



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**FAKULTI KEJURUTERAAN ELEKTRONIK DAN  
KEJURUTERAAN KOMPUTER**

**BENT 3173  
DATA COMMUNICATIONS & NETWORKING**

**LAB SESSION 1  
BASICS OF COMPUTER NETWORKING**

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**BENT 3173: DATA COMMUNICATIONS & NETWORKING**

**Lab Session 1: Basics of Computer Networking**

### Objectives

The objectives of this lab session are to introduce student to the basic of :

1. Network Interface Card (NIC) verification
2. Computer name and workgroup configuration
3. IP configuration
4. Wiring standards for UTP cable according to EIA/TIA-568-B (T568A and T568B)
5. Making and testing crossover Ethernet patch cable
6. Building a simple Local Area Network that consist of two workstations connected using single crossover cable
7. Configuring file sharing services to share files between the workstations

### Theories

#### Basic Hardware

Your workstations or computers can communicate with each other only if they are physically connected. To physically connect them, you must have some hardware. For a **wired connection**, you must have at least the following components to connect your computers to a network:

- **Network Interface Card (NIC)**

A network interface card (NIC) allows the computer to be physically connected to the network cable. The NIC provides the physical layer connection from the computer to the network. There are many types of NIC. Figure (a) shows a normal NIC which is installed inside systems unit by plugging it into expansion slot on the motherboard. Figure (b) shows a PC Card NIC which is installed in PC Card slot in notebook and some personal digital assistant (PDA). Newer computers typically have a LAN chip on the motherboard. If your motherboard already has an onboard LAN chip, you do not have to install a new NIC.



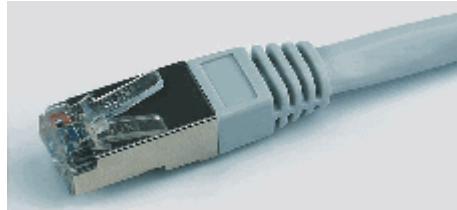
(a) Normal NIC



(b) PC Card NIC

- **Network cable**

CAT5 copper cables (Category 5 cables with RJ45 connectors on both ends).



### Transmission Control Protocol / Internet Protocol (TCP/IP)

Network protocols help your computers speak the same language so they can share data. Network protocols define the rules for communication. Most computers use TCP/IP protocol. Basic TCP/IP configuration includes these two items:

- **IP Address**

The most important item is the IP address. The IP address gives each computer a unique address where it can be accessed in the network. This address has four numbers between 0 and 255, separated by periods. All computers are numbered in a series.

- **Subnet Mask**

The subnet mask determines the network where the computer resides. This is especially important in larger networks. Large networks are frequently divided into several subnets. In your small network, all the computers are in the same subnet.

### Network Cable

This lab session will introduce students to UTP cable Category 5 (Cat5) and how to wire Cat5 cable with RJ45 connector. Using this cable, students will build their own LAN. Figure 1 shows the RJ45 pin position.

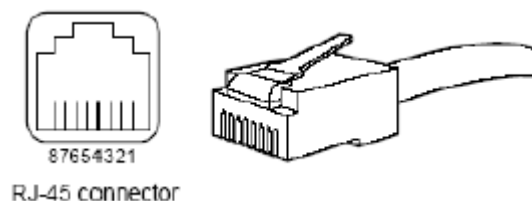


Figure 1: RJ45 Pin Position

Figure 2 shows wiring standards for UTP cable according to EIA/TIA-568-B standards

