LAB MANUAL

STUDENTS VERSION

COMPUTER NETWORK ENGINEERING LAB

(FIFTH SEMESTER, COURSE CODE: 5137)

Department Of Computer Engineering
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INDEX

General Remarks (*for office use only*)							
Test 1:		Test 2:		Assign 1:		Assign 2:	

VISION AND MISSION

Government Polytechnic College, Perumbavoor

Vision: Excel as a centre of skill education moulding professionals who sincerely strive for the betterment of society

Mission:

- To impart state of the art knowledge and skill to the graduate and moulding them to be competent, committed and responsible for the well-being of society
- To apply technology in the traditional skills, thereby enhancing the living standard of the community

Department of Computer Engineering

Vision: Excel as a center of skill education in Computer Engineering moulding professionals who sincerely strive for the betterment of themselves and the society.

Mission:

- To impart state of the art knowledge, skill and attitude to the graduates and contribute to their sustainable development
- To merge technologies in the field of computer engineering with occupational skills, thereby improving the quality of living

PEO, PO AND PSOs OF THE PROGRAM

PROGRAM OUTCOMES

PO1: Basic and Discipline specific knowledge: Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems.

PO2: Problem analysis: Identify and analyse well-defined engineering problems using codified standard methods.

PO3: Design/ development of solutions: Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.

PO4: Engineering Tools, Experimentation and Testing: Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.

PO5: Engineering practices for society, sustainability and environment: Apply appropriate technology in context of society, sustainability, environment and ethical practices.

PO6: Project Management: Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.

PO7: Life-long learning: Ability to analyse individual needs and engage in updating in the context of technological changes.

PROGRAM SPECIFIC OUTCOMES (PSOS)

PSO1: Apply concepts and knowledge in the field of software systems, hardware and networking with concern for the society.

PSO2: Generate ideas from the knowledge of engineering specialization leading to professional growth.

PSO3: Apply knowledge and understanding of engineering principles to initiate entrepreneurship ventures.

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

PEO1: Secure successful careers in hardware and software design, development, testing, maintenance and marketing.

PEO2: Acquire knowledge and competency in the domain to develop innovative, cost effective and socially acceptable solutions to engineering problems in a multi-disciplinary work environment.

PEO3: Develop strong fundamental knowledge that prepares them for professional careers/ higher studies with attitude for lifelong learning.

PEO4: Instill the attitude to be sensitive to ethical, societal and environmental issues while pursuing their professional duties.

PEO5: Possess leadership qualities and be effective communicator to work efficiently with diverse teams, promote and practice appropriate ethical practices.

GENERAL INSTRUCTIONS

Rough record and Fair record are needed to record the experiments conducted in the laboratory. Rough records are needed to be certified immediately on completion of the experiment. Fair records are due at the beginning of the next lab period. Fair records must be submitted as neat, legible, and complete.

INSTRUCTIONS TO STUDENTS FOR WRITING THE FAIR RECORD

In the fair record, the index page should be filled properly by writing the corresponding experiment number, experiment name , date on which it was done and the page number.

On the right side page of the record following has to be written:

1. Title: The title of the experiment should be written in the page in capital letters.

2.Exp No: And Date: In the top margin, experiment number and date should be written.

3. Aim: The purpose of the experiment should be written clearly.

4.Principle/Theory: Simple algorithm should be written

5. Procedure: Steps for doing the experiment.

6. Program: Simple working of the algorithm should be written.

7. Results: The results of the experiment must be summarized in writing and should be fulfilling the aim.

On the Left side page of the record following has to be recorded:

1. **Input:** Input of the program given
2. **Output :** Output of the program
3. **Design:** The design of the output (if necessary).

Exp No : 01 **Date :** D D / M M / Y Y

SAFETY PROCEDURES

Problem Statement:

The safety instructions are presented to the attention of the students as a mean of preventing accidents while performing experiments and activities in Software lab of the department .The purpose is to draw attention to the risks involved in lab activities to prevent human suffering and damage to equipment.

Safety in the laboratory:

Working in the lab is not allowed without following electricity precautions displayed.

No individual work is allowed in the lab.

Laboratory in charge is responsible for the arrangements of your lab activities; Listen carefully to his/her instructions and follow them.

To do and not to do:

Inform the lab in charge about dangerous conditions and faults in the lab or nearby environment.

Do not do any action that may harm people or equipment in the lab.

Do not misuse any of the tools or instruments belong to the lab.

Strict discipline should be maintained in the laboratory.

Turn off cell phones before entering the lab.

At the end and beginning of laboratory, follow 5S procedures and leave the work table clean and tidy.

Electrical Safety:

Consult Electrical Engineering section available in the campus for electrical safety queries.

The lab equipment is powered from electrical sockets installed on the tables.

Do not use equipment that is powered from a damaged socket.

Do not use equipment that is powered from flexible cable with damaged insulation or if it's plug is not assembled properly.

Do not repair or disassemble electrical equipment including replacement of fuses installed in the equipment.

Do not open the main fuse box, unless it is an emergency and you need to switch off main circuit breaker.

Be sure to turn off the power and remove the power plug from all equipment before working repairing or assembling.

Do not plug in or remove equipment while the power is on.

Emergency Switches:

The laboratory has circuit breakers, which is located in the main panel. Identify the place.

In an emergency condition, switch off circuit breakers immediately.

Result:

Familiarization of safety precautions performed

	Signature of Lab in Charge	Remarks
Readiness to do experiment		
Completion of Experiment		

Exp No : 02 **Date :** D D / M M / Y Y

HARDWARE COMPONENTS FOR COMPUTER NETWORKING

Aim: To study about the purpose, features and functions of hardware components used in networking.

