1. *Define computer networks and communications.*

   i. Computer network is a system of interconnected computers and peripheral devices. For example, it may connect computers, printers, scanners and cameras.

      Using hardware and software, these interconnected computing devices can communicate with each other through defined rules of data communications. In a network, computers can exchange and share information and resources. A computer network may operate on wired connections or wireless connections.

   ii. Communications is about the transfer of information from a sender, across a distance, to a receiver. Using electricity, radio waves or light, information and data in the form of codes are transmitted through a physical medium such as wire, cable, or even the atmosphere.

2. *State the importance of computer networks and communications.*

      Information is now made easy with the availability of network communications. In a clinic for example, network communications plays an important part in keeping patients' database for easy retrieval. Unlike in conventional practice, doctors and nurses have to look for a patient's personal file from hundreds or maybe thousands of records. With network communication, the clinic saves time and manpower. Allocation can be effectively planned

3. *Define types of computer networks*

Local Area Network (LAN)
A LAN covers a small region of space, typically a single building ~ Eg: within a school lab.

Metropolitan Area Network (MAN)
A MAN is a collection of LANs with the same geographical area, for instance a city ~ Eg: Kuala Lumpur

Wide Area Network (WAN)
A WAN can be a collection of LANs or MANs or the mix of two with a very large geographical area, for instance a country or even beyond the border ~ Eg: between KL and London

4. *Differentiate between the three types of computer networks.*

LAN is a group of computers and network devices connected together, usually within the same building. It is the smallest network compared to the other two networks. The simplest form of LAN is to connect two computers together. LAN is operated within a limited physical area, such as at home, school, a single building or several buildings. A network which consists of less than 500 interconnected devices across several buildings, is still recognised as a LAN

MAN can be defined as a group of computers and network devices connected together within a large physical area. It is a network of computers located at different sites within a large physical area, such as a city. Companies that have several branches within the Kuala Lumpur city such as banks, might find a MAN useful to them.

WAN is the largest network of all network types. The Internet is the largest WAN in the world. WAN generally covers large distances such as states, countries or continents.

	LAN	**MAN**	**WAN**
Cost	Low	High	Higher
Network Size	Small	Larger	Largest
Speed	Fastest	Slower	Slower
Transmission media type	Twisted-Pair	Twisted-Pair & Fibre Optic Cable	Fiber Optic Radiowave & Sattelite
Number of computer	Smallest	Large	Largest

5. *Define two types of network architecture*

Client/Server
A client/server network is a network in which the shared files and applications are stored in the server but network users (clients) can still store files on their individual PCs. A server is a computer that shares information and resources with other computers on a network. A client is a computer which requests services or files from a server computer.

Peer-to-Peer

Peer-to-peer network is a network with all the nodes acting as both servers and clients. A PC can access files located on another PC and can also provide files to other PCs. With peer-to-peer network, no server is needed; each computer in the network is called a peer. All computers in the peer-to-peer network has equal responsibilities and capabilities to use the resources available on the network

6. Differentiate between the three types of network topology.

	Bus Topology	**Ring Topology**	**Star Topology**
Structure	There is a single central cable (backbone) and all computers and other devices connect to it	All computers and other devices are connected in a circle	There is a central host and all nodes connect to it
Host existence	Depends on network needs	Depends on network needs	Yes
Connection between nodes	It has no connection between the nodes.	Yes	No
Host failure	Network can still run	Network will fail	Network will fail
Node failure	Network can still run	Network will fail	Network can still run
Ease of troubleshooting	Difficult. Need to search for the problematic node one by one	Depends on backbone. If there is a backbone, troubleshooting is difficult. If there is no backbone, the focus is on the two nodes not communicating	Depends on the host. It is easier to repair the problematic host. However, if the nodes fail, then each node has to be searched
Ease of adding or removing nodes	Easy	Difficult	Average
Number of nodes when extending network	Many	Limited	Limited

7. Define Transmission Control Protocol/Internet Protocol (TCP/IP) as a protocol to facilitate communication over computer network.

TCP/IP is the internet communication protocol. It is a standard that sets the rules computers must follow in communicating with each other on a network. Some refer TCP/IP as the Internet Protocol Suite

8. *Describe the types of network communications technology*

    Internet
    The Internet is the worldwide, publicly accessible system of interconnected computer networks that transmit data by packet switching using the standard Internet Protocol (IP).

    Intranet
    An Intranet is an internal network that uses Internet technologies and it is a small version of the Internet that exists within an organization

    Extranet
    An extranet is a private network that uses Internet protocols, network connectivity, and possibly the public telecommunication system to securely share part of a business's information or operations with suppliers, vendors, partners, customers or other businesses

---

LATIHAN 3.2

---

1. *Identify the function the devices needed in computer network communication:*

DEVICE	FUNCTION/USAGE
NETWORK INTERFACE CARD (NIC)	A network card adapter card or PC card that enables the computer to access the network.
WIRELESS NETWORK INTERFACE CARD (WNIC)	A network card that provides wireless data transmission.
INTERNAL AND EXTERNAL MODEM	A modem is a device that enables a computer to transmit data over telephone or cable lines. Converts Analog signal to digital signal, vice versa.
HUB OR SWITCH OR ROUTER	Hubs/ Switch are commonly used to connect segments of a LAN. A router is a communications device that connects multiple computers or other routers together and transmits data to the correct destination.
WIRELESS ACCESS POINT	A wireless access point is a central communications device that allow computers to transfer data. This device can help information to be transferred wirelessly to other wireless devices or to a wired network.

