Week 1. **Study of different types of network cables and practically implement the cross-wired cable and straight through cable using clamping tool.**

Objective: To Analyze the different types of network cables and use them in different communication networks.

Outcome: Student will able to create a Communication network using different types of network cables and Network devices.

Apparatus (Components): RJ-45 connector, Crimping Tool, Twisted pair Cable.

Procedure:

RJ-45 Connector:

Categories Of Coaxial			Connectors	
Category	Impedance	Use		
Rg-59	75	Cable TV	BNC Connector	Used as a TV Set
Rg-58	50	Thin Ethernet	BNC T Connector	Ethernet
Rg-11	50	Thick Ethernet	BNC Terminator	It is used at the end of the cable to prevent the reflection of the signal

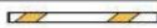**fig.1 Diagram shows you how to prepare Cross wired connection**
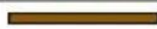
RJ45 Pin # (END 1)	Wire Color	Diagram End #1	RJ45 Pin # (END 2)	Wire Color	Diagram End #2
1	White/Orange		1	White/Green	
2	Orange		2	Green	
3	White/Green		3	White/Orange	
4	Blue		4	White/Brown	
5	White/Blue		5	Brown	
6	Green		6	Orange	
7	White/Brown		7	Blue	
8	Brown		8	White/Blue	

fig 2. Diagram shows you how to prepare straight through wired connection

STRAIGHT THROUGH WIRING
568A

ORANGE	ORANGE
ORANGE WHITE	ORANGE WHITE
GREEN	GREEN
BLUE WHITE	BLUE WHITE
BLUE	BLUE
GREEN WHITE	GREEN WHITE
BROWN	BROWN
BROWN WHITE	BROWN WHITE
FIRST SIDE OF CABLE	SECOND SIDE OF CABLE
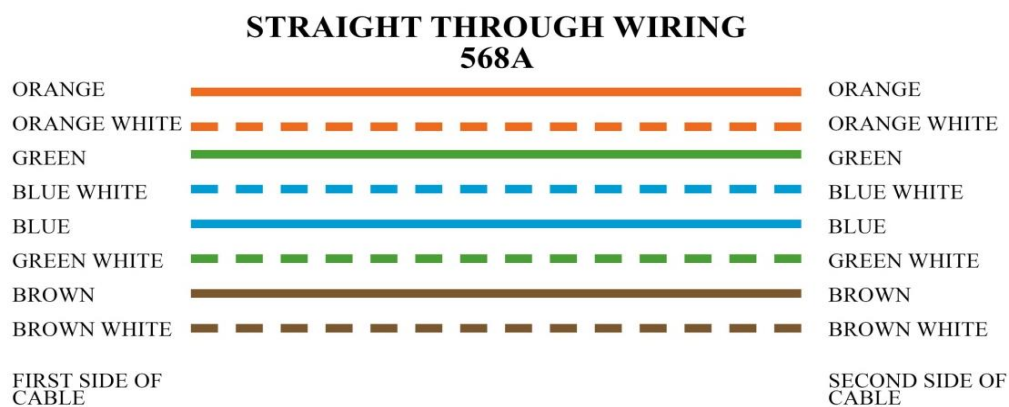
Cable crimping Steps:

1. Remove the outmost vinyl shield for 12mm at one end of the cable (we call this side A-side).
2. Arrange the metal wires in parallel.
3. Insert the metal wires into RJ45 connector on keeping the metal wire arrangement.
4. Set the RJ45 connector (with the cable) on the pliers, and squeeze it tightly.
5. Make the other side of the cable (we call this side B-side) in the same way.
6. After you made it, you don't need to take care of the direction of the cable.
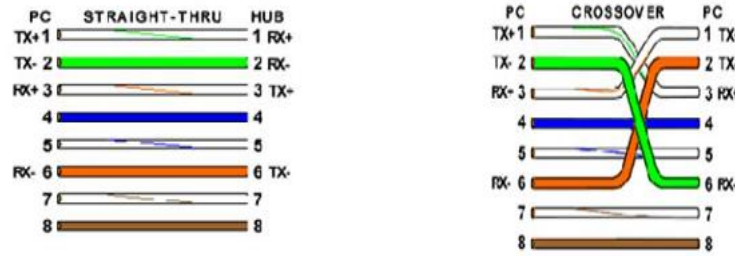
Types of Network Cables:

a).Twisted Pair Cable:

- In this 2 conductors of a single circuit are twisted together. First one work as a Forward circuit and second one is return circuit. It suitable for use in the field of telecommunication for a long time.
- This design helps to reduce noise from outside sources and crosstalk on multi-pair cables. Twisted pair cables has two versions:
- **A). Unshielded Twisted-Pair (UTP)** : UTP cable lacks shielding, it's more susceptible to interference from electronic devices. UTP is used in Ethernet networks.
- **B). Shielded Twisted-pair (STP):** STP cable consists of a foil jacket which helps to prevent crosstalk and noise from outside source. STP is commonly used in Token Ring networks and

Fig: Twisted Pair Cable
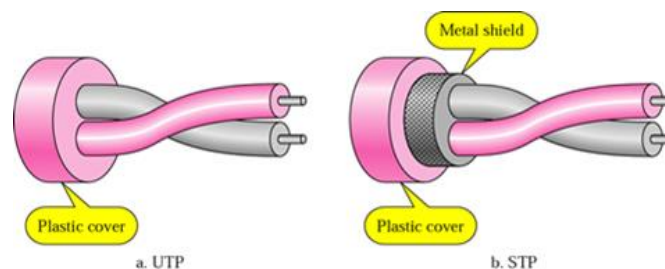
b). Co-axial Cable:

- It is also referred to as coax and It has four layers.
- The core is an "inner conductor" which is surrounded by a "foam insulation", symmetrically surrounded by a woven "braided metal shield". Then covered in a plastic jacket.
- coaxial cable can carry analogy signals with a wide range of frequencies.
- It is widely used in cable television services and video connections, like those used by closed circuit surveillance systems.

