BRCM CET, BAHAL

CN LAB MANUAL

COMPUTER NETWORK

(LC-CSE-323G)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Check list for Lab Manual

S. No.	Particulars
1	Mission and Vision
2	Course Outcomes
3	Guidelines for the student
4	Software & Hardware requirements
5	List of Programs as per University
6	Sample copy of File

Department of Computer Science & Engineering

Vision and Mission of the Department

Vision

To be a Model in Quality Education for producing highly talented and globally recognizable students with sound ethics, latest knowledge, and innovative ideas in Computer Science & Engineering.

MISSION

To be a Model in Quality Education by

M1: Imparting good sound theoretical basis and wide-ranging practical experience to the Students for fulfilling the upcoming needs of the Society in the various fields of Computer Science & Engineering.

M2: Offering the Students an overall background suitable for making a Successful career in Industry/Research/Higher Education in India and abroad.

M3: Providing opportunity to the Students for Learning beyond Curriculum and improving Communication Skills.

M4: Engaging Students in Learning, Understanding and Applying Novel Ideas.

Course: Computer Networks Lab
Course Code: LC-CSE-323G

	CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy's
CO1	To **Demonstrate** the function(s) of each layers of the OSI model and TCP/IP.		L3 (Apply)
CO2	To **Describe** the different types of network topologies and protocols.		L2 (Understand)
CO3	To **Analyze** the various routing algorithms.		L4 (Analyze)
CO4	To **Construct** simple network by using any modern Open Source Network Simulation Tool.		L6 (Create)
CO5	To **Design** and implement a peer to peer file sharing application utilizing application layer protocols such as HTTP, DNS, and SMTP and transportation layer protocol.		L6 (Create)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3											1	2	3
CO2	2	3	2		2							1	1	2
CO3	3	2	2		2							1	2	2
CO4	2	2		3	2							1	3	3
CO5	2	3	2		2							1	3	1

Guidelines for the Students :

1. Students should be regular and come prepared for the lab practice.

2. In case a student misses a class, it is his/her responsibility to complete that missed experiment(s).

3. Students should bring the observation book, lab journal and lab manual. Prescribed textbook and class notes can be kept ready for reference if required.

4. They should implement the given Program individually.

5. While conducting the experiments students should see that their programs would meet the following criteria:

- Programs should be interactive with appropriate prompt messages, error messages if any, and descriptive messages for outputs.

- Programs should perform input validation (Data type, range error, etc.) and give appropriate error messages and suggest corrective actions.

- Comments should be used to give the statement of the problem and every function should indicate the purpose of the function, inputs and outputs

- Statements within the program should be properly indented

- Use meaningful names for variables and functions.

- Make use of Constants and type definitions wherever needed.

6. Once the experiment(s) get executed, they should show the program and results to the instructors and copy the same in their observation book.

7. Questions for lab tests and exam need not necessarily be limited to the questions in the manual, but could involve some variations and / or combinations of the questions.

S.No	Experiment
1	Study of different types of Network cables and Practically implement the cross-wired cable and straight through cable using clamping tool.
2	Study of Network Devices in Detail. (Repeater, Hub, Switch)
3	Study of Network Devices in Detail. (Bridge, Router, Gate Way)
4	Study of network IP.
5	Connect the computers in Local Area Network.
6	Study about OSI Model and its each layer
7	Study about TCP/IP Model and its each layer
8	Study of basic network command on Command Prompt and Network configuration commands.
9	Study of basic Network configuration commands.
10	Study About various Network topology used in Computer Network.
11	Configure a Network topology using packet tracer software.

Hardware and Software Requirement

Hardware Requirement

RJ-45 connector,
Climping Tool,
Twisted pair Cable

Software Requirement

Command Prompt And Packet Tracer.

EXPERIMENT-1

Aim: Study of different types of Network cables and Practically implement the cross-wired cable and straight through cable using clamping tool.

