WAVE PROPAGATION AND BROADBAND COMMUNICATION ENGINEERING(WP&BCE)

(As per the latest syllabus prepared by the SCTE&VT, Bhubaneswar, Odisha)

5TH Semester

ELECTRICAL &ELECTRONICS ENGG

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CHAPTER-1

Short Questions With Answers

1. Define an antenna.

Antenna is a transition device or a transducer between a guided wave and a free space waveor vice versa. Antenna is also said to be an impedance transforming device.

2. What is meant by radiation pattern?

Radiation pattern is the relative distribution of radiated power as a function of distance in space .It is a graph which shows the variation in actual field strength of the EM wave at all points which are at equal distance from the antenna. The energy radiated in a particular direction by an antenna is measured in terms of FIELD STRENGTH.(E Volts/m)

3. Define Radiation intensity?

The power radiated from an antenna per unit solid angle is called the radiation intensity U (watts per steradian or per square degree). The radiation intensity is independent of distance.

4. Define Beam efficiency?

The total beam area (WA) consists of the main beam area (WM) plus the minor lobe area (Wm) . Thus WA = WM+ Wm . The ratio of the main beam area to the total beam area is called beam efficiency. Beam efficiency = SM = WM / WA.

5.Define Directivity?

The directivity of an antenna is equal to the ratio of the maximum power density P(q,f)max to its average value over a sphere as observed in the far field of an antenna. D = P(q,f)max / P(q,f)av. Directivity from Pattern. D = 4p / WA. . Directivity from beam area(WA).

6.What are the different types of aperture.?

i) Effective aperture. ii). Scattering aperture. iii) Loss aperture. iv) collecting aperture.
v). Physical aperture.

7.Define different types of aperture.?

Effective aperture(Ae). It is the area over which the power is extrated from the incident wave and delivered to the load is called effective aperture. Scattering aperture(As.) It is the ratio of the reradiated power to the power density of the incident wave. Loss aperture. (Ae). It is the area of the antenna which dissipates power as heat. Collecting aperture. (Ae). It is the addition of above three apertures. Physical aperture. (Ap). This aperture is a measure of the physical size of the antenna.

10. What are the field zone?

The fields around an antenna may be divided into two principal regions. i. Near field zone (Fresnel zone) ii. Far field zone (Fraunhofer zone)

incident field.i.e H= V / E.

8. Define Aperture efficiency?

The ratio of the effective aperture to the physical aperture is the aperture efficiency. i.e Aperture efficiency = hap = Ae / Ap (dimensionless).

Long Questions

1. Write short note on effects of environment in wave propagation.
2. Write short note on Sky wave propagation.
3. Define and derive equation for Radiation mechanism of Antenna.
4. Define dipole Antenna. Explain full wave dipole Antenna in detail.
5. Explain how Yagi-Uda Antenna perform its operation ?

CHAPTER NO-02 :

Short Type Questions With Answers

1. **Define the line parameters?**

Ans- The parameters of a transmission line are Resistance (R), Inductance (L),Capacitance (C),Conductance (G).

2. **What are the secondary constants of a line? Why the lineparameters are calleddistributed elements?**

Ans- The secondary constants of a line are: Characteristic Impedance Propagation Constant Since the line constants R, L, C, G are distributed through the entire length ofthe line, they are calledas distributed elements. They are also called as primary constants.

3. **Define Characteristic impedance**

Ans- Characteristic impedance is the impedance measured at the sending end of the line.It is given by

$Z0 = \sqrt{Z/Y}$,where
$Z = R + j\omega L$ is the series impedance
$Y = G + j\omega C$ is the shunt admittance

4. **Define Propagation constant**

Ans- Propagation constant is defined as the natural logarithm of the ratio of the sendingend currentor voltage to the receiving end current or voltage of the line. It gives the manner in the wave is propagated along a line and specifies the variation of voltage and current in the line as a function of distance. Propagation constant is a complex quantity and is expressed as

$\gamma = \alpha + j\,\beta$

The real part is called the attenuation constant α whereas the imaginary part of propagation constantis called the phase constant β

5. **What is a finite line? Write down the significance of this line?**

Ans- An infinite line is a line in which the length of the transmission line is infinite. A finite line, which is terminated in its characteristic impedance, is termed as infinite line. So for an infinite line, the input impedance is equivalent to the characteristic impedance.