Fig. Co-axial cable

A	B	C	D
Inner Conductor	Insulation	Outer Conductor Braid Shield	Jacket
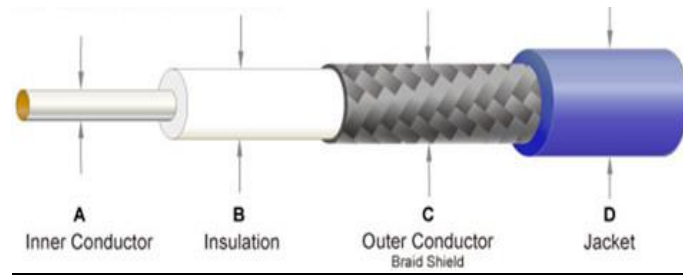
c). Fiber Optic Cable:

- A fiber optic cable is made of glass or plastic and transmit signals in the form of light.
- Each of the optical fiber elements is individually coated by plastic layers and contained in a protective tube.
- A fiber optic cable can accommodate many wavelengths (or channels), able to accommodate ever-increasing data capacity requirements.
- When terminated with LC/SC/ST/FC/MTRJ/MU/ SMA connectors on both ends, such as LC-LC, LC-ST, SC-SC, ST-ST, LC SC cable, fiber optic cables can achieve fiber link connection between equipment during fiber cabling

Fig. Fiber optic cable

Crimping Tool:

A crimping tool is a device used to conjoin two pieces of metal by deforming one or both of them in a way that causes them to hold each other. The result of the tool's work is called a **crimp**. A good example of crimping is the process of affixing a connector to the end of a cable.

Fig. Crimping Tool

RJ-11 (6-Pin) and RJ-45 (8-Pin) Crimping Tool

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Ethernet Cable Tips:

1. A straight-thru cable has identical ends.
2. A crossover cable has different ends.
3. A straight-thru is used as a patch cord in Ethernet connections.
4. A crossover is used to connect two Ethernet devices without a hub or for connecting two hubs.
5. A crossover has one end with the Orange set of wires switched with the Green set.
6. Odd numbered pins are always striped; even numbered pins are always solid colored.
7. Looking at the RJ-45 with the clip facing away from you, Brown is always on the right, and pin 1 is on the left.
8. No more than 1/2" of the Ethernet cable should be untwisted otherwise it will be susceptible to crosstalk.
9. Do not deform, do not bend, do not stretch, do not staple, do not run parallel with power cables, and do not run Ethernet cables near noise inducing components.

Discussion Topics:

1. Define Crimping tool.

A crimping tool is a device used to conjoin two pieces of metal by deforming one or both of them in a way that causes them to hold each other. The result of the tool's work is called a crimp. A good example of crimping is the process of affixing a connector to the end of a cable.

2. What is Network Cabling? List types of Network Cables.

Cable is the medium through which information usually moves from one network device to another. Types of Network cables:
- Unshielded Twisted Pair (UTP) Cable
- Shielded Twisted Pair (STP) Cable
- Coaxial Cable
- Fiber Optic Cable.

3. What is the Use of Registered Jack 45(RJ45) Connector?

Registered Jack 45 (RJ45) is a standard type of physical connector for network cables. RJ45 connectors are most commonly seen with Ethernet cables and networks. Modern Ethernet cables feature small plastic plugs on each end that are inserted into the RJ45 jacks of Ethernet devices.

4. What is the purpose of Crossover Ethernet Cable?

The purpose of a Crossover Ethernet cable is to directly connect one computer to another computer (or device) without going through a router, switch or hub.

5. Compare Shielded Twisted Pair (STP) and Unshielded Twisted Pair(UTP).

STP cable is also divided by overall shield and individual shield. Individual shielded twisted pair is with aluminum foil for each twisted pair or quad. This type of shielding protects cable from external electromagnetic interference (EMI) entering or exiting the cable and also protects neighboring pairs from crosstalk. Overall shielded twisted pair is with overall foil or braided shield across all of the pairs within the 100 Ω twisted pair cable. This type of shielding helps prevent EMI from entering or exiting the cable. One STP cable can have both overall and individual shielding.
UTP cable without shielding is more prone to outside interference. For this reason, this cable type is more often found in indoor telephone applications. Outdoor telephone cables contain hundreds or thousands pairs. Pairs that have the same twisted rate within the cable can experience some degree of

crosstalk, so wire pairs are usually selected carefully within a large cable to reduce the crosstalk.Most UTP cable uses RJ45 connectors, which look like telephone connectors (RJ11) but have eight wires instead of four.

6. Differentiate between Fast Ethernet and Gigabit Ethernet.

- The data rate provided by fast ethernet is up to 100 Mbps. On the other hand, gigabit- ethernet offers up to 1 Gbps speed.
- As the speed is increased in Gigabit ethernet, so the delay is decreased whereas the   fast ethernet generates more delay.
- The configuration of fast ethernet is simpler than gigabit ethernet.
- The distance covered by fast ethernet is at most 10 km. On the contrary, the gigabit ethernet covers 70 km.
- Round trip delay of fast ethernet is 100-500 bit times. As against, gigabit ethernet has the delay of 4000 bit times.