2 MARK QUESTION & ANSWERS

UNIT – I

FUNDAMENTALS OF TELEVISION

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 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.

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

4. What do you understand by illuminance?
   Illuminance is the average luminous flux incident on to a surface.

5. Mention some important characteristics of human eye?
   Visual acuity, persistence of vision, brightness and colour sensation are some of the important characteristics of human eye.

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

7. 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.
8. 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.

9. 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.

10. Define vertical resolution?

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

11. What is horizontal resolution?

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

12. List the contents of a composite video signal?

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

13. What do you mean by pedestal?

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

14. 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.

15. Define pedestal height?

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

16. 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 75 percent during the time scanning the circuits develop retrace.
17. 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.
UNIT – II

MONOCHROME TELEVISION TRANSMITTER & RECEIVER

1. Differentiate monochrome and colour 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.

2. 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.

3. 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.

4. What type of antenna is used in VHF band?
   A yagi antenna with a large number of directors is commonly used with success in fringe areas for stations in the VHF band.

5. 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.

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

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

8. What is ghost interference?
   Ghost interference arises as a result of discrete reflections of the signal from the surface of hills, bridges, buildings, towers etc.

9. 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.

10. What do you understand by ground waves?
    Vertically polarized electromagnetic waves are radiated at zero or small angles with ground. They are guided by the conducting surface of the ground along which they are propagated. Such waves are known as ground or surface waves. As the ground waves travel along the surface of the earth, their attenuation is proportional to frequency. The attenuation is reasonably low below 1500KHz. Therefore, all medium wave broadcast and long wave telegraph and telephone communication is carried out by ground wave propagation.
11. What are sky waves?
In ground wave propagation, frequencies above 1600 KHz does not serve any useful purpose as the signal gets very much attenuated within a short distance of its transmission. Therefore, most radio communication in short wave bands up to 30MHz is carried out by sky waves. When these waves are transmitted high up in the sky, they travel in the straight line until the ionosphere is reached. This region begins about 120Km above the surface of the earth. The region consists of large concentrations of charge gaseous ions, free electrons and neutral molecules. The ions and free electrons cause to band all passing electromagnetic waves.

12. Describe briefly about space wave propagation.
Propagation of radio waves above about 40MHz is not possible through either sky wave or surface wave propagation. Therefore, the only alternative for transmission in the VHF and UHF bands, despite large attenuation is by radio waves which travel in a straight line from transmitter to receiver. This called space wave propagation.

13. 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 changes as the beat frequency changes therefore, no study 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.

14. 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 degree. This is done by changing the field cable length by 1/4 to the two alternate panels and by reversal of polarity of the current.

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

16. 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.

17. 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.
18. 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.

19. 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 subchasis, called the front end.

20. 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.

21. 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.

22. 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.

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

24. 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.

25. What is meant by high level modulation.
   In high level modulation modulation occurs in the output circuit of the final amplifier.
UNIT – III

ESSENTIALS OF COLOUR TELEVISION

1. What do you understand by Hue?
   Hue or tint can be defined as the predominant spectral colour of the received light. The colour of any object is distinguished by its hue or tint.

2. Define Brightness.
   Brightness can be defined as the amount of light intensity as perceived by the eye regardless of the colour.

3. What do you mean by saturation?
   Saturation refers to the spectral purity of the colour light. It indicates the degree by which the colour is diluted by white.

4. List any three requirements to be satisfied for compatibility in television systems.
   a. It should have the same bandwidth as the corresponding monochrome signal.
   b. The colour 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.

5. What is additive mixing?
   All light sensations to the eye are split into three main colour groups namely red, blue, and green. The optic nerve system integrates the different colour impressions in accordance with the curve to perceive the actual colour of the object.

   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.

7. Explain the significance of generating colour difference signals.
   Colour difference signals are generated to avoid the separate transmission of R, G, B signals.
8. Why is \((G-y)\) not suitable for transmission?

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

9. What is gamma correction.

A colour camera is used to develop three voltages proportional to red, green and blue colour 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 \(1\) V p-p level.

10. What do you mean by compatibility?

Compatibility means that a colour 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 colour receiver.

11. What do you mean by colour 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 colour subcarrier oscillator output at the encoder are transmitted along with other sync pulses. This sample of the colour subcarrier called colour burst, is placed at the back porch of each horizontal blanking pulse pedestal.

12. 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.

13. 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.

14. 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.

15. What are the two types of AGC control?

✓ Forward AGC control
✓ Reverse AGC control
16. 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”.