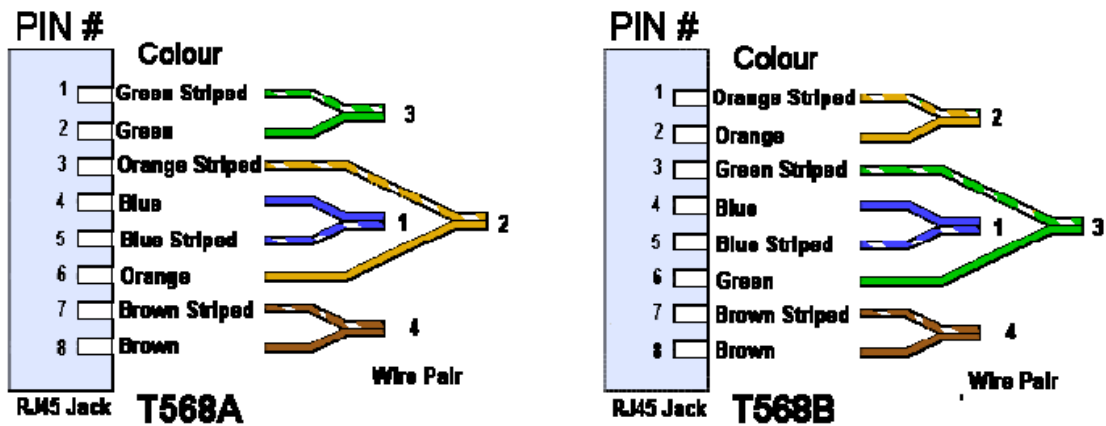


Figure 2: T568A and T568B wiring configuration according to EIA/TIA-568-B standards

Students will build a simple point to point or peer-to-peer local area network (LAN) using the crossover cable that they have wired according to the EIA/TIA standards. The two PCs or workstations will be connected directly to each other by using the crossover cable. Point to point connection is useful to establish direct link between two devices for resource sharing or testing purposes without the need for a hub. Figure 3 shows two workstation connected to each other by using crossover cable to establish a point to point network.

