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Semester → 5<sup>th</sup>

Branch → Computer Science Engg.

Subject → Computer Networks

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1)	Recognise the physical topology and colouring of a network		
2)	Recognition and use of various type of connector RJ-45 RJ-11 etc		
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4)	Install and configure a NIC ...		
5)	Identify the IP address ...		
6)	Managing user accounts on windows and LINUX		
7)	Sharing of Hardware resources on the network		
8)	Use of Netstat and its options		
9)	Connectivity troubleshooting using PING, IPCONFIG, IFCONFIG		
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11)	Create a network of at least 6 computers .		

## Practical No. 1

Aim: Recognize the physical topology and cabling (coaxial, OFC, UTP, STP) of a network.

### Types of Topology -

- Bus topology
- Star topology
- Ring topology
- Mesh topology
- Tree topology
- Hybrid topology.

### Cabling of a network:

#### Coaxial Cable-

Coaxial cable has two types wires of copper. The core wire lies in center and is made of solid conductor. Core is enclosed in an insulating sheath. Over the sheath the second wire is wrapped around and that too in turn encased by insulator sheath. This is all covered by plastic cover.

### Optical-fiber cable (OFC) -

A cable with central glass tube covered with protective shield which transmit data using photons is fiber optics cable. These cables transmit data via concentrated bursts of laser beams which are carried through bundles of hair thin glass fibers.

### Unshielded Twisted Pair (UTP) -

It consists of colour-coded copper wires, but does not include any foil or braiding as insulator to protect against interference.

### Shielded Twisted Pair (STP) -

STP is made up of pairs of copper wires that are twisted together. The pairs are covered in a foil or braided mesh, as well as outer PVC jacket. The foil or mesh prevents the penetration of electromagnetic noise and eliminate cross talk.

## Practical No. 2

Aim: Recognition and use of various types of connectors RJ-45, RJ-11, BNC and SCST.

### RJ-45 Connector :-

The RJ-45 connector is a form of telephone connector. It sees its most frequent use as a local-area network connector, and is frequently referred to simply as an Ethernet connector.

### RJ-11 Connector :-

RJ-11 (Registered Jack-11) is a telephone interface that uses a cable of twisted wire pairs and a modular jack with two, four or six contacts. RJ-11 is the common connector for plugging a telephone into the wall and the handset into the telephone.

### BNC :-

BNC connector is commonly used on a Token Ring Network. BNC is also short for Bayonet Nut Connector or British Naval / Navy Connector although more approximately known as the Bayonet Neill Concelman.

## SC and ST connectors :-

SC/ST connectors are used for connecting fiber-optic cabling to networking devices. SC stands for subscriber connector and ST stands for straight tip.

- SC (Subscriber Connector) is a standard-duplex fiber-optic connector with a square molded plastic body and push-pull locking features.
- ST (Straight tip) is a high performance fiber-optic connector with round ceramic ferrules and bayonet locking features.

## Practical No. 3

Aim: Making of cross cable and straight cable.

### Straight - Through Wired Cables :

Straight - Through refers to cables that have the pin assignments on each end of the cable. In other words, Pin 1 connector A goes to Pin 1 on connector B, Pin 2 to Pin 2, etc.

Straight - Through wired cables are most commonly used to connect a host to client. When we talk about patch cables, the straight - through wired patch cable is used to connect computers, printers and other network client devices to the routers switch or hub (the host device in this instance).

### Crossover Wired Cables :

An Ethernet crossover cable is a type of Ethernet cable used to connect computing devices together directly. Normal straight through or patch cables were used to connect from a host network interface controller (a computer or similar device) to a network switch, hub or router. A cable with connections that "cross over" was used to connect two devices of the same type; two hosts or two switches to each other.

## Practical No. 4

Aim: Install and configure Network Interface card in a Workstation.

Requirement: Network Interface card.

Step 1: Install a network card. This could be PCI card or USB network card adaptor.

Step 2: Install the device driver for the network card. Windows will detect that you have installed a new hardware.