Apparatus (Components): RJ-45 connector, Climping Tool, Twisted pair Cable
Procedure: To do these practical following steps should be done:

1. Start by stripping off about 2 inches of the plastic jacket off the end of the cable. Be very careful at this point, as to not nick or cut into the wires, which are inside. Doing so could alter the characteristics of your cable, or even worse render is useless. Check the wires, **one more time** for nicks or cuts. If there are any, just whack the whole end off, and start over.

2. Spread the wires apart, but be sure to hold onto the base of the jacket with your other hand. You do not want the wires to become untwisted down inside the jacket. Category 5 cable must only have 1/2 of an inch of 'untwisted' wire at the end; otherwise it will be 'out of spec'. At this point, you obviously have ALOT more than 1/2 of an inch of un-twisted wire.

3. You have 2 end jacks, which must be installed on your cable. If you are using a pre-made cable, with one of the ends whacked off, you only have one end to install - the crossed over end. Below are two diagrams, which show how you need to arrange the cables for each type of cable end. Decide at this point which end you are making and examine the associated picture below.
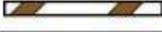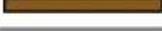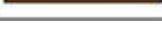**Diagram shows you how to prepare Cross wired connection**

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	

Diagram shows you how to prepare straight through 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	

EXPERIMENT-2

Aim: Study of following Network Devices in Detail
- Repeater
- Hub
- Switch
- Bridge
- Router
- Gate Way

Apparatus (Software): No software or hardware needed.

Procedure: Following should be done to understand this practical.

1. **Repeater:**Functioning at Physical Layer.A **repeater** is an electronic device that receives a signal and retransmits it at a higher level and/or higher power, or onto the other side of an obstruction, so that the signal can cover longer distances. Repeater have two ports ,so cannot be use to connect for more than two devices

2. Hub: An **Ethernet hub**, **active hub**, **network hub**, **repeater hub**, **hub** or **concentrator** is a device for connecting multiple twisted pair or fiber optic Ethernet devices together and making them act as a single network segment. Hubs work at the physical layer (layer 1) of the OSI model. The device is a form of multiport repeater. Repeater hubs also participate in collision detection, forwarding a jam signal to all ports if it detects a collision.

3. **Switch:**A **network switch** or **switching hub** is a computer networking device that connects network segments.The term commonly refers to a network bridge that processes and routes data at the data link layer (layer 2) of the OSI model. Switches that additionally process data at the network layer (layer 3 and above) are often referred to as Layer 3 switches or multilayer switches.

4. **Bridge:** A **network bridge** connects multiple network segments at the data link layer (Layer 2) of the OSI model. In Ethernet networks, the term *bridge* formally means a device that behaves according to the IEEE 802.1D standard. A bridge and switch are very much alike; a switch being a bridge with numerous ports. *Switch* or *Layer 2 switch* is often used interchangeably with *bridge*.Bridges can analyze incoming data packets to determine if the bridge is able to send the given packet to another segment of the network.

5. **Router:** A **router** is an electronic device that interconnects two or more computer networks, and selectively interchanges packets of data between them. Each data packet contains address information that a router can use to determine if the source and destination are on the same network, or if the data packet must be transferred from one network to another. Where multiple routers are used in a large collection of interconnected networks, the routers exchange information about target system addresses, so that each router can build up a table showing the preferred paths between any two systems on the interconnected networks.

6. **Gate Way:** In a communications network, a network node equipped for interfacing with

another network that uses different protocols.

- A gateway may contain devices such as protocol translators, impedance matching devices, rate converters, fault isolators, or signal translators as necessary to provide system interoperability. It also requires the establishment of mutually acceptable administrative procedures between both networks.
- A protocol translation/mapping gateway interconnects networks with different network protocol technologies by performing the required protocol conversions.

EXPERIMENT- 3

Aim: Study of network IP

- Classification of IP address
- Sub netting
- Super netting

Apparatus (Software): NA

Procedure: Following is required to be study under this practical.