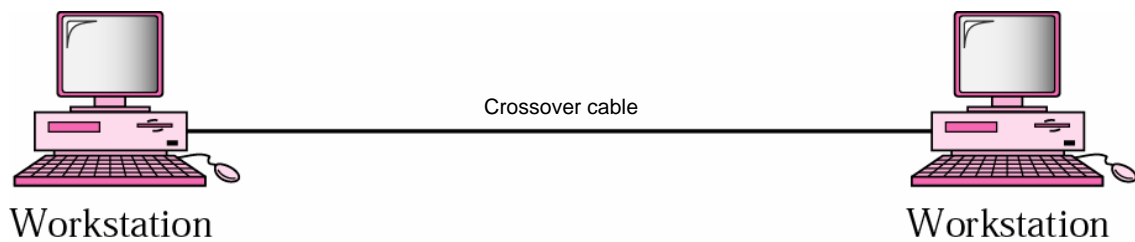


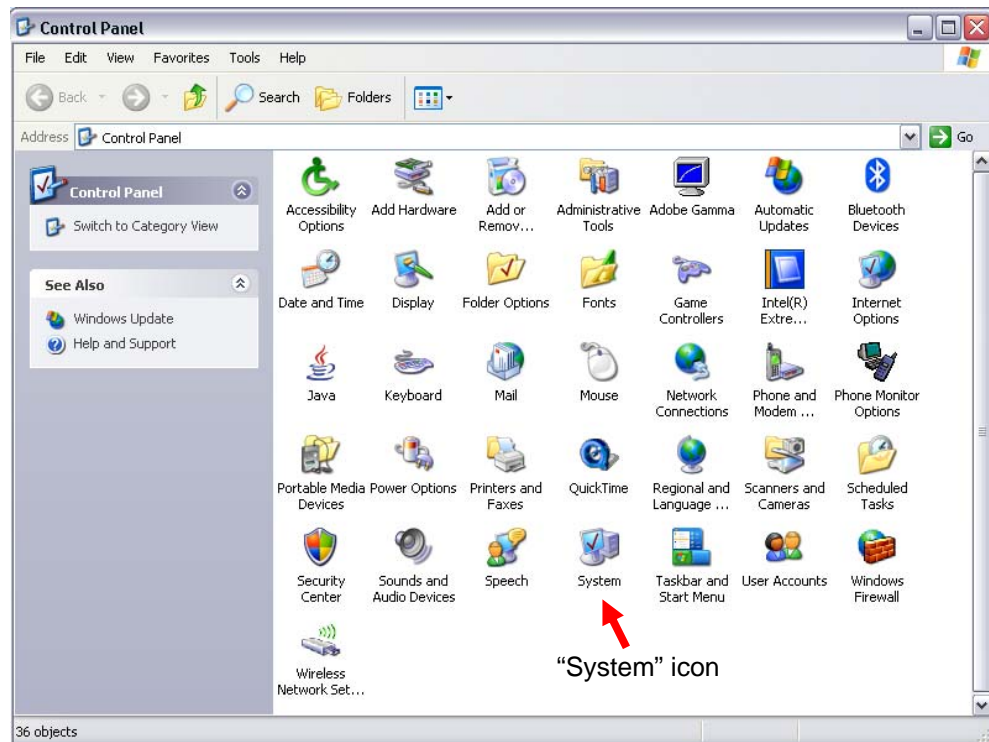
Figure 3: Point to point network

## Procedures

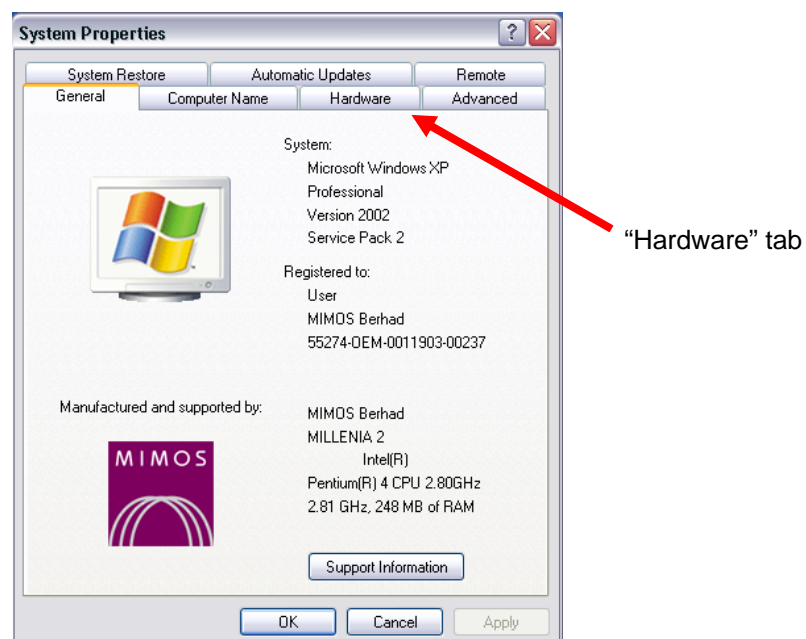
### A. Network Interface Card (NIC) Verification

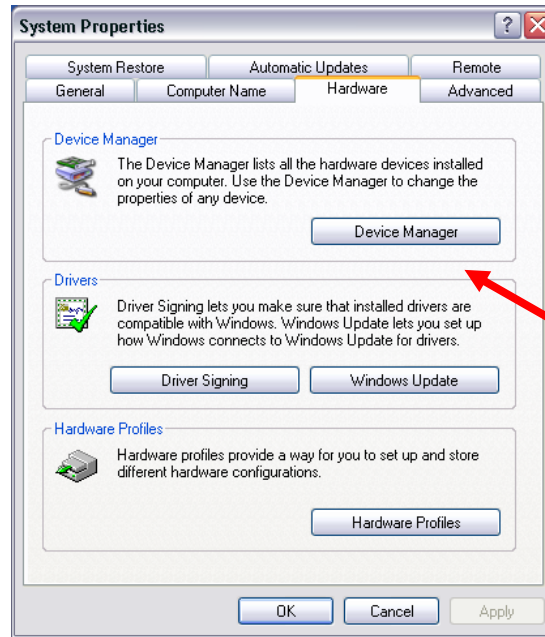
To verify that the network card has been properly identified and is working properly, follow these steps:

1. Open the Control Panel window
2. Open the System Properties windows by selecting the "System" icon in the Control Panel window