Theory

Computer network is a group of two or more computers that connect with each other to share a resource. **Sharing of devices and resources is the purpose of computer network.** We can share printers, fax machines, scanners, network connection, local drives and other resources.

Major computer network components

Computer network requires the following devices (some of them are optional):-

Network Hub:

- Network Hub is a networking device which is used to connect multiple network hosts.
- It is also used to do data transfer in terms of packets on a computer network.
- Most hubs are referred to as either active or passive. Active regenerate a signal before forwarding it to all the ports on the device and requires a power supply. Small workgroup hubs normally use an external power adapter, but on larger units the power supply is built in. Passive hubs, which today are seen only on older networks, do not need power and they don't regenerate the data signal.
- When a host sends a data packet to a network hub, the hub copies the data packet to all of its ports connected to. Like this, all the ports know about the data and the port for whom the packet is intended, claims the packet.
- Because of its working mechanism, a hub is not so secure and safe. Moreover, copying the data packets on all the interfaces or ports makes it slower and more congested which led to the use of network switch.

Network Switch:

- A *network switch* (also called *switching* hub, bridging hub, officially MAC bridge) is a computer *networking d*evice that connects devices on a computer *network* by using packet *switching* to receive, process, and forward data to the destination device.

- A switch is more intelligent than a hub. While hub just does the work of data forwarding, a switch does 'filter and forwarding' which is a more intelligent way of dealing with the data packets. So, when a packet is received at one of the interfaces of the switch, it filters the packet and sends only to the interface of the intended receiver.

Network Router:

- A router is a network device which is responsible for routing traffic from one to another network. These two networks could be a private company network to a public network.

- By examining data as it arrives, the router can determine the destination address for the data; then, by using tables of defined routes, the router determines the best way for the data to continue its journey.

- Unlike bridges and switches, which use the hardware-configured MAC address to determine the destination of the data, routers use the software-configured network address to make decisions.

Bridge:

- If a router connects two different types of networks, then a bridge connects two sub networks as a part of the same network.

- A bridge functions by blocking or forwarding data, based on the destination MAC address written into each frame of data.

Repeater:

- A repeater is an electronic device that amplifies the signal it receives.

- Repeater is a device which receives a signal and retransmits it at a higher level or higher power so that the signal can cover longer distances.

Modems

- A modem enables to connect the computer to the available internet connection over **the existing telephone line**.

- A modem is not necessary for LAN, but required for internet connection such as dial-up and DSL.

- There are some types of modems, which differs in **speed and transmission rate**. Standard PC modem or Dial-up modems (56Kb data transmission speed), Cellular modem (used in a laptop that enables to connect while on the go), **cable modem (500 times faster than standard modem)** and DSL Modems are the most popular.

Network Interface Card

- **Network adapter** is a device that enables a computer to talk with other computer/network. Using unique **hardware addresses (MAC address)** encoded on the card chip, the data-link protocol employs these addresses to discover other systems on the network so that it can transfer data to the right destination.

- There are **two types of network cards: wired and wireless.** The wired NIC uses cables and connectors as a medium to transfer data, whereas in the wireless card, the connection is made using antenna that employs radio wave technology. All modern laptop computers incorporated wireless NIC in addition to the wired adapter.

Cables and connectors

- Cable is one way of transmission media which can transmit communication signals. The wired network typology uses special type of cable to connect computers on a network.

- There are a number of solid transmission Media types, which are listed below.

Twisted pair wire

- It is classified as Category 1, 2, 3, 4, 5, 5E, 6 and 7. Category 5E, 6 and 7 are high-speed cables that can transmit 1Gbps or more.

Coaxial cable

- Coaxial cable more resembles like TV installation cable. It is more expensive than twisted-pair cable but provide high data transmission speed.

Fiber-optic cable

- It is a high-speed cable which transmits data using light beams through a glass bound fibers. Fiber-optic cable is high data transmission cable comparing to the other cable types.

Result

Familiarized about the features and purpose of hardware components used in networking.

	Signature of Lab in Charge	Remarks
Readiness to do experiment		
Completion of Experiment		

Exp No : 03 **Date :** D D / M M / Y Y

CRIMPING ETHERNET CABLE

Aim: To crimp Ethernet cable for networking computers.

Tools required: rj45 plug, Ethernet cable, LAN wire cutter, crimping tool and rj45 LAN cable tester.

Theory

Common Ethernet network cables are straight and crossover cable. This Ethernet network cable is made of 4 pair high performance cable that consists of twisted pair conductors that used for data transmission. Both end of cable is called RJ45 connector. The cable can be categorized as Cat 5, Cat 5e, Cat 6 UTP cable. Cat 5 UTP cable can support 10/100 Mbps Ethernet network, whereas Cat 5e and Cat 6 UTP cable can support Ethernet network running at 10/100/1000 Mbps. Straight and crossover cable can be Cat3, Cat 5, Cat 5e or Cat 6 UTP cable, the only difference is each type will have different wire arrangement in the cable for serving different purposes.

Straight Cable

You usually use straight cable to connect different type of devices. This type of cable will be used most of the time and can be used to:

1) Connect a computer to a switch/hub's normal port.
2) Connect a computer to a cable/DSL modem's LAN port.
3) Connect a router's WAN port to a cable/DSL modem's LAN port.
4) Connect a router's LAN port to a switch/hub's uplink port. (normally used for expanding network)
5) Connect 2 switches/hubs with one of the switch/hub using an uplink port and the other one using normal port.