Step 3: After the drivers have been installed successfully you can see a network card listed under windows device manager. To go to the device manager click Start → Control Panel → System and Security → Device Manager.

Step 4: Go to network sharing center by clicking Start → Control Panel → Network and Internet → Network and Sharing center.

Step 5: Check your local Area connection by which you can check your LAN status. It shows the network connection duration, the speed

of the connection, number of bytes sent and received etc.

Step 6: Double click on Local Area Connection icon, which will display your LAN status.

Step 7: Click details to see the Network connection details. You will see some very important connection details. Inside the red highlighted area you will see DHCP Enable is set to Yes and your IP address listed.

Step 8: Close the Network Connection details. Click Properties → (on Network area connections details) → Internet protocol version 4 (TCP/IPv4) → Properties.

Step 9: If you have many computers on a network i.e. your Desktop PC, Your Laptop, and your PS3 console it's a good idea to fix the IP address for each device.

Step 10: You can check if the static settings have taken effect by clicking on Details icon. You will notice that the DHCP enable is set to No, as we have set each value manually.

## Practical No. 5

Aim: Identify the IP address of a workstation and the class of the address and configure the IP address of a workstation.

Theory: Sometimes in order to gain connectivity in certain networks where a DHCP server is not running, the configuration of a static IP address is required.

Let's go through the steps now and configure a static IPv4 address in Windows 7.

### Static IPv4 configuration in Windows 7

- ' The first thing that must be done is to gain access to the Network and Sharing center in Windows 7. This can be done in one of two ways; the first way is to access it via the control panel and second is by using search bar.
- ' Select View network status and Tasks.
- ' Open the Network and Sharing Center is open there is an option which allows the change of adapter settings which is shown in the

upper left hand corner of the window.

- Now we will go to Change adapter settings.  
And we will right click on the window that comes to get properties option and then click on that and this screen gives the option to configure a number of different network parameters.
- Make sure to select Internet protocol Version 4.
- Once the properties button is pressed the IPv4 properties window is displayed which shows the interface is currently configured to obtain both the IP address and its DNS server information automatically.
- Select Use the following IP address and enter the IP address as per your preference.
- Once all the parameters have been entered on the screen, simply press OK on both property screen and the configuration of a static IP is complete.

## Practical No. 6

Aim: Create and Manage User Accounts and privileges in Windows 10 and Linux.

Theory: Adding, Configuring, and Changing Windows 10 accounts.

### Create Additional Accounts

You'll create your first Windows 10 account when you first set up and configure a new Windows 10 PC.

- If you want to add another user to your computer, you can do so by opening Start → Settings → Accounts → Family & other people.
- Under other people, click Add someone else to this PC.
- In the resulting dialog box, enter a username, password, confirm the password then create a hint. Click Next to complete the creation of the account.

### Delete Accounts

If any time you would like to delete an account, select the account, open Start → Settings → Accounts → Family & other people, then click

Remove.

Click Delete account and data.

### Change Account Privileges

- 1) Go to the system settings look for an icon which says 'User Accounts'.
- 2) Click on the unlock icon and enter a password when prompted, then click the plus sign.
- 3) A new window would pop-up, asking you for adding information in the new user account. Fill all the details and click create.
- 4) The new account would show, but would be disabled by default.  
⇒ To activate it, click the password option and add a new password. Click change to enable the account.

## Practical No. 7

Aim: Sharing of hardware resources in the network.

- 1) If you're running a typical standalone network switch, you can either unplug the existing Ethernet cables from all existing computers and plug them into the new sharing device or connect the WAN port from the existing hub into one of the ports on the Internet sharing device.
- 2) Plug the power supply from the sharing device into the AC socket.
- 3) Configure one of the PCs on your new network with the default network settings provided by the device manufacturer.
- 4) Run Internet Explorer on the PC you configured in step 3 and use the web-based configuration utility to finish configuring the device.

## Practical No. 8

Aim: Use of Netstat and its option.

The netstat command, meaning network statistics, is a Command Prompt command used to display very detailed information about how your computer is communicating with other computers or network devices.