6. **How frequency distortion occurs in a line?**

Ans- When a signal having many frequency components are transmitted along the line, all the frequencies will not have equal attenuation and hence the received end waveformwill not be identicalwith the input waveform at the sending end because each frequencyis having different attenuation. This type of distortion is called frequency distortion.

7. **What is delay distortion?**

Ans- When a signal having many frequency components are transmitted along the line, all the frequencies will not have same time of transmission, some frequencies being delayed more than others. So the received end waveform will not be identical with the input waveform at the sendingend because some frequency components will be delayed more than those of Mention different types of losses in Transmissionline.(w-20)

Ans-

- copper loss,
- Dielectric Loss,
- Radiation or Induction Loss.

Possible Long Questions

1. Explain equivalent circuit of Transmission line and RF equivalent circuit.(w-20)
2. Explain about different losses in Transmission Line.
3. What is impedance matching? Explain single stub matching in detail.
4. Discuss about the primary and secondary constants of transmission line.(w-20)

CHAPTER-3

Possible Short Type Questions With Answers

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

Ans- The major function of the camera tube is to convert an optical image into electricalsignals.

2. **Define visual acuity?**

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

3. **Define aspect ratio?(w-20)**

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

4. **Define luminous flux?**

Ans- Luminous flux can be defined as the radiated luminous power or power of visible lightexpressed interms of its effect on the average or normal human eye.

5. **Define luminance?**

Ans- Luminance can be defined as the quantity of light intensity emitted per square centimeter of anilluminated area.

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

Ans- 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 colour perception. There are 65 lakhs cones and about 10 crores rodsconnected to the brain through 8 lakhs optic nerve fibres.

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

Ans- 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 offrames per second is obtained to give the illusion of continuous motion.

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

Ans- The flickering problem is solved in motion pictures by showing each picture twice. Hence 48views of the scene are shown per second although they are still the same 24 pictures frames per second. As a result of the increased.

9.Define Flicker and Resolution Of TV.?(w-20)

Ans- Flicker is when each frame is only displayed for a short time with black frames inserted between.

Resolution is the total number of pixels available on a display screen or total pixels contained within the processed picture,

Possible Long Questions

1. Explain the function of each block of a TV Transmitter.(w-20)
2. Explain the function of each block of a TV Reciever.
3. Briefly explain about the color TV signals.
4. Explain different types of TV according to its technology.
5. Explain principle of operation of LCD.(w-20)
6. With Neat Diagram, explain the composite video signal.(w-20

CHAPTER-4
Possible Short Type Questions With Answers

1. **What is transmission matrix?**

Ans- When a number of microwave devices are connected in cascade.Each junction is represented bya transmission matrix which gives the output quantities interms of input quantities.

2. **Define VSWR.**

Ans- Voltage standing wave ratio is defined as the ratio of maximum voltage to the minimum vottageVSWR=Vmax/Vmin.

3. **What is the principle of Microwave phase shifter?**

Ans- When a wave propagates on a line,a phase difference prevails between any two arbitary pointsalong its paths.The phase difference between two points.

4. **What are the different types of Directional coupler?**

Ans- Two hole directional coupler, Three hole directional coupler, Four hole directional coupler

5. **What are hybrid couplers?**

Ans- Hybrid couplers are interdigitated microstrip couplers consisting of four parallel striplines withalternate lines tied together,It has four ports.This type of coupler is called Lange hybrid coupler.

