

# Section-C

## Lecture-1

- ▣ TRANSMISSION LINES MEASUREMENTS:
- ▣ The Measurement of standing wave Ratio, Wavelength,
- ▣ Impedance,
- ▣ Power and Reflection Coefficient;
- ▣ Special Impedance Measuring methods;

- ▣ Special Impedance Measuring methods;
- ▣ Measurement of standing waves in wave guides;
- ▣ Measurement of Insertion loss

# Electromagnetic Waves:

- ▣ Maxwell was able to establish that electromagnetic waves possess the following properties:
- ▣ The magnetic field oscillates in phase with the electric field.
- ▣ In other words, a wave maximum of the magnetic field always coincides with a wave maximum of the electric field in both time and space.

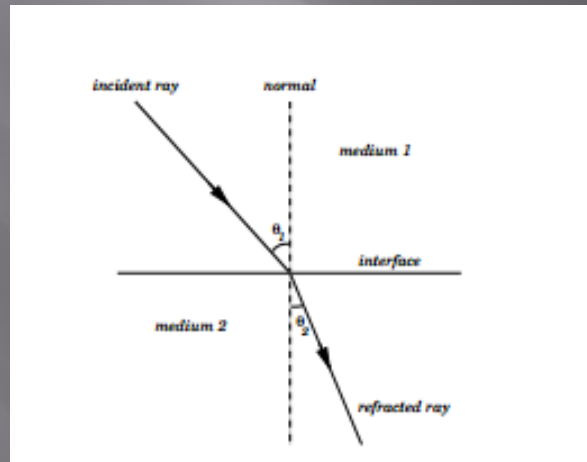
## Contii..

- ▣ The electric field is always perpendicular to the magnetic field, and both fields are directed at right-angles to the direction of propagation of the wave.
- ▣ In fact, the wave propagates in the direction  $\mathbf{E} \times \mathbf{B}$ . Electromagnetic waves are clearly a type of transverse wave

## Law of Refraction:

- ▣ The law of refraction, which is generally known as Snell's law, governs the behaviour of light-rays as they propagate across a sharp interface between two transparent dielectric media.
- ▣ Consider a light-ray incident on a plane interface between two transparent dielectric media.

# The law of refraction:



## Lecture-2

### Dispersion:

- When a wave is refracted into a dielectric medium whose refractive index varies with wavelength then the angle of refraction also varies with wavelength.
- If the incident wave is not monochromatic, but is, instead, composed of a mixture of waves of different wavelengths, then each component wave is refracted through a different angle. This phenomenon is called dispersion.

## What are standing waves:

- ▣ If the transmission is not terminated in its characteristic impedance, then there will be two waves traveling along the line which gives rise to standing waves having fixed maxima and fixed minima.
- ▣ What is called standing wave ratio?
- ▣ The ratio of the maximum to minimum magnitudes of current or voltage on a line having standing wave is called the standing-wave ratio



# What is the use of a circle diagram

- ▣ The circle diagram may be used to find the input impedance of a line of any chosen length

## What are guided waves? Give examples :

- ▣ The electromagnetic waves that are guided along or over conducting or dielectric surface are called guided waves.
- ▣ Examples: Parallel wire, transmission lines

## What is TE wave or H wave?

- ▣ Transverse electric (TE) wave is a wave in which the electric field strength  $E$  is entirely transverse.
- ▣ It has a magnetic field strength  $H_z$  in the direction of propagation and no component of electric field  $E_z$  in the same direction

## What is TH wave or E wave?

- ▣ Transverse magnetic (TM) wave is a wave in which the magnetic field strength  $H$  is entirely transverse. It has a electric field strength  $E_z$  in the direction of propagation and no component of magnetic field  $H_z$  in the same direction

# Lecture-3

- ▣ Why is circular or rectangular form used as waveguide?
- ▣ Waveguides usually take the form of rectangular or circular cylinders because of
- ▣ its simpler forms in use and less expensive to manufacture

# What is a circular waveguide?

- ▣ A circular waveguide is a hollow metallic tube with circular cross section for propagating the electromagnetic waves by continuous reflections from the surfaces or walls of the guide.

- ▣ Why circular waveguides are not preferred over rectangular waveguides?
- ▣ The circular waveguides are avoided because of the following reasons:
  - ▣ a) The frequency difference between the lowest frequency on the dominant mode and the next mode is smaller than in a rectangular wave guide, with  $b/a = 0.5$

- ▣ Mention the applications of circular waveguide.
- ▣ Circular waveguides are used as attenuators and phase-shifters



- ▣ b) The circular symmetry of the waveguide may reflect on the possibility of the wave not maintaining its polarization throughout the length of the guide.
- ▣ c) For the same operating frequency, circular waveguide is bigger in size
- ▣ than a rectangular waveguide.