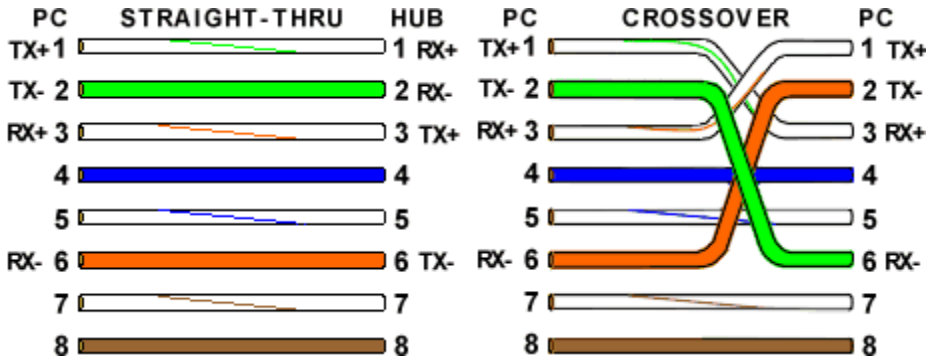
Both side (side A and side B) of cable have wire arrangement with same color.

Pin ID	Side A	Side B
1	Orange-white	Orange-white
2	Orange	Orange
3	Green-white	Green-white
4	Blue	Blue
5	Blue-white	Blue-white
6	Green	Green
7	Brown-white	Brown-white
8	Brown	Brown

Crossover Cable

A crossover cable can be used to:

1) Connect 2 computers directly.
2) Connect a router's LAN port to a switch/hub's normal port. (normally used for expanding network)
3) Connect 2 switches/hubs by using normal port in both switches/hubs.



Procedure

Step 1: Strip the outer cover of LAN Cable

Step 2: Unwind the 4 pair of twisted wire and make it straight and cut the edge of wire.

Step 3: Trim all the wires to the same length

Step 4: Insert the wires into the RJ45 plug in the correct order and then crimp the cable using crimping tool.

Step 5: Do the same procedure on other end also.

Step 6: Test the cable using LAN tester.

RESULT

	Signature of Lab in Charge	Remarks
Readiness to do experiment		
Completion of Experiment		

Exp No : 04 **Date :** D D / M M / Y Y

NETWORK CARD CONFIGURATION

Aim

Install and configure Network Interface Card

Theory

Network Interface Card, a NIC is also commonly referred to as a network adapter and is an expansion card that enables a computer to connect to a network such as a home network and/or the Internet using a Ethernet cable with a RJ-45 connector.

Network Card Driver Installation

Steps

1. First step is to read the user's guide and familiarize yourself with the new card.
2. Power down PC and remove the AC power cord.
3. Open the computer case.
4. Find an available Peripheral Component Interconnect (PCI) slot on the motherboard and remove slot insert if one exists.
5. Carefully remove the network card from its static-proof plastic envelope, and slide it into the slot.
6. Seat the card in the slot firmly with gentle pressure along the length of the card, especially right about the slot itself.
7. Screw the card to the computer frame
8. Close the computer case.

Without installing the driver, network card will not work. If plug in the network card the first time to the computer and boot up the Windows , the system will detect new hardware and prompt to install the driver, you can then use the driver installation CD or the driver downloaded from vendor website to finish the

installation. Sometimes Windows will detect the card and install the driver automatically if it's supported. Next step is to check the driver status to make sure it works well after the driver installation

Checking Network or Wireless Adapter Driver Status

1. Go to **Start** and click on **Control Panel**.
2. Control Panel window will appear, click **Hardware and Sound**.
3. Click on **Device Manager** in Hardware and Sound window.
4. The Device Manager will appear, then locate and expand **Network adapters** and **right click the network or wireless adapter** you want to check, finally click on **Properties**.
5. The network or wireless adapter properties window will appear, your driver works well if it shows **This device is working properly** under General tab. You can also manually configure network adapter's driver parameters under **Advanced** tab.
6. If the device does not work well, click on **Driver** tab to check driver details, update driver, rollback driver, disable driver or uninstall driver.

Result

Installation and configuration of network card is done successfully.

	Signature of Lab in Charge	Remarks
Readiness to do experiment		
Completion of Experiment		

Exp No : 05 **Date :** D D / M M / Y Y

ASSIGNING COMPUTER NAME AND WORKGROUP IN WINDOWS

Aim: To assign a unique name to computer and also the workgroup to which it belongs .

Theory

Assigning **computer name and workgroup** in Windows 7 is highly recommended, because it allows other computers to access your computer to access shared file or printer easily by using computer name. It is needed to assign unique computer name on each computer, but can group all home computers under same workgroup for easy access. Default workgroup in Windows 7 is **WORKGROUP**, same as default workgroup in Windows Vista and Windows XP.

Steps

1) Go to **Start**, right click **Computer** and click on **Properties**

2) System Properties window will appear, and we can see the configured computer name and also workgroup. Just click **Change settings** to change those settings or click **Advanced system settings** to make similar change.

3) System Properties window will appear. Select Computer Name tab and then click **Change…**

4) Proceed to key in **new computer name and workgroup name** in Computer Name/Domain Changes window. Finally click **OK** button to close all windows and restart the computer.

RESULT

	Signature of Lab in Charge	Remarks
Readiness to do experiment		
Completion of Experiment		

Exp No : 06 **Date :** D D / M M / Y Y

INSTALL AND CONFIGURE NETWORK DEVICES:

HUB AND SWITCH

Aim: To connect computers to hub and switch to form a network.

Theory

A hub is simply a device that repeats the signals it receives. It does not "know" which computers are connected to it, and it does not do any network processing based on the source or destination computer. Hubs are primarily used as inexpensive devices that allow you to add more computers to your network. A switch is similar to a hub, except that it registers the IP addresses of the computers plugged into it. When it receives a message, it only sends it to the intended recipient. Switches cut down on unnecessary traffic broadcasts and allow to have an affordable high-performance network.