Specifically, the netstat command can show details about individual network connections, overall and protocol-specific networking statistics, and much more, all of which could help troubleshoot certain kinds of networking issues.

### Netstat Command Availability

The netstat command is available from within the Command Prompt in most versions of Windows including Windows 10, Windows 8, Windows 7, Windows Vista, Windows XP, Windows Server operating systems and some older versions of Windows, too.

#### Syntax -

```
netstat [-a] [-b] [-c] [-f] [-n] [-o] [-p protocol.] [-r] [-s] [-t] [-x]
[-y] [time interval] [/?]
```

## Practical No. 9

Aim: Connectivity troubleshooting using PING, IPCONFIG, IFCONFIG.

### The IPCONFIG command Basics

The IPCONFIG command gets its name from the acronym IP (Internet Protocol) and a shorthand term for configure. Understanding this served as a mnemonic device for me when I was first learning networking. It is used to display and configure your connection to the internet

### Deciphering the Information

To get to ipconfig, we have to get to the command line.

- Click Start, click Run, type in "cmd" & hit enter.
- Type in ipconfig & hit enter. (you can use ipconfig /all for detailed information)

### Ping Your Router (Default Gate)

Use the ipconfig command so that we can get the IP number of the router. As discussed at the end of the last paragraph about ipconfig, we want to ping our router. If we can ping it, then it should be working properly.

To do this, type in ping and the router (default

gateway) number.

### ipconfig Command Line Options

ipconfig has several command line options that you can utilize. You can display all of them with the command ipconfig /?.

Some of the most common uses are -

- ipconfig /release - Releases all IPv4 addresses  
(Requires DHCP)
- ipconfig /renew - Renew all IPv4 addresses  
(Requires DHCP)
- ipconfig /flushdns - Flushes the DNS cache.

## Practical No. 10

Aim: Installation of Network Operating System (NOS)

### Network Operating System Installation -

Installation is one of the most prior thing to build server. This installation includes two things: the installation of hardware and software. As a server that will serve the communication between the network, the server must have at least two network cards. One of the internal network and other external networks. Other requirements in the installation: server installation follows the general requirements operating system, such as:

- The amount of RAM required
- Large hard drive space will be used
- The type and processor speed
- Resolution video / screen (required for the operating system GUI)

This information is normally supplied by the provider of the operating system is concerned.

Example -

For the Operating System Debian Wheezy with

Desktop requires a computer science device requirements such as :-

- At least a Pentium IV processor 1 GHz
- At minimum of 128 MB RAM (Recommended 512 MB)
- At least 5 GB hard drive

### Operating System Installation Methods -

- 1) New Installation
- 2) Upgrade
- 3) Multi-boot
- 4) Virtualization

## Practical No. 12

Aim: Create a Network of Computers (at least 6)

### 1) Obtain the network hardware -

To create a LAN, you will need a router and/or a switch. These hardware items are the "hub" of your LAN, and all of your computer will be connected to them.

### 2.) Connect your modem to the WAN port on the router -

This port may be labelled "INTERNET" instead. This will provide internet access to every computer that is connected to your LAN.

\* You can skip this if you are setting up a LAN without internet access.

\* You don't need a router at all to create a LAN but it makes things easier. If you just use a network switch, you will need to manually assign IP addresses to each computer after connecting them.

### 3.) Connect the switch to a LAN port on the router -

If you are using a network switch to connect more computers, connect it to one of the LAN ports of the router.

- > Find the Ethernet port on your PC -  
You can usually find this on the back of the desktop tower, or along the side or back of a laptop.
- > Plug one end of an Ethernet cable into your computer -  
make sure you are using an Ethernet cable (RJ45), not a telephone cable (RJ11).
- > Plug the other end of the cable into an open LAN port -  
This can be any open LAN port on either the router or the switch, depending on your LAN setup.
- > Test out your network (router only) -  
If you are using a router, your work is complete. Once all of the computers are connected to a LAN port, they will be assigned IPs automatically and will appear on the network.