- Classification of IP address

As show in figure we teach how the ip addresses are classified and when they are used.

Class	Address Range	Supports
Class A	1.0.0.1 to 126.255.255.254	Supports 16 million hosts on each of 127 networks.
Class B	128.1.0.1 to 191.255.255.254	Supports 65,000 hosts on each of 16,000 networks.
Class C	192.0.1.1 to 223.255.254.254	Supports 254 hosts on each of 2 million networks.
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.

- Sub netting

Why we Develop sub netting and How to calculate subnet mask and how to identify subnet address.

- Super netting

Why we develop super netting and How to calculate supernet mask and how to identify supernet address.

EXPERIMENT-4

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 **Internet 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 **Internet 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, click **OK**.

12. Quit Control Panel.

EXPERIMENT- 5

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

Apparatus (Software): Command Prompt And Packet Tracer.

Procedure: To do this EXPERIMENT- follows these steps:

In this EXPERIMENT- students have to understand basic networking commands e.g ping, tracert etc.

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.

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.
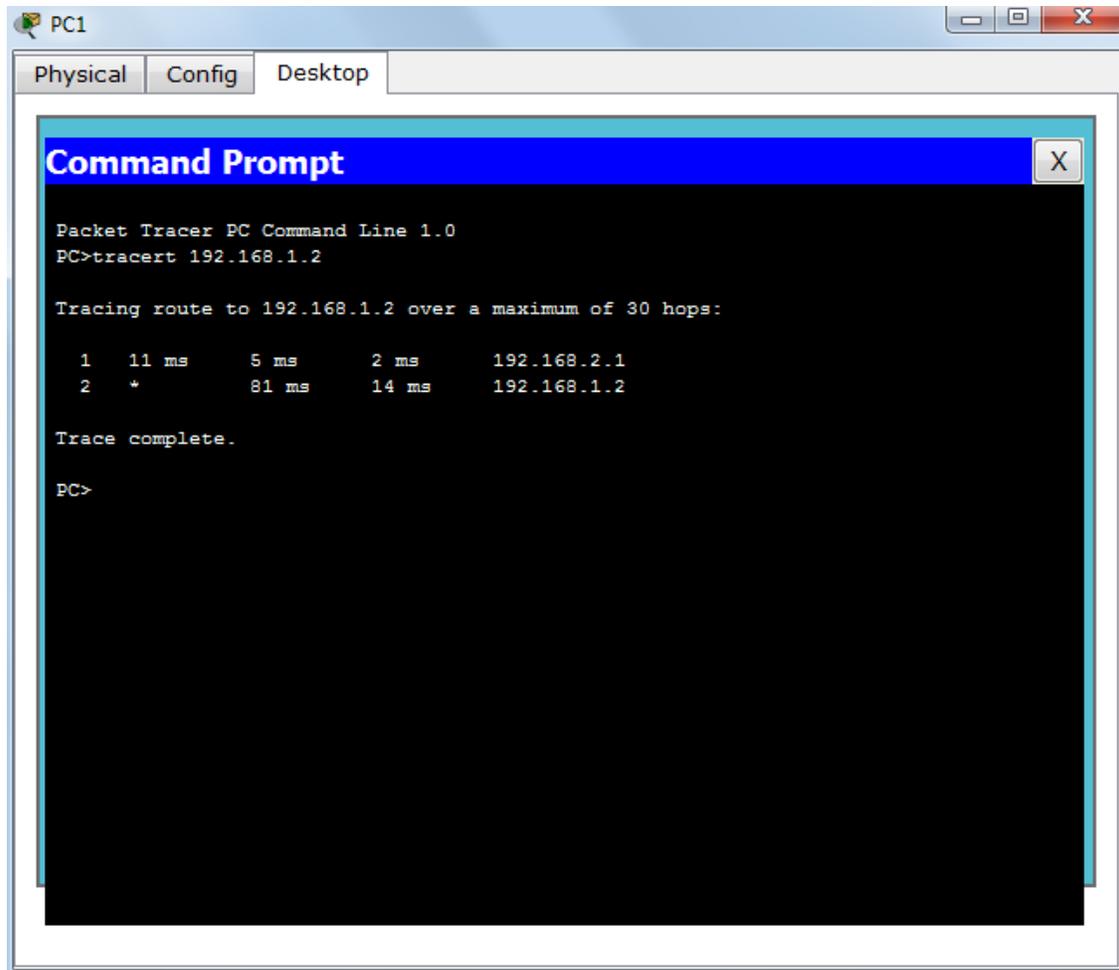
nslookup:

Displays information from Domain Name System (DNS) name servers.
NOTE :If you write the command as above it shows as default your pc's server name firstly.

pathping:

  A better version of tracert that gives you statics about packet lost and latency.

```
Administrator: C:\windows\system32\cmd.exe

C:\Users\lenovo>pathping 192.168.1.12

Tracing route to 192.168.1.12 over a maximum of 30 hops

   0  lenovo-PC.dronacharya [192.168.1.97]
   1  lenovo-PC.dronacharya [192.168.1.97]  reports: Destination host unreachable
.

Computing statistics for 25 seconds...
            Source to Here   This Node/Link
Hop  RTT    Lost/Sent = Pct  Lost/Sent = Pct  Address
   0                                           lenovo-PC.dronacharya [192.168.1.9
7]
                             100/ 100 =100%   |
   1  ---    100/ 100 =100%    0/ 100 =  0%   lenovo-PC [0.0.0.0]

Trace complete.

C:\Users\lenovo>_
```

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 haracters 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 subnetmask 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]**

<div align="center">

EXPERIMENT-6

</div>

Aim: Configure a Network topology using packet tracer software.

Apparatus (Software): Packet tracer Software

Procedure: To implement this practical following network topology is required to be configured using the commands learned in previous practical.

After configuring the given network a packet should be ping from any one machine to another.
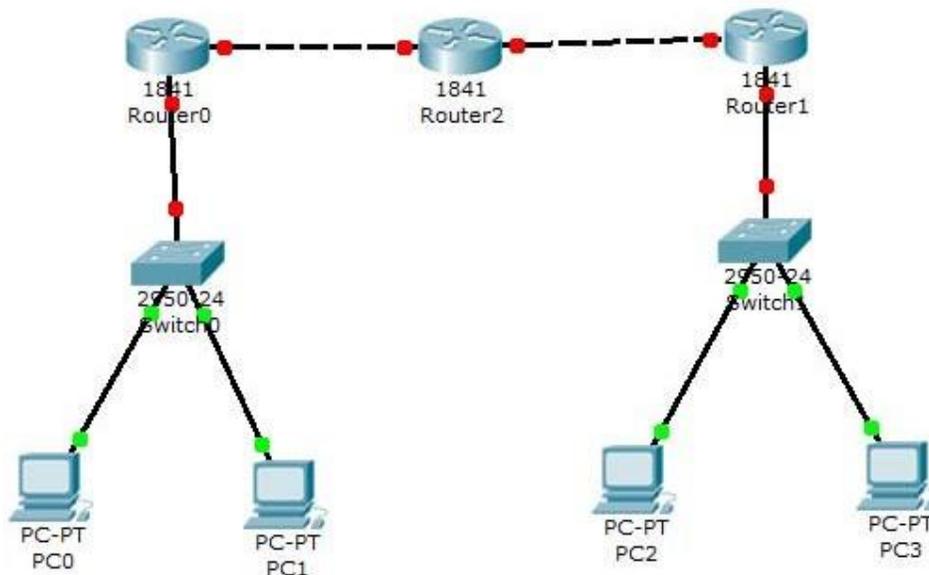
Router0 Configuration Command :.........

Continue with configuration dialog? [yes/no]: no

Press RETURN to get started!