3. The "System Properties" window will be opened. Select the "Hardware" tab and then click the "Device Manager" button.

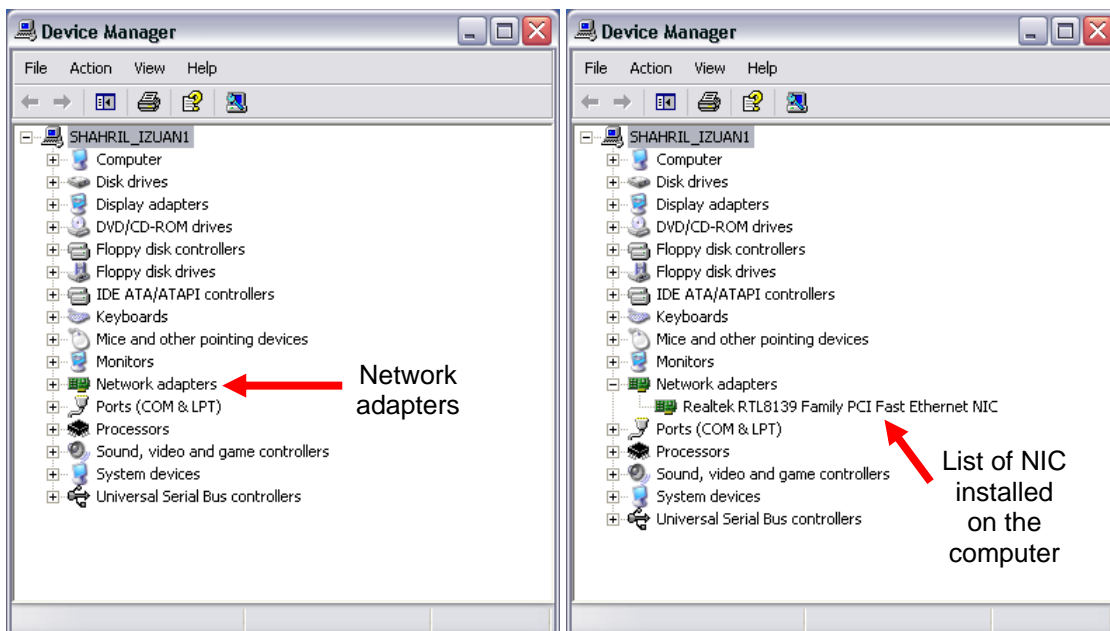




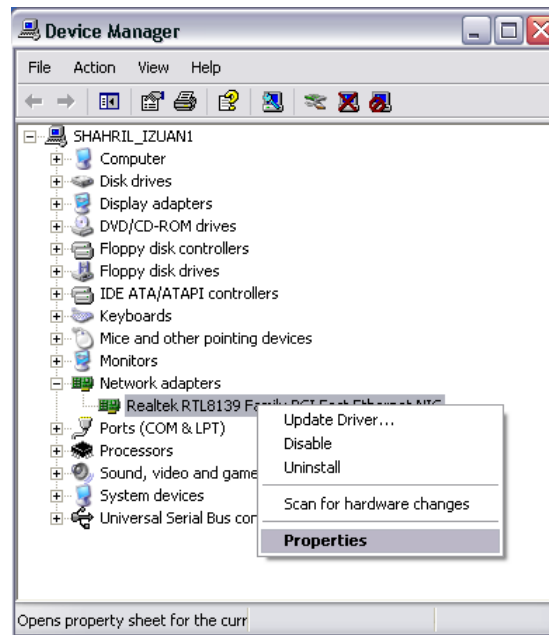
- In the Device Manager window, expand the section for network adapters by clicking the “+” sign besides the network adapters label. It will display the name of the NIC that has been installed in the computer if the NIC is properly identified by the system.

**Question 1:**

What is the name of the NIC installed in your workstation?



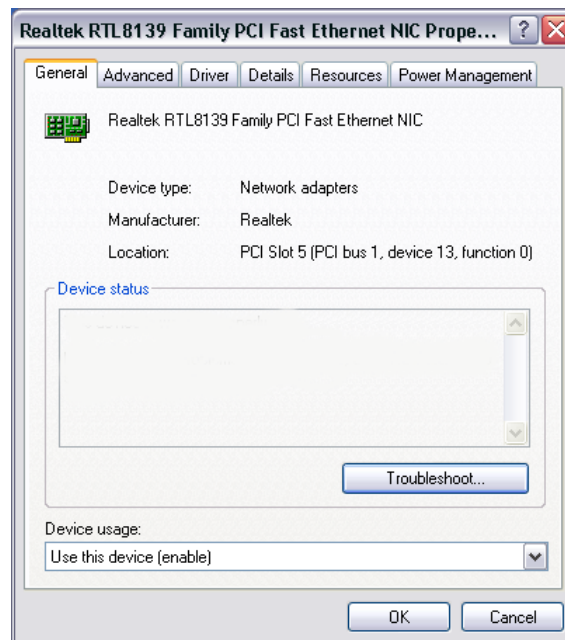
5. Right click on your NIC name and select "Properties"



6. The properties window for the NIC will be opened. The "General" tab will display some information about the NIC such as device type, manufacturer, device location and device status.

