90° at any instant with respect to each other.

Thus when one is passing through its positive or negative peak, the other is passing through Zero.

The demodulating devices are normally biased to cutoff and conduct only at positive peaks of the externally fed subcarrier which is large in amplitude.

**17.Describe with a circuit Burst phase discriminator.**

The burst separator circuit has the function of extracting 8 to 10 cycles of reference color burst which are transmitted on the back porch of every horizontal pulse. The circuit is tuned to the subcarrier frequency and is keyed on during the flyback time by pulses derived from the horizontal output stage.

**18.Write the need and working of Automatic Gain control Circuit.**

AGC circuit controls the gain of RF and IF stage to enable almost constant signal voltage at the output of video detector, despite changes in the signal picked up by the antenna. The change in gain is achieved by shifting the operating point of transistors used in the amplifiers. The operating point is changed by a bias voltage that is developed in the bias circuit.

**19.Write Short notes on color killer circuit.**

When a monochrome transmission is received there is no input to the color killer and no positive voltage is developed. Therefore no input is given to the

second chroma amplifier from the color killer circuit ,it blocks the second chroma amplifier. Thus it prevents the color noise on black and white picture.

**20.Briefly explain PAL-D system.**

The use of eye as the averaging mechanism for the correct hue is the basic concept of simple 'PAL' system. Beyond a certain limit , the human eye see the effect of color changes on alternate lines hence the system needs modification. Considerable improvement found in the system of a delay line is used to do the averaging first and then present the color to the eye.This is called PAL-D or delay line PAL method and is most commonly employe in PAL receivers.