Router>

Router>Enable

Router#config t

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#hostname router0

router0(config)#interface fastethernet 0/0

router0(config-if)#ip address 192.168.1.1 255.255.255.0

router0(config-if)#description router0 fastethernet 0/0

router0(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

router0(config-if)#exit

router0(config)#interface fastethernet 0/1

router0(config-if)#description router0 fastethernet 0/1

router0(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

router0(config-if)#exit

router0(config)#exit

%SYS-5-CONFIG_I: Configured from console by console

router0#show running-config

Building configuration...

Current configuration : 437 bytes

```
!
version 12.4
no service password-encryption
!
hostname router0
!
!
!
!
!
ip ssh version 1
!
!
interface FastEthernet0/0
 description router0 fastethernet 0/0
 ip address 192.168.1.1 255.255.255.0
 duplex auto
 speed auto
!
interface FastEthernet0/1
 description router0 fastethernet 0/1
 no ip address
 duplex auto
 speed auto
!
interface Vlan1
 no ip address
```

```
 shutdown
!
ip classless
!
!
!
!
!
line con 0
line vty 0 4
 login
!
!
end




router0#
router0#
router0#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
router0#
```
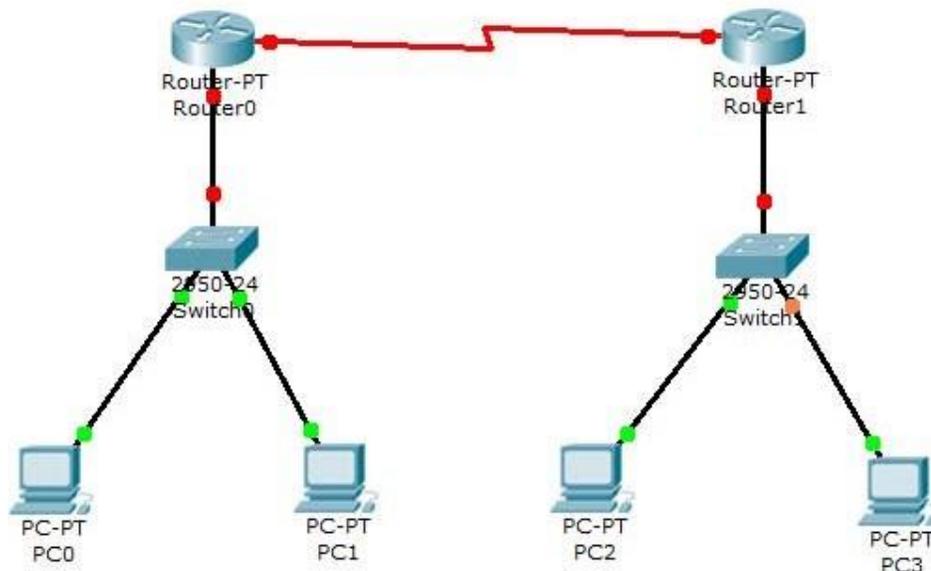
Aim: Configure a Network topology using packet tracer software.

Apparatus (Software): Packet tracer Software

Procedure: To implement this practical following network topology is required to be configured using the commands learned in previous practical.

After configuring the given network a packet should be ping from any one machine to another.

Router0 Configuration Command.........

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.0.254 255.255.255.0

Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
Router(config-if)#exit

```
Router(config)#exit
%SYS-5-CONFIG_I: Configured from console by console
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial2/0, changed state to down
Router(config-if)#exit
Router(config)#exit
%SYS-5-CONFIG_I: Configured from console by console
Router#wr
Building configuration...
[OK]
Router#show running-config
Building configuration...

Current configuration : 542 bytes
!
version 12.2
no service password-encryption
!
hostname Router
!
!
!
!
!
ip ssh version 1
!
!
interface FastEthernet0/0
 ip address 192.168.0.254 255.255.255.0
 duplex auto
 speed auto
!
interface FastEthernet1/0
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial2/0
 ip address 192.168.1.1 255.255.255.0
!
```

```
interface Serial3/0
 no ip address
 shutdown
!
interface FastEthernet4/0
 no ip address
 shutdown
!
interface FastEthernet5/0
 no ip address
 shutdown
!
ip classless
!
!
!
!
!
line con 0
line vty 0 4
 login
!
!
end


Router#
```

Router1 Configuration Command.......

