



# **SNS COLLEGE OF TECHNOLOGY**

**Coimbatore-35**  
**An Autonomous Institution**



Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A++' Grade (3rd Cycle)  
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

## **DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING**

### **19ECT302 – TRANSMISSION LINES AND ANTENNAS**

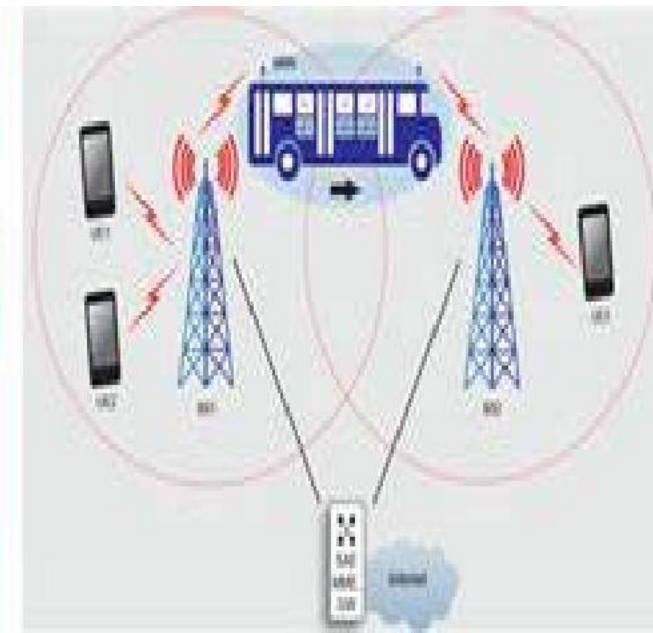
III YEAR/<sub>1</sub> V SEMESTER

#### **UNIT 1 – TRANSMISSION LINE THEORY**

**TOPIC – INTRODUCTION TO TRANSMISSION LINES**



# INFORMATION TRANSFER



How to transfer the information from one place to other ?



# TRANSMISSION MEDIUM



- For information transfer from one place to other requires a medium known as Transmission medium.



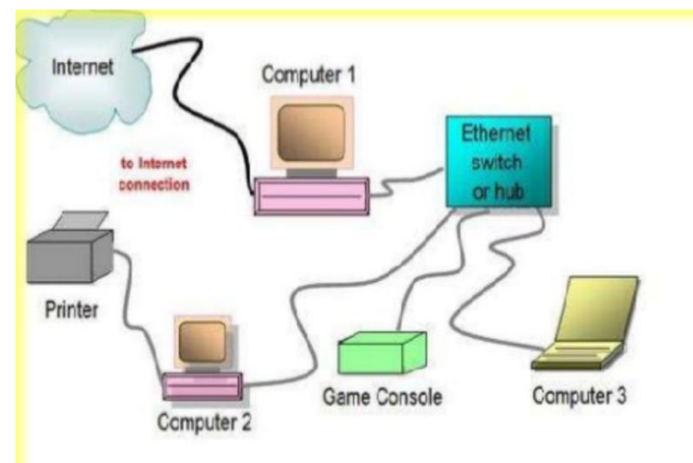
# TRANSMISSION MEDIUM - TYPES



## Wired (Guided)

A guiding structure needed for transmission.

Ex: telephone network , cable television or internet access , and fiber optic-communication etc.,



## Wireless (Unguided)

Transmission happens through free space (air medium)

EX: IR wireless communication, satellite communication, Bluetooth, Zigbee etc.,





# GUIDED TRANSMISSION MEDIUM - TRANSMISSION LINES



- Any physical structure that will guide an electromagnetic wave from one place to other is called a Transmission Line.
- Transmission lines in microwave engineering are known as **distributed parameter networks**.
- Enables the transfer of electrical signals by a pair of conducting wires that are separated from each other by a dielectric medium which is usually air.





# TRANSMISSION LINE - TYPES



## EXAMPLES

- Open wire lines
- cables
- Coaxial Lines
- Optical fibers
- Waveguides





## ACTIVITY



The day before yesterday I was 25.  
The next year I will be 28.  
This is true only one day in a year.  
What day is my birthday?

My birthday is on December 31. I am telling this on January 1.

Day before yesterday (dec 30) = I am 25

Present day (January 1) = I am 26

this year december 31 = I will be 27.

Next year december 31 = I will be 28.



# OPEN-WIRE TRANSMISSION LINE



Open wire line

## Structure

- These are the conductors having two lines (wires) separated by dielectric medium whose one end connected to the source and other to the destination.
- These lines are open to air hence called open wire lines.
- Mounted on towers - Ex., Electrical Power transmission lines, Telephone lines





# OPEN-WIRE TRANSMISSION LINE



Open wire line

## Advantages

- These are low cost and simplest form of transmission line.

## Disadvantages

- But, their installation cost is somewhat higher .
- And its maintenance is sometimes difficult due to the change in atmospheric conditions.



# CABLES



- **Structure**

- These are underground lines
- Telephone cable consists of hundred of conductors which are individually insulated with paper.



# CABLES



- **Advantages**

- Reduced range of Electromagnetic field Emission into the surrounding area.
- They pose no hazard to low flying aircraft or to wildlife

- **Disadvantages**

- More expensive
- Underground repairs can take days or weeks.