Steps: computers to hub

1. Connect the hub's power cable into the socket on the back of the device. Plug the power adapter into the power outlet, and then power on the hub.
2. Connect an Ethernet cable from the WAN port of the hub to either the Ethernet port of the internet modem or, if expanding a network, to an empty LAN port on the existing network's router, switch or hub.
3. Plug an Ethernet cable into one of the LAN ports on the Ethernet hub and connect the other end of cable to the computer or device that will be added to the network. Repeat for any other devices that will need to be on the network.

Steps: computers to switch

1. Connect either end of an Ethernet cable into the outgoing port on your broadband or cable modem. Connect the other end of the Ethernet cable into the port on the switch that is marked as "WAN" or "Wide Area Network."

2. Plug a separate Ethernet cable into any of the other numbered ports on the networking switch. Connect the other end of the cable into the Ethernet port on the computer

3. On computer's Start menu and click on the "Control Panel" option. Scroll down through the various Control Panel entries and then double-click the entry labeled as the "Network and Sharing Center." Click on the text link at the left side of the screen labeled as "Connect to a Network."

4. Click on the radio button marked as "Wired Network" and then click on the "Next" button. Scroll down through the list of networking devices that the computer has detected. Locate the entry for your network switch. Click on the entry and then click on the "Connect" button.

5. Connect Ethernet cables to the other computers that need to be networked together. Plug the other end of the cables into any of the open numbered ports on the networking switch. On those computers, repeat the setup process of connecting to the switch by going through the "Network and Sharing Center" menu.

Result

	Signature of Lab in Charge	Remarks
Readiness to do experiment		
Completion of Experiment		

Exp No : 07 **Date :** D D / M M / Y Y

CONNECTION OF TWO COMPUTERS USING LAN CABLE

Aim: To connect two computers using crossover cable and transfer files.

Steps

1. Go to "Control Panel -> Network and Internet -> Network and Sharing Center -> Change Adapter Settings."

2. Click on "Change Adapter Settings." This will reveal different connections. Select the appropriate connection for your LAN. Usually, the connection will be called Ethernet and have the description network cable unplugged .Right-click on the connection and select "Properties." The local area's connection properties window will appear.

3. Under the network tab select "Internet protocol version 4 (TCP/IPv4)," then click on "Properties."In the Properties windows set the IP address and subnet masks of the first computer to: IP – 192.168.0.1 Subnet Mask – 225.225.225.0

4.Repeat all the above steps for the second computer, and set the IP address and subnet Mask as follows: IP – 192.168.0.2 Subnet Mask – 225.225.225.0

5. Connect the crossover cable to the network ports of the two computers.

6. Right-click on "This PC," and choose "Properties." Click on "Change settings -> Change." This reveals the window with the name of the work group. The value for the workgroup name should be the same for both PCs. By default, the workgroup name will be WORKGROUP, but can change it to any name.

7.Right-click on the drive to share. Scroll to the "Give access to" option and click "Advanced Sharing." Under the sharing tab, click the "Advanced Sharing" button. This reveals the advanced sharing window. Check the "Share this folder" checkbox, and click "Apply -> OK."

Transferring Files

Specific folders or files can now be transferred.

To share specific folders or files from Computer A with Computer B

Steps

1. Right-click the desired folder or file in Computer A, scroll to the "Give access to" option and click "Specific People."

2.Select "Everyone" from the drop-down menu in the file sharing window. Next, click "Add" and click "Share."

3.Go to the Network Panel on Computer B, and will see the name of whatever computer is part of the network. Double-click on Computer A , and all files shared will be displayed. At this stage you can use the normal copy and paste to move the desired content.

4.In the case of copying files from Computer B to Computer A, perform the same steps, but this time the steps previously performed on Computer A are performed on Computer B and vice versa.

RESULT

	Signature of Lab in Charge	Remarks
Readiness to do experiment		
Completion of Experiment		

Exp No : 08 Date : D D / M M / Y Y

TO CONNECT THE COMPUTERS IN LOCAL AREA NETWORK

Aim: Connect the computers in Local Area Network.

Procedure:

On the host computer

On the host computer, follow these steps to share the Internet connection:

1. Log on to the host computer as Administrator or as Owner.

2. Click **Start, and then click Control Panel.**

3. Click **Network and Internet Connections.**

4. Click **Network Connections.**

5. Right-click the connection that you use to connect to the Internet. For example, if you connect to the Internet by using a modem, right-click the connection that you want under Dial-up / other network available.

6. Click **Properties.**

7. Click the **Advanced tab**.

8. Under I**nternet Connection Sharing**, select the **Allow** other network users to connect through this computer's Internet connection check box.

9. If you are sharing a dial-up Internet connection, select the Establish a dial-up connection whenever a computer on my network attempts to access the Internet check box if you want to permit your computer to automatically connect to the Internet.

10. Click **OK.** You receive the following message:

When Internet Connection Sharing is enabled, your LAN adapter will be set to use IP address 192.168.0.1. Your computer may lose connectivity with other computers on your network. If these other computers have static IP addresses, it is a good idea to set them to obtain their IP addresses automatically. Are you sure you want to enable Internet Connection Sharing

11. Click **Yes.**

The connection to the Internet is shared to other computers on the local area network (LAN). The network adapter that is connected to the LAN is configured with a static IP address of 192.168.0.1 and a subnet mask of 255.255.255.0

On the client computer

To connect to the Internet by using the shared connection, you must confirm the LAN adapter IP configuration, and then configure the client computer. To confirm the LAN adapter IP configuration, follow these steps:

1. Log on to the client computer as Administrator or as Owner.

2. Click **Start**, and then click **Control Panel**.

3. Click **Network and Internet Connections.**

4. Click **Network Connections.**

5. Right-click **Local Area Connection** and then click **Properties.**

6. Click the **General tab**, click I**nternet Protocol** (TCP/IP) in the connection uses the following items list, and then click **Properties.**

7. In the Internet Protocol (TCP/IP) Properties dialog box, click Obtain an IP address automatically (if it is not already selected), and then click **OK**.