Continue with configuration dialog? [yes/no]: no

Press RETURN to get started!


```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Serial2/0
Router(config-if)#ip address 192.168.1.2 255.255.255.0
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial2/0, changed state to up
Router(config-if)#exit
Router(config)#exit
%SYS-5-CONFIG_I: Configured from console by console
Router#config t
```

Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#interface Serial2/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.2.254 255.255.255.0
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to
up
Router(config-if)#exit
Router(config)#exit
%SYS-5-CONFIG_I: Configured from console by console
Router#wr
Building configuration...
[OK]
Router#
Router#show running-config
Building configuration...

Current configuration : 542 bytes
!
version 12.2
no service password-encryption
!
hostname Router
!
!
!
!
!
ip ssh version 1
!
!
interface FastEthernet0/0
 ip address 192.168.2.254 255.255.255.0
 duplex auto
 speed auto
!
interface FastEthernet1/0
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial2/0
 ip address 192.168.1.2 255.255.255.0
!

```
interface Serial3/0
 no ip address
 shutdown
!
interface FastEthernet4/0
 no ip address
 shutdown
!
interface FastEthernet5/0
 no ip address
 shutdown
!
ip classless
!
!
!
!
!
line con 0
line vty 0 4
 login
!
!
end


Router#
```

IP ROUTE Command.....
```
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 192.168.2.0 255.255.255.0 192.168.2.2
Router(config)#exit
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

C    192.168.2.0/24 is directly connected, FastEthernet0/0
C    192.168.1.2/24 is directly connected, Serial2/0
S    192.168.2.0/24 [1/0] via 192.168.1.2
Router#
```

IP ROUTE Command.....

Router>enable
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
    D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
    N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
    E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
    i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
    * - candidate default, U - per-user static route, o - ODR
    P - periodic downloaded static route

Gateway of last resort is not set

S   192.168.0.0/24 [1/0] via 192.168.1.1
C   192.168.0.0/24 is directly connected, FastEthernet0/0
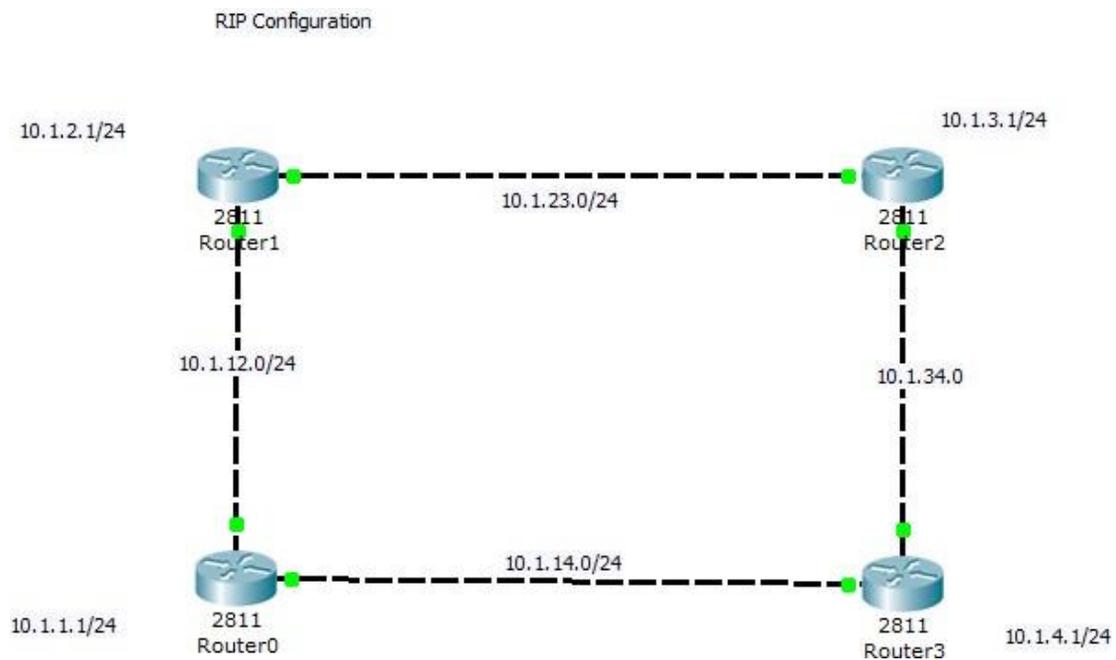C   192.168.1.1/24 is directly connected, Serial2/0
Router#