**Question 2:**

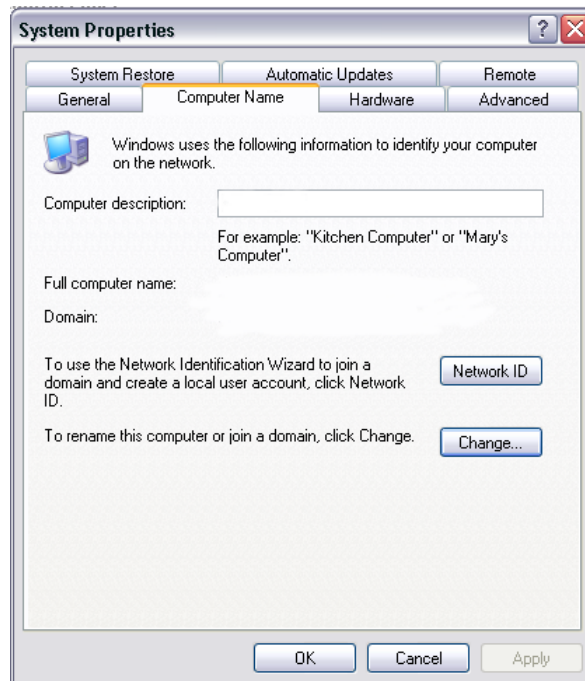
What is the NIC status?



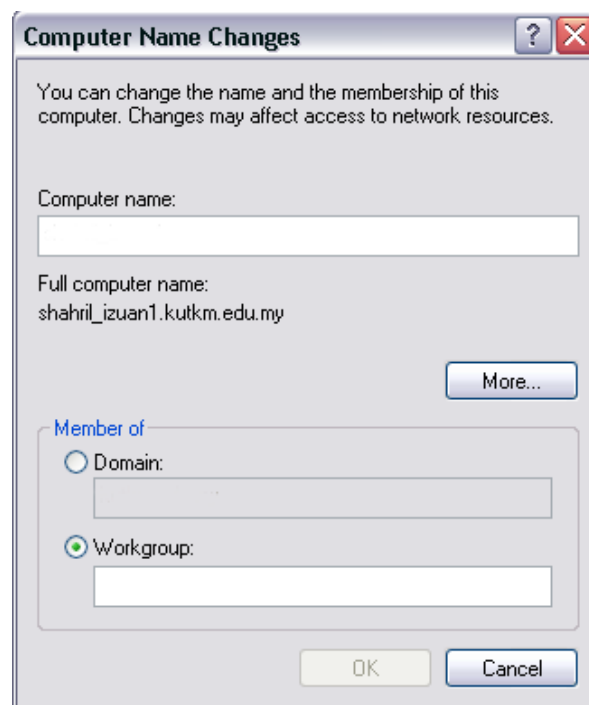
7. The NIC installed in the computer is ready to be used if it is properly identified and detected as working properly by the system.

## B. Computer Name & Workgroup Configuration

1. Follow step 1 and 2 in section A.
2. The “System Properties” window will be opened. Select the "Computer Name" tab.



3. Click the “Change” button. A “Computer Name Changes” window will be opened. Type a new computer name.



4. Check the “Workgroup” bullet and type new workgroup name “BENT”.
5. Click the “OK” button.



### C. IP Configuration

1. Connect the NIC of the workstation to one of the port of the Ethernet switch using the cable provided.
2. Switch on the Ethernet switch.
3. Open the "Control Panel" window.
4. Click the "Network Connections" icon to open the "Network Connections" window.
5. Right-click on the "Local Area Network" icon and select "Properties".
6. Double-click on "Internet Protocol (TCP/IP)".
7. Check the "Use the following IP address" bullet. Fill in this information in the appropriate place.
  - i) IP address: **10.1.1.1**
  - ii) Subnet mask: **255.0.0.0**
8. Click the "OK" button.
9. To check that the workstation is set-up properly for networking, do a simple ping test. Open the "Command Prompt" window by clicking Start > All Programs > Accessories > Command Prompt.
10. Type in these command in the "Command Prompt" window and observe what the window will display:
  - i) ping 10.1.1.1
  - ii) ipconfig

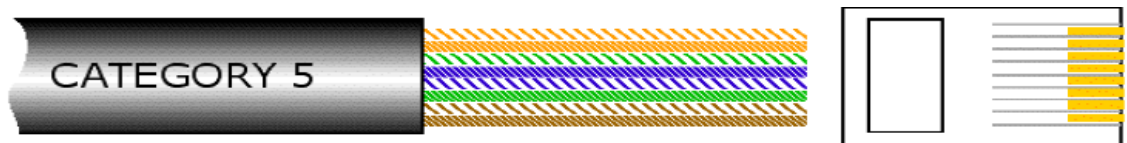
#### Question 3:

What are the information displayed by the "Command Prompt" window after execution of each of the command above? Write back exactly what the window displayed.