Note: You can also assign a unique static IP address in the range of 192.168.0.2 to

192.168.0.254. For example, you can assign the following static IP address, subnet mask, and default gateway:

8. IP Address 192.168.31.202

9. Subnet mask 255.255.255.0

10. Default gateway 192.168.31.1

11.In the **Local Area Connection Properties** dialog box, cli ck **OK.**

12.Quit **Control Panel**.

Result:

The computers Connected in Local Area Network.

	Signature of Lab in Charge	Remarks
Readiness to do experiment		
Completion of Experiment		

Exp No : 09 **Date :** D D / M M / Y Y

CONFIGURE HOST IP, SUBNET MASK AND DEFAULT GATEWAY IN A SYSTEM IN LAN (TCP/IP CONFIGURATION).

Aim:

To Configure IP Address in a system in LAN (TCP/IP Configuration) and Configure DNS to establish interconnection between systems

Theory

Classification of IP address

Class	Range	Hosts	Networks
Class A	1.0.0.1to 126.255.255.254	16 million	**127**
Class B	128.1.0.1 to 191.255.255.254	65,000	16,000
Class C	192.0.1.1 to 223.255.254.254	254	2 million
Class D	224.0.0.0 to 239.255.255.255	Reserved for multicast groups	
Class E	240.0.0.0 to 254.255.255.254	Reserved	

Procedure:

(a) Steps to configure IP address, Subnet mask and Default Gateway:

1. Click on the Start button and select Control Panel then Network and Internet Connections.
2. Click Network and Internet Connections.
3. Right click on the Local Area Connection icon and select Properties.
4. Select Internet Protocol (TCP/IP).
5. Click on the Properties button.
6. Uncheck that Obtain an IP address automatically and Obtain DNS server address automatically and put

IP, Subnet mask & Default Gateways.

7. Click on the Advanced button and select the DNS tab in the Advanced TCP/IP Settings window.

8. Ensure that Register this connection's addresses in DNS is not selected.

9. Click OK, OK, then Close to close all boxes.

Result :

Configuration of IP Address in a system in LAN (TCP/IP Configuration) and Configuration to establish interconnection between systems have been done successfully.

	Signature of Lab in Charge	Remarks
Readiness to do experiment		
Completion of Experiment		

Exp No : 10 **Date :** D D / M M / Y Y

PEER TO PEER NETWORK CONNECTION

Aim: To establish peer to peer network connection in a LAN and share folders among work group.

Principle:

Computer networks are of two types. One is the Client server model where all computers are connected to a server computer that facilitates file sharing. The other type of computer network is Peer to Peer. Peer to peer means absence of a dedicated server. As the name suggests, they are connected as peers – directly to each other instead of having to connect to a server. They can be connected via the USB or via Ethernet cables. Suppose there are three computers A, B, and C, if A connects to B and B connects to C, the users of A can easily access files and printers connected to C, provided the computer C allows for file and printer sharing.

In a peer to peer (P2P) network, a computer is both a client and a server at the same time. It is a client because it asks for data or any other service from a different computer to which, it is connected. It is a server because it provides access to the files on its hard disk or to the peripherals connected to it, to other connected computers.

Procedure:

1. Creation of workgroups

Workgroups are small networks that share files, printers and Internet connections.

Steps

1. Click the "Start" button, right-click on "Computer" and select "Properties" from the context menu to open the "System and Security" window.

Click "Advanced system settings" to open the System Properties dialog.

3. Select the "Computer Name" tab, and then click "Change" to open the Computer Name/Domain Changes dialog.

4. Mark the "Workgroup" radio button, and then type the name of the new workgroup in the text field.

5. Click "OK" to create the workgroup and then click Yes when you are prompted to restart your computer.

2. To create a user account

1. Click Start -> Control Panel
2. Under User Accounts and Family Safety, click Add Or Remove User Accounts
3. Click Create a New Account
4. Specify a user name.
5. You have the option of making it a regular account (Standard option) or an account that can perform more advanced options (such as managing other account and/or controlling various operations on the computer). When you are ready, click Create Account
6. To assign a password to the account, click the account to open its properties
7. Click Create a Password
8. Type a password in the first text box and press Tab
9. Type the same password and press Tab twice
10. Type something that can help you remember the password if you happen to forget it
11. Click Create Password

3. Sharing a folder

1. To create a folder, open Windows Explorer or any file utility of your choice. select the drive. Right-click it or right-click the right frame, position the mouse on New, and click Folder:
2. Give a name to the folder and press Enter
3. After creating a folder, to share it:
4. Start Windows Explorer and display the drive where the folder is located

5. Right-click the folder -> Share With -> Specific People...
6. Click the arrow of the combo box:Then:
    - If you want to control access of the folder for all user accounts, click Everyone
    - If you want to control access for a specific account and that account is in the list, select it
    - If you want to control access for a certain user but his or her account is not listed, click Create A New User... and create the new account

7. Under Permission Level click the down-pointing arrow for the account you selected

Select the desired permission, click Share and click Done

4. Accessing a shared folder

When a folder is shared in a computer, the other computers can access it. To access such a folder from another computer, you must use an account that exists in the computer where the folder is shared.