6. **Give the drawbacks of klystron amplifiers.**

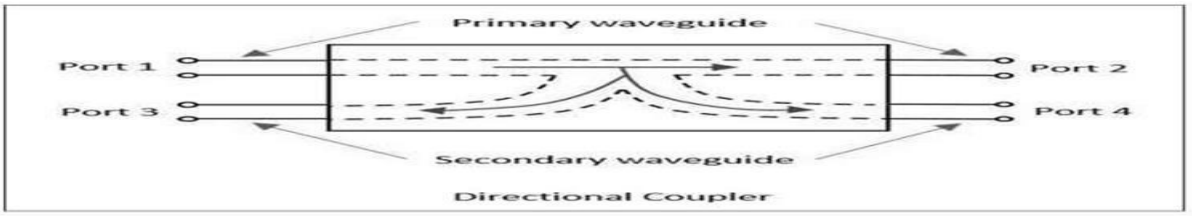
Ans- 1. As the oscillator frequency changes then resonator frequency also changes and the feedbackpath phase shift must be readjusted for a positive feedback.
2. The multicavity klystron amplifiers suffer from the noise caused because bunching is nevercomplete and electrons arrive at random at catcher cavity.
Hence it is not used in receivers.

7. **What is the purpose of slow wave structures used in TWT amplifiers?**

Ans- Slow wave structures are special circuits that are used in microwave tubes to reduce wave velocity in a certain direction so that the electron beam and the signal wave can interact. In TWT, since the beam can be accelerated only to velocities that are about a fraction of the velocity of light,slow wave structures are used.

8. **Draw directional coupler and write its ports.(w-20)**

Ans -



Directional Coupler

Possible Long Type Questions

1. Explain operation of rectangular wave guide and write its advantages.
2. Discuss propagation of EM wave through waveguide with TE and TM modes.
3. Write short note on Cavity Klystron and write its applications.(w-20)
4. Explain operation of Isolator and Circulator.(w-20)
5. Explain briefly about Reflex Klystron.
6. Write short note on Travelling Wave Tube.
7. Explain in detail the principle of operation of Travelling Wave Tubes with a neat diagram.(w-20)

CHAPTER-5
Possible Short Type Questions with Answers

1. **Define Nyquist rate**.

Ans- Let the signal be bandlimited to „W" Hz.
Then Nyquist rate is given as,*Nyquist rate = 2W samples/sec*
Aliasing will not take place if sampling rate is greater than Nyquist rate.

2. **What is meant by aliasing effect?**

Ans- Aliasing effect takes place when sampling frequency is less than Nyquist rate.Under such condition, he spectrum of the sampled signal overlaps with itself. Hence higher frequencies take the form of lower frequencies. This interference of the frequency components iscalled as aliasing effect.

3. **State Sampling theorem.**

Ans- A bandlimited signal of finite energy, which has no frequency components higher than W Hz, may be completely recovered from the knowledge of its samples taken at the rate of 2W samples persecond.

4. **How the message can be recovered from PAM?**

Ans- The message can be recovered from PAM by passing the PAM signal .through reconstruction filter integrates amplitude of PAM pulses. Amplitude reconstruction signal isdone to remove amplitude discontinuities due to pulses.

5. **What do u understand from adaptive coding?**

Ans- In adaptive coding, the quantization step size and prediction filter coefficients are changed as per properties of input signal. This reduces the quantization error and number of bits to represent thesample value. Adaptive coding is used for speech coding at low bits rates.

6. **What is meant by adaptive delta modulation?**

Ans- In adaptive delta modulation, the step size is adjusted as per the slope of the input signal. Stepsize is made high if slope of the input signal is high. This avoids slope overload distortion.

7. **Write the full form of ISDN and BISDN.(w-20)**

Ans- ISDN- Integrated Services Digital Network.
BISDN- Broadband Integrated Services Digital Network

Possible Long Type Questions

1. Explain fundamentals of Broadband Communication.
2. Explain Architecture, Future of Broadband communication system.(w-20)
3. Write short note on SONET. (w-20)
4. Write short note on ISDN.
5. Write short note on BISDN.