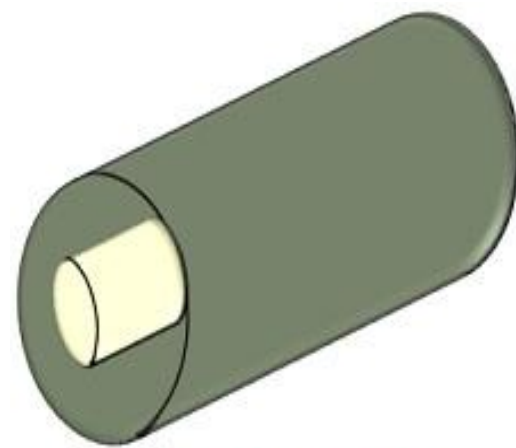


# COAXIAL LINES



## Structure

- These lines are formed when a conducting wire is coaxially inserted inside another hollow conductor.
- The dielectric may be solid or gaseous.
- These are widely used in applications where high voltage levels are needed.



Coaxial cable



# COAXIAL LINES

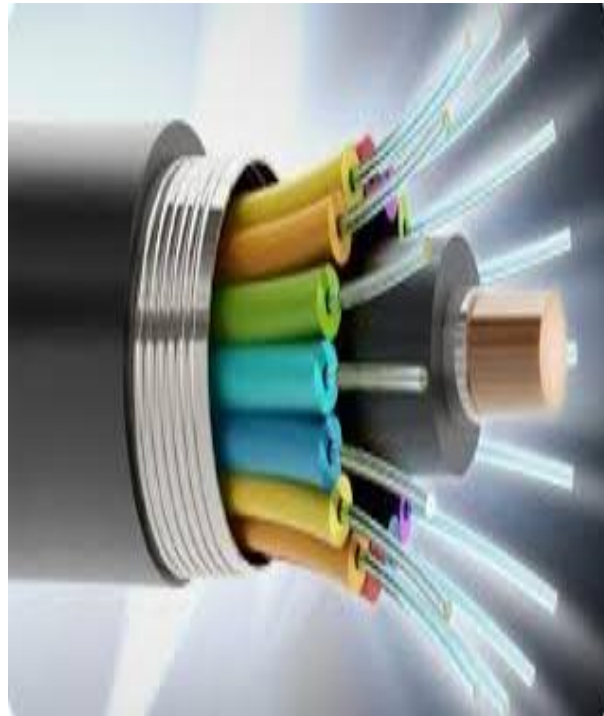


Coaxial cable

- **Advantages**
  - Lower error rates.
  - Coaxial cable shielding reduces noise
- **Disadvantages**
  - Expensive when compared to twisted pair cable.



# OPTICAL FIBERS

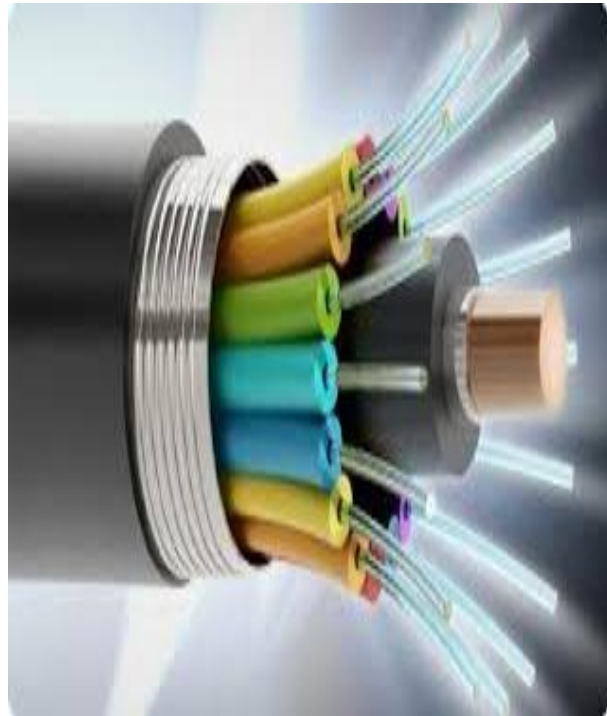


- **Structure**

- Method of transmitting information one place to another by sending pulses of Infrared light.
- An assembly similar to an electrical cable but containing one or more optical fibers that are used to carry light.
- Can transmit voice, video and telemetry through local area networks, computer networks or across long distances.



# OPTICAL FIBERS



## Advantages

- Greater bandwidth.
- Low power loss
- High level of security
- Low cost

## • Disadvantages

- Expensive to install
- Requires more protection



# WAVEGUIDES



- **Structure**

- Used for signal transmission at microwave frequencies.
- These are basically hollow conducting tubes as they somewhat resemble like coaxial cable line but do not have center conductor as present in coaxial cables.
- The energy is transmitted from inner walls of the tube by the phenomenon total internal reflection





# WAVEGUIDES



- **Advantages**

- Higher power handling capability
- Simple structure
- Lower attenuation
- Good amount of immunity against RF Interference from outside

- **Disadvantages**

- Not suitable for low frequency applications
- Bulky in size and weight
- TEM mode propagation is not possible



# ASSESSMENT



IDENTIFY THE TYPES OF TRANSMISSION LINES

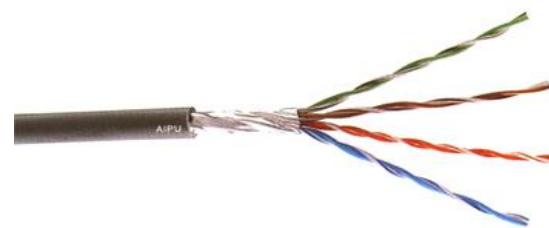




## ASSESSMENT - 2



### IDENTIFY THE TYPES OF TRANSMISSION LINES





## REFERENCES



- J.D.Ryder “Networks, Lines and Fields”, PHI, New Delhi, 2003
- Raju, “Electromagnetic Field Theory and Transmission Lines”, Pearson Education, 2005.

THANK YOU