To access a shared folder:

1. Open Windows Explorer
2. In the left frame, click Network.
   The right should play the names of the computers of the same network
3. Double-click the icon of the computer where the desired folder is located
4. A Windows Security dialog box may come. In the top text box, type the name of the computer that has the folder, followed by \, followed by the user account you created in that computer
5. Press Tab
6. Type the password that was given to that account
7. About the check box:

a. If you leave Remember My Credentials unchecked, the next time you try accessing the folders of that computer, you will be asked to provide the credentials (user name and password) again

b. If you check Remember My Credentials, next time, you can access the folders of that computer

When you are ready, click OK
The computer should then show its shared folder(s)

Result:

	Signature of Lab in Charge	Remarks
Readiness to do experiment		
Completion of Experiment		

Exp No : 11 **Date :** D D / M M / Y Y

PRINTER SHARING IN A LAN

Aim: To share printer among workgroup and can print to any shared printer.

Principle:

Printer sharing is the process of allowing multiple computers and devices connected to the same network to access one or more printers. Each node or device on the network can print to any shared printer and, to some extent, make changes to the printer settings, depending on the permissions set by the administrator for each user. The sharing is facilitated by the OS, which handles the communication between computers and devices within the network and the printer itself. When a print request is sent from a networked computer, this is received by the computer where the shared printer is attached; this host computer initializes the printer and then sends the print job to it.

Procedure

1.Log on to the computer with the printer connected, Control Panel > Appearance and Personalization. Select Folder Options, then select the View tab, then uncheck Use Sharing Wizard (Recommended) if it is checked. Then click OK.

2.Click Start > Control Panel > Chose homegroup and sharing options > Change advanced sharing settings. The “Change sharing options for different network profiles” screen appears. For the current profile, scroll down to Password protected sharing and then check Turn on file and printer sharing. Also check Turn off password protected sharing. Click Save changes.

3.Click Start > Control Panel > View devices and printers. Right-click the printer, and then select Printer properties. The “Printer Properties” window opens. Click the Sharing tab. Select Share this printer. Name the new share as All-in-One Printer and then click OK.

Log on to the computer without the printer connected.

4.Click Start > Control Panel > View devices and printers. Then click Add printer. The “Add Printer” window appears. Click Add a network, wireless or Bluetooth printer. The “Searching for available Printers” screen appears. When all printers are discovered, the “Select a printer” screen appears. If displayed in the search list, select Printer on Computer name. Click Next. If prompted to install drivers, click Install driver. If User Account Control appears, click Continue. The “You’ve successfully added a printer” screen appears. After the printer successfully installs, click Next. Click Finish to close the “Add Printer” window.

5.In the Devices and Printers window, right-click the printer, and then select Printer properties. Click Print Test Page.

Result

Printer sharing established among workgroup and printed a test page successfully.

	Signature of Lab in Charge	Remarks
Readiness to do experiment		
Completion of Experiment		

Exp No 12 **Date :** D D / M M / Y Y

REMOTE DESKTOP CONNECTION

Aim

To establish connection to a remote desktop.

Principle

With Remote Desktop Connection, you can connect to a computer running Windows from another computer running Windows that's connected to the same network or to the Internet. For example, you can use all of your work computer's programs, files, and network resources from your home computer, and it's just like you're sitting in front of your computer at work. To connect to a remote computer, that computer must be turned on, it must have a network connection, Remote Desktop must be enabled, you must have network access to the remote computer (this could be through the Internet), and you must have permission to connect. For permission to connect, you must be on the list of
users.

To allow remote connections on the computer you want to connect to

1. Click Start button right-click Computer, and then click Properties. Click Remote settings.
2. If you're prompted for an administrator password or confirmation, type the password or provide confirmation. Under Remote Desktop, select one of the three options.
3. Click Select Users. If you're an administrator on the computer, your current user account will automatically be added to the list of remote users and you can skip the next two steps.
4. In the Remote Desktop Users dialog box, click Add.

5. In the Select Users or Groups dialog box, do the following:

6. To specify the search location, click Locations, and then select the location you want to search.

7. In Enter the object names to select, type the name of the user that you want to add, and then click OK.

8. The name will be displayed in the list of users in the Remote Desktop Users dialog box. Click OK, and then click OK again.

To look up the computer name of the remote computer

1. On the remote computer, open System by clicking the Start button , rightclicking Computer, and then clicking Properties.

2. Under Computer name, domain, and workgroup settings, you can find your computer name, and its full computer name if your computer is on a domain.

To allow Remote Desktop connections through a Windows Firewall

If you're having trouble connecting, Remote Desktop connections might be getting blocked by the firewall. If you're using another firewall, make sure the port for Remote Desktop (usually 3389) is open.

1. On the remote computer, click Start and select Control Panel.

2. Click System and Security.

3. Click Allow a program through Windows Firewall under Windows Firewall.

4. Click Change settings and then check the box next to Remote Desktop.

5. Click OK to save the changes.

To set a password for your user account

Your user account must have a password before you can use Remote Desktop to connect to another computer.

1. Click Start and select Control Panel.

2. Double-click User Accounts.

3. Select Change your Windows Password under User Accounts.

4. Click Create a password for your account and follow the instructions on the screen.

To start Remote Desktop on the computer you want to work from

1. Click Start button
2. In the search box, type Remote Desktop Connection, and then, in the list of results, click Remote Desktop Connection.
3. In the Computer box, type the name of the computer that you want to connect to, and then click Connect. (You can also type the IP address instead of the computer name.)

Result

Remote desktop connection established successfully.

	Signature of Lab in Charge	Remarks
Readiness to do experiment		
Completion of Experiment		

Exp No 13 **Date :** D D / M M / Y Y

COMMANDS- IPCONFIG, PING / TRACER AND NET STAT

Aim: To Configure Internet connection and use IPCONFIG, PING / Tracer and Net stat utilities to debug the network issues**.**

Procedure:
Configure Internet connection and use IPCONFIG, PING:

1. Open Command Prompt, and then type ipconfig. From the display of the ipconfig command, ensure that the network adapter for the TCP/IP configuration you are testing is not in a Media disconnected state.
2. At the command prompt, ping the loopback address by typing ping 127.0.0.1.
3. Ping the IP address of the computer.
4. Ping the IP address of the default gateway. If the ping command fails, verify that the default gateway IP address is correct and that the gateway (router) is operational.
5. Ping the IP address of a remote host (a host that is on a different subnet).
If the ping command fails, verify that the remote host IP address is correct, that the remote host is operational, and that all of the gateways (routers) between this computer and the remote host are operational.
6. Ping the IP address of the DNS server.If the ping command fails, verify that the DNS server IP address is correct that the DNS server is operational, and that all of the gateways (routers) between this computer and the DNS server are operational.