EXPERIMENT- 8

Aim: Configure a Network using Distance Vector Routing protocol.

- RIP

Apparatus (Software): packet tracer software

Procedure:
1. Develop a Topology shown in figure given below.
3. Configure all Routers
4. Implement RIP protocols in Router to configure Network.

RIP Configuration

Router0 configuration.....

Continue with configuration dialog? [yes/no]: no

Press RETURN to get started!

Router>
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#hostname router0

router0(config)#int lo0

%LINK-5-CHANGED: Interface Loopback0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
router0(config-if)#ip address 10.1.1.1 255.255.255.0
router0(config-if)#int f0/0
router0(config-if)#ip address 10.1.12.1 255.255.255.0
router0(config-if)#no shut

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
router0(config-if)#int f0/1
router0(config-if)#ip address 10.1.14.1 255.255.255.0
router0(config-if)#no shut

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
router0(config-if)#end
%SYS-5-CONFIG_I: Configured from console by console
router0#wr
Building configuration...
[OK]
router0#
router0#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

router0 con0 is now available

Press RETURN to get started.

router0>
router0>en
router0#config t
Enter configuration commands, one per line. End with CNTL/Z.
router0(config)#router rip
router0(config-router)#net 10.0.0.0
router0(config-router)#
router0(config-router)#end
%SYS-5-CONFIG_I: Configured from console by console
router0#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
     D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
     N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
     E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
     i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
     * - candidate default, U - per-user static route, o - ODR
     P - periodic downloaded static route

Gateway of last resort is not set

10.0.0.0/24 is subnetted, 3 subnets
C 10.1.1.0 is directly connected, Loopback0
C 10.1.12.0 is directly connected, FastEthernet0/0
C 10.1.14.0 is directly connected, FastEthernet0/1
router0#
router0#

Router1 Configuration.....

Continue with configuration dialog? [yes/no]: no

Press RETURN to get started!

Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int lo0

%LINK-5-CHANGED: Interface Loopback0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
Router(config-if)#ip address 10.1.2.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#int f0/1
Router(config-if)#ip address 10.1.23.1 255.255.255.0
Router(config-if)#no shut

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
Router(config-if)#int f0/0
Router(config-if)#ip address 10.1.12.2 255.255.255.0
Router(config-if)#no shut

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
Router(config-if)#end
%SYS-5-CONFIG_I: Configured from console by console
Router#wr
Building configuration...
[OK]
Router#
Router#
Router#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

Router con0 is now available

Press RETURN to get started.

Router>
Router>en
Router#con t

```
% Ambiguous command: "con t"
Router#co t
% Ambiguous command: "co t"
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router rip
Router(config-router)#net 10.0.0.0
Router(config-router)#
Router(config-router)#
Router(config-router)#end
%SYS-5-CONFIG_I: Configured from console by console
Router#
```