17. 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”.

18. List the drawbacks of nonkeyed 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.

19. 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.
1. 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 colour 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.

2. 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 not the chrominance. This makes the color more saturated during fade to black.

3. Limitations of the NTSC system.
   The NTSC system is sensitive to transmission path differences which introduces phase errors that result in colour 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 colour distortion.

4. 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 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.

5. Write notes on NTSC system.
   NTSC system is compatible with 525 line American system. In order to maintain compatibility two new colour 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.
6. 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.

7. What do you mean by high frequency preemphasis?

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.

8. What is the use of line identification pulses?

In SECAM system, the switching of Dr and Db 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.

9. 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.

10. What is the use of chrominance bandpass amplifier?

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

11. 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.

12. 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.
13. Merits of PAL system.
   The problem of differential phase errors has been successfully overcome in the PAL system.

14. 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 colour system.

15. 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.

16. 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.

17. 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.

18. 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.

19. Give the abbreviation for NTSC, SECAM, and PAL.
   NTSC - National Television systems committee
   SECAM - Sequential –a-Memoire
   PAL - Phase Alteration by Line

20. What do you understand by PAL –D Colour 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 colour 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.
21. Write short notes on colour 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.
1. 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.

2. 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.

3. List some of the applications of satellite TV?

The sheer range of programmes currently available on satellite channel is very much impressive such as 24-hour music videos, news, and feature films. A variety of general entertainment programmes, sports, children’s programmes, foreign language broadcasts and cultural programmes are all available for the keyboard dish owner. Some of these come through subscription channels and others by free to watch channels which are sponsored by advertising.

4. State the merits of satellite TV.

The picture quality from satellite systems is surprisingly good and compares well with conventional land based TV transmissions. In addition unlike terrestrial broadcasts it is free from the spectrum of picture ghosting.

5. Mention the limitations of satellite TV.

The limitation of the satellite TV is varying picture and audio quality. By adopting de-emphasis circuits we can avoid the variations.

6. Give the applications of video tape recorders.

Smaller and lower priced video tape recorders using ½ 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.
7. List some merits of high definition television.
   - Improvement in both vertical and horizontal resolution of the reproduced picture by approximately 2:1 over existing standards.
   - Much improved colour rendition
   - Higher aspect ratio of at least 5:3

8. What do you mean by Longitudinal video recording?
   A method in which video signals are recorded on at least several tracks along the length of the tape.

9. 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.

10. 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.

11. What are two types of video disc system?
    - Laser or optical disc system
    - Capacitance disc system

12. List the fundamental components of DVD player.
    - A drive motor to spin the disc.
    - A laser and lens system to focus on the bumps and read them.
    - Tracking mechanism that can move the laser assembly so that the laser’s beam can follow the spiral track.
    - Electronic circuitry

13. 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.

    - Reduced Ghosts
    - Reduction of 50Hz flicker
    - High resolution pictures
    - Slow motion action
15. Define visual acuity?
    Visual acuity can be defined as the ability of human eye to resolve finer details in a picture

16. What do you refer by persistence of eye?
    The persistence of eye refers to the storage capability of the human eye
16 MARK QUESTIONS

1. Describe how the flicker is solved by interlaced scanning?
2. Explain the structure and the generation of video output from a vidicon camera.
3. Give the constructional details of a monochrome picture tube and explain the beam landing
4. Explain in detail the silicon diode array vidicon camera tube.
5. Write notes on composite video signal.
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.
7. Describe briefly the factors that influenced the choice of picture IF =38.9 and sound IF =33.4MHz in the 625 line system.
8. Explain how composite video signal is detected ?How is the polarity of video output signal decided?
9. Draw block diagram of a monochrome TV receiver and briefly explain the operation of TV receiver.
10. Explain briefly the operation of IF subsystem.
11. Explain in detail the NTSC color receiver system.
12. Explain working of a PAL system.
13. Describe with necessary diagrams the encoding of color difference signal.
14. Describe the generation of Y signal and color difference signals.
15. Explain in detail about SECAM system.
16. Explain the working of U and V demodulators.
17. Describe with a circuit Burst phase discriminator.
18. Write the need and working of Automatic Gain control Circuit.
19. Write Short notes on color killer circuit.
20. Briefly explain PAL-D system.
21. Briefly explain satellite based TV broadcast system.
22. Write short notes on Video disc system.
23. Write short notes on High definition Television.
24. Briefly explain CATV system.