Tracer to debug the network issues.

Tracer network:
Open Command Prompt, and type the following:

tracert host_name
Or
tracert ip_address

where host_name or ip_address is the host name or IP address, respectively, of the remote computer.
If you do not want the tracert command to resolve and display the names of all routers in the path, use the-d parameter. This expedites the display of the path. For

example, to trace a path from this computer towww.microsoft.com without displaying the router names, type the following at a command prompt:

Net stat utilities to debug the network issues:
Displays active TCP connections, ports on which the computer is listening, Ethernet statistics, the IP routing table, IPv4 statistics (for the IP, ICMP, TCP, and UDP protocols), and IPv6 statistics (for the IPv6, ICMPv6, TCP over IPv6, and UDP over IPv6 protocols). Used without parameters, netstat displays active TCP connections

Syntax
netstat [-a] [-e] [-n] [-o] [-p *Protocol*] [-r] [-s] [*Interval*]
Parameters
-a
Displays all active TCP connections and the TCP and UDP ports on which the computer is listening.
-e
Displays Ethernet statistics, such as the number of bytes and packets sent and received. This parameter
can be combined with -s.
-n
Displays active TCP connections, however, addresses and port numbers are expressed numerically and no
attempt is made to determine names.
-o
Displays active TCP connections and includes the process ID (PID) for each connection. You can find the
application based on the PID on the Processes tab in Windows Task Manager. This parameter can be
combined with -a, -n, and -p.
-p *Protocol*
Shows connections for the protocol specified by *Protocol*. In this case, the *Protocol* can be tcp, udp,
tcpv6, or udpv6. If this parameter is used with -s to display statistics by protocol, *Protocol* can be tcp, udp,
icmp, ip, tcpv6, udpv6, icmpv6, or ipv6.
-s
Displays statistics by protocol. By default, statistics are shown for the TCP, UDP, ICMP, and IP protocols.

If the IPv6 protocol for Windows XP is installed, statistics are shown for the TCP over IPv6, UDP over
IPv6, ICMPv6, and IPv6 protocols. The -p parameter can be used to specify a set of protocols.

-r

Displays the contents of the IP routing table. This is equivalent to the route print command.

Interval

Redisplays the selected information every *Interval* seconds. Press CTRL+C to stop the redisplay. If this
parameter is omitted, netstat prints the selected information only once.

/?

Displays help at the command prompt

Result:

	Signature of Lab in Charge	Remarks
Readiness to do experiment		
Completion of Experiment		

Exp No 14 **Date :** D D / M M / Y Y

NETWORK CONFIGURATION

Aim: Study of basic network command and Network configuration commands.

Apparatus (Software): Command Prompt And Packet Tracer.

Principle:
All commands related to Network configuration which includes how to switch to privilege
mode and normal mode and how to configure router interface and how to save this configuration to flash memory or permanent memory.
This commands includes
• Configuring the Router commands
• General Commands to configure network
• Privileged Mode commands of a router
• Router Processes & Statistics
• IP Commands
• Other IP Commands e.g. show ip route etc.

Procedure:

To do this EXPERIMENT- follows these steps:
ping:
ping(8) sends an ICMP ECHO_REQUEST packet to the specified host. If the host responds,
you get an ICMP packet back. Sound strange? Well, you can “ping” an IP address to see if a
machine is alive. If there is no response, you know something is wrong.
Traceroute:
Tracert is a command which can show you the path a packet of information takes from your
computer to one you specify. It will list all the routers it passes through until it reaches its
destination, or fails to and is discarded. In addition to this, it will tell you how long each 'hop'
from router to router takes.

nslookup:
Displays information from Domain Name System (DNS) name servers.
pathping:
A better version of tracert that gives you statics about packet lost and latency
Getting Help
In any command mode, you can get a list of available commands by entering a question mark (?).
Router>?
To obtain a list of commands that begin with a particular character sequence, type in those characters followed immediately by the question mark (?).
Router#**co?**
configure connect copy
To list keywords or arguments, enter a question mark in place of a keyword or argument. Include a space before the question mark.
Router#**configure ?**
memory Configure from NV memory
network Configure from a TFTP network host
terminal Configure from the terminal
You can also abbreviate commands and keywords by entering just enough characters to make the command unique from other commands. For example, you can abbreviate the **show** command to **sh**.
Configuration Files
Any time you make changes to the router configuration, you must save the changes to memory
because if you do not they will be lost if there is a system reload or power outage. There are two types of configuration files: the running (current operating) configuration and the startup
configuration.
Use the following privileged mode commands to work with configuration files.

• **configure terminal** – modify the running configuration manually from the terminal.
• **show running-config** – display the running configuration.
• **show startup-config** – display the startup configuration.
• **copy running-config startup-config** – copy the running configuration to the startup
configuration.
• **copy startup-config running-config** – copy the startup configuration to the running
configuration.

• **erase startup-config** – erase the startup-configuration in NVRAM.
• **copy tftp running-config** – load a configuration file stored on a Trivial File Transfer Protocol (TFTP) server into the running configuration.
• **copy running-config tftp** – store the running configuration on a TFTP server.

IP Address Configuration

Take the following steps to configure the IP address of an interface.