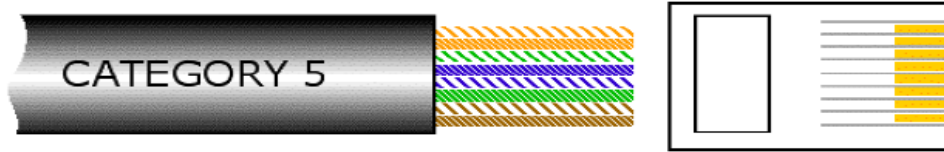
### D. Making and testing crossover Ethernet patch cable

Important for crossover cable wiring: wire one end using T568B wiring configuration and the other end with T568A wiring configuration

1. Cut the outer jacket of the wire about 1" from the end.
2. Separate the pairs and align them in the order, according to T568B wiring configuration.
3. Begin flattening the wires so that it will easily slip into the connector and into the individual channeled areas.



- Once all the wires aligned and ready to insert, trim them to approximately 1/2" in order to have as little "untwisted" wire in the connection as possible.



- Insert the wires into the connector making sure that each wire goes into its appropriate "channel" and extends all the way to the end of the connector underneath the gold crimping connectors.



- Press the cable and the jacket into the connector firmly so that the jacket will be crimped by the plastic wedge near the rear of the connector, and insert it into your crimping tool and crimp the cable.
- Repeat steps 1 through 4 for the other end of the cable using T568A wiring configuration
- Use a cable tester to test for proper continuity.

**Question 4:**

How can you tell if your cable is functioning properly?

**E. Building simple Local Area Network & configuring file sharing services**

- Connect the two workstations using crossover cable.
- Set the IP address for the first workstation to **192.168.0.1** and IP address for second workstation to **192.168.0.2**. Set the subnet mask for both workstations to **255.255.255.0**.
- Execute the 'ipconfig' command to see your TCP/IP settings.

**Question 5:**

What is the result of the execution of the command?

- Execute the 'ping' command to check for basic TCP/IP connectivity. (Tips: Ping IP address of the second PC from the first PC and vice versa)

**Question 6:**

What are the results of the execution of the commands?

- Execute the Network Setup Wizard. From "Control Panel", click on "Network Setup Wizard"
  - If the computer detects any other connection such as wireless that is not connected, just check the "ignore disconnected network hardware" checkbox.
  - In the "Connection Method" window, select "Other".
  - In the "Other Internet Connection Method" window, select "This computer belongs to a network that does not have an internet connection"
  - Type in a new computer name. Name the first PC as **PC1** and the second PC as **PC2**
  - Type in a new workgroup name as **BENT3173**
  - Select "Turn on file and printer sharing" option

- g. Select “Just finish the wizard; I don’t need to run the wizard on other computer” option
6. After successfully completed the Network Setup Wizard, verify that both workstations have been connected and are in the same workgroup. Open ‘My Network Places’ & select ‘View Workgroup Computers’.

**Question 7:**

What do you see after selecting ‘View Workgroup Computers’ if you have successfully networked the computers?

7. Create a new folder named ‘3BENT’ on the desktop.
8. Create a text file named after your group number inside the ‘3BENT’ folder. (Tips: For group 1, the text file should be named ‘GROUP 1a’ for PC1 and ‘GROUP 1b’ for PC2). The text file should contain the name and matrix no. of each of the user of the workstation.
9. Shared the ‘3BENT’ folder with the other workstation by setting the ‘Sharing and Security’ option. (Tips: Right-click the folder name)

**Question 8:**

Describe the way to share a folder in a network?

10. From each workstation, access the ‘3BENT’ folder on the other workstation and copy the text file to your own workstation.
11. Open the file and verify that you have received the right file.

**Results**

Answer all the questions that have been asked previously in the Procedure section. Then summarized all the process that you have done during this lab session.