Router2 Configuration.....

```
Continue with configuration dialog? [yes/no]: no


Press RETURN to get started!

Router>en
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int lo0

%LINK-5-CHANGED: Interface Loopback0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
Router(config-if)#ip address 10.1.3.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#int  f0/0
Router(config-if)#ip address 10.1.23.2 255.255.255.0
Router(config-if)#no shut

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
Router(config-if)#int f0/1
Router(config-if)#ip address 10.1.34.1 255.255.255.0
Router(config-if)#no shut

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
Router(config-if)#End
%SYS-5-CONFIG_I: Configured from console by console

Router#wr
Building configuration...
[OK]
Router#
Router#
Router#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
```

Router con0 is now available

Press RETURN to get started.


```
Router>
Router>
Router>en
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/24 is subnetted, 3 subnets
C    10.1.3.0 is directly connected, Loopback0
C    10.1.23.0 is directly connected, FastEthernet0/0
C    10.1.34.0 is directly connected, FastEthernet0/1
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router rip
Router(config-router)#net 10.0.0.0
Router(config-router)#end
%SYS-5-CONFIG_I: Configured from console by console
Router#
Router#
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/24 is subnetted, 7 subnets
R    10.1.1.0 [120/2] via 10.1.23.1, 00:00:19, FastEthernet0/0
R    10.1.2.0 [120/1] via 10.1.23.1, 00:00:19, FastEthernet0/0
C    10.1.3.0 is directly connected, Loopback0
R    10.1.12.0 [120/1] via 10.1.23.1, 00:00:19, FastEthernet0/0
R    10.1.14.0 [120/2] via 10.1.23.1, 00:00:19, FastEthernet0/0
C    10.1.23.0 is directly connected, FastEthernet0/0
```

```
C    10.1.34.0 is directly connected, FastEthernet0/1
Router#
Router#
Router#
```

Router3 Configuration.......

```
Continue with configuration dialog? [yes/no]: no


Press RETURN to get started!

Router>
Router>en
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int lo0

%LINK-5-CHANGED: Interface Loopback0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
Router(config-if)#int f0/0
Router(config-if)#ip address 10.1.34.2 255.255.255.0
Router(config-if)#no shut

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
Router(config-if)#
Router(config-if)#int  f0/1
Router(config-if)#ip address 10.1.14.2 255.255.255.0
Router(config-if)#no shut

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
Router(config-if)#end
%SYS-5-CONFIG_I: Configured from console by console
Router#wr
Building configuration...
[OK]
Router#
Router#
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set
```

```
    10.0.0.0/24 is subnetted, 2 subnets
C 10.1.14.0 is directly connected, FastEthernet0/1
C 10.1.34.0 is directly connected, FastEthernet0/0
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router rip
Router(config-router)#net 10.0.0.0
Router(config-router)#

Router(config-router)#end
%SYS-5-CONFIG_I: Configured from console by console
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
    D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
    N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
    E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
    i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
    * - candidate default, U - per-user static route, o - ODR
    P - periodic downloaded static route

Gateway of last resort is not set

    10.0.0.0/24 is subnetted, 7 subnets
R    10.1.1.0 [120/1] via 10.1.14.1, 00:00:09, FastEthernet0/1
R    10.1.2.0 [120/2] via 10.1.34.1, 00:00:14, FastEthernet0/0
          [120/2] via 10.1.14.1, 00:00:09, FastEthernet0/1
R    10.1.3.0 [120/1] via 10.1.34.1, 00:00:14, FastEthernet0/0
R    10.1.12.0 [120/1] via 10.1.14.1, 00:00:09, FastEthernet0/1
C    10.1.14.0 is directly connected, FastEthernet0/1
R    10.1.23.0 [120/1] via 10.1.34.1, 00:00:14, FastEthernet0/0
C    10.1.34.0 is directly connected, FastEthernet0/0
Router#
```

EXPERIMENT- 9

Aim: Configure Network using Link State Vector Routing protocol.
- OSPF

Apparatus (Software): Packet Tracer Software

Procedure:

1. Develop a Topology shown in figure given below.
2. Configure all the workstations
3. Configure all switches
4. Configure all Routers
5. Implement OSPF protocols in Router to configure Network.