Step 1: Enter privileged EXEC mode:

Router>**enable** password

Step 2: Enter the **configure terminal** command to enter global configuration mode.

Router#**config terminal**

Step 3: Enter the **interface** type slot/port (for Cisco 7000 series) or **interface** type port (for Cisco
2500 series) to enter the interface configuration mode.

Example:Router (config)#**interface ethernet 0/1**

Step 4: Enter the IP address and subnet mask of the interface using the **ip address** ipaddress
subnet mask command.

Example,Router (config-if)#**ip address 192.168.10.1 255.255.255.0**

Step 5: Exit the configuration mode by pressing Ctrl-Z

Router(config-if)#**[Ctrl-Z]**

Result:

	Signature of Lab in Charge	Remarks
Readiness to do experiment		
Completion of Experiment		

Exp No 15 **Date :** D D / M M / Y Y

PACKET TRACER

Packet Tracer is a cross-platform visual simulation tool designed by Cisco Systems that allows users to create network topologies and imitate modern computer networks. The software allows users to simulate the configuration of Cisco routers and switches using a simulated command line interface. Packet Tracer makes use of a drag and drop user interface, allowing users to add and remove simulated network devices as they see fit.

Steps

1. Open Network Topology- identify the components of the network, for example; Servers, Routers, End Devices, etc.

2. Complete the cabling-Access the cables section and connect completely and correctly the

cables between the network in order to ensure connectivity between the devices in the network using the connections table given.

3. Configure the IP addresses on the end devices-Using the address table still, correctly and

completely configure the IP addresses on all end devices. This can be done by accessing the

desktop platform on each device and locating the IP configuration section. The reason for doing

this is to enable the devices is on the right network.

4. Configure the IP addresses on your routers and switches. -After configuring the right IP

addresses on the end devices, you will have to do the same on the routers and switches also, using the address table.Access the configuration panel on both devices and can be done in two ways:

- Click on the device and open the Command Line Interface (CLI) and then type in the right

commands to configure the right addresses for the router using the addressing table.

- Use a console cable from an end device and connect it to the device to configure and access

the terminal platform on the end device and the n device's Command Line Interface

will be open and then type the commands in order to configure the right addresses.

5. Configure your default gateway. The reason for this is for the end devices would know what network they are operating on. The default gateway can be found either in the addressing table (if given) or in the network topology.

6. Test connectivity. After configuring the addresses, test connectivity by opening a command

prompt window on the end devices and try pinging the address which the network operates on. If it gives a reply, it means the network was configured correctly.

RESULT

	Signature of Lab in Charge	Remarks
Readiness to do experiment		
Completion of Experiment		

Exp No 16 **Date :** D D / M M / Y Y

STATIC ROUTING CONFIGURATION USING 2 ROUTERS

Aim: To simulate and configure static routing in the following topology

Principle:
Static routing is the most secure way of routing. It reduces overhead from network resources. In this type of routing we manually add routes in routing table. It is useful in small networks.

Procedure:

1.Complete the topology
• First take 2 routers , 2 switches and 4 end devices (laptops or pc)
• Go to connections and select copper straight cable for connecting switches and end devices .
• Then go to first device and select Fast Ethernet 0.
• Then take that wire connection to switch and select its Fast Ethernet 0/1 port .
• Take other straight copper wire connection . And select second device Fast Ethernet port 0 and switch's Fast Ethernet 0/2 port .
• Select one more straight copper wire and select switch's Fast Ethernet 0/3 port .
• And other cable end with router' s Fast Ethernet 0/0 port .
• Connect other part with the same way .
• Select copper cross wire to connect both routers .
• Select first router 's Fast Ethernet 0/1 port and connect it with another router's Fast Ethernet 0/1 port .

2. IP Address Configuration
• In first device, go to its Desktop panel and select Ip configuration.
• Give ip address to this device and tap TAB key . It will auto fill subnet mask . Give Default
gateway (point where the cable is connected to router) ip address too.
• Give ip address to other devices .

3. Router configuration
• Type these commands in router 1
• Router>**enable**

• Router#**configure terminal**
• Router(config)#**hostname Router1**
• Router1(config)#**interface fa0/0**
• Router1(config-if)**#ip address 3.0.0.5 255.0.0.0**
• Router1(config-if)**#no shutdown**
• Router1(config-if)**#exit**
• Router1(config)**#interface fa0/1**
• Router1(config-if)#**ip address 2.0.0.1 255.0.0.0**
• Router(config-if)#**no shutdown**
• Router1(config-if)#**exit**
• Type these commands in Router 2 ◦
Router**>enable**
◦ Router#**configure terminal**
◦ Router(config)**#hostname Router2**
◦ Router2(config)**#interface fa0/0**
◦ Router2(config-if)**#ip address 1.0.0.5 255.0.0.0**
◦ Router2(config-if)**#no shutdown**
◦ Router2(config-if)**#exit**
◦ Router2(config)#**interface fa0/1**
◦ Router2(config-if)#**ip address 2.0.0.2 255.0.0.0**
◦ Router2(config-if)#**no shutdown**
◦ Router2(config-if)#**exit**

4.Static routing implementation
◦ Go to Router1 and type
◦ Router(config)#**ip route 3.0.0.0 255.0.0.0 2.0.0.2**
◦ Go to second router and type
◦ Router(config)#**ip route 1.0.0.0 255.0.0.0 2.0.0.1 5.Testing connectivity**
Now select one of the device and go to its command prompt . Type ping ip address of other network ip to check whether it is connecting to other network machine or not . Eg:ping second device having ip address 3.0.0.1 from device having ip address 1.0.0.1. Type **ping 3.0.0.1** in its command prompt .

Result:

	Signature of Lab in Charge	Remarks
Readiness to do experiment		
Completion of Experiment		