2. *Identify various types of cables such as Unshielded Twisted Pair (UTP), Shielded Twisted Pair (STP), Coaxial and Fibre Optic Cable*

UNSHIELDED TWISTED-PAIR CABLE

The twisted-pair cable is generally a common form of transmission medium. It consists of two wires or conductors twisted together, each with its own plastic insulation. The twisted wires cancel out electromagnetic interference that can cause, the noise generated by adjacent pairs. Undesired coupling of a signal from one circuit, part of a circuit, or channel, to another. The most common connector used for twisted-pair cable is RJ-45. A wave produced by the interaction of time-varying electric and magnetic fields.

Registered Jack-45 (RJ-45) is an eight-wire connector used commonly to connect computers onto Local Area Networks (LAN), especially Ethernets. The Unshielded Twisted-Pair or UTP is the most common twisted-pair cable used in communications. Cables that consist of pairs of unshielded wire twisted together. It is the most common kind of copper telephone wiring. It has four pairs of colour-coded twisted-pair cables that are covered with a plastic outer jacket.

SHIELDED TWISTED-PAIR CABLE

The Shielded Twisted-Pair or STP is another form of twisted-pair cable. Twisted-pair cable wires that consist of an outer covering or shield. Its four pairs of colour-coded wires are each wrapped in metallic foil, and all four are then collectively wrapped in a layer of metallic braid or foil. Finally, this layer is wrapped with a plastic outer jacket.

COAXIAL CABLE

The coaxial cable, often referred to as 'coax', consists of a single copper wire surrounded by at least three layers. They are an insulating material, a woven or braided metal and a plastic outer coating. This cable is often used as cable television (CATV) network wiring because it can be cabled over longer distances in comparison to the twisted-pair cable.

FIBRE OPTIC CABLE

The fibre optic cable is a networking medium that uses light for data transmission. The intensity of light is increased and decreased to represent binary one and zero. The binary system is a way of counting using just the two numbers 0 and 1. Its core consists of dozens or hundreds of thin strands of glass or plastic which uses light to transmit signals. Each strand, called an optical fibre, is as thin as a human hair.

3. *Identify various types of wireless transmission media such as infrared, radio wave and satellite.*

	Radio Waves	Micro Waves	Infra red
DEFINITION	Electromagnetic waves ranging in frequencies between 3 KHz and 1 GHz.	Electronic waves with frequencies between 1 GHz to 300 GHz.	Infrared signals have frequencies between 300 GHz to 400 THz - used for short-range communication.
DIRECTION	Omnidirectional - useful for multicasting, in which there is one sender but many receiver	Unidirectional - the sending and receiving antennas need to be aligned.	
DISADVANTAGE	Susceptible to interference by another antenna that is sending signals of the same frequency or band.	High-frequency microwaves cannot penetrate walls, receiving antennas cannot be placed inside buildings.	cannot be used for long distance communication, cannot use outside a building because sun's rays can interfere with communication.

LATIHAN 3.3

---

1. *Define and state the various type of Network Operating System.*

An operating system is the program that first loads when a computer boots and manages any other software or hardware on the computer. A Network Operating System or known as NOS, has additional functionality that allows it to connect computers and peripherals to a network.

A Network Operating System is most frequently used with Local Area Networks and Wide Area Networks, but could also have application to larger network systems. A NOS is not the same as the networking tools provided by some existing operating systems, Windows XP for instance. NOS is an operating system that has been specifically written to keep networks running at optimal performance

Example of Network Operating System Software

- ❖ Windows NT
- ❖ Windows 2000 Server
- ❖ Windows Server 2003
- ❖ Red Hat Linux

2. *State the functions of various client software.*

I.   Web Browser
A web browser is a software application that enables a user to display and interact with HTML documents hosted by web servers or held in a file system.Text and images on a web page can contain hyperlinks to other web pages at the same or to different websites.Web browsers allow a user to quickly and easily access information provided on many web pages at many websites by surfing these links.

Web browsers available for personal computers include Microsoft Internet Explorer, Safari, Netscape and Opera.   Web browsers are the most commonly used type of Hypertext Transfer Protocol (HTTP) user agent. Although browsers are typically used to access the World Wide Web, they can also be used to access information provided by web servers in private networks or content in file systems.

II.   Email Client
An email client is a computer program that is used to read and send email.

III.   Functions Of File Transfer Protocol (Ftp) Client
File Transfer Protocol (FTP) client is used to connect two computers over the Internet so that the user of one computer can transfer files and perform file commands on the other computer.

LATIHAN 3.4

---

1. *Describe a latest Mobile Computing*

I.   Notebook Computer
A notebook computer or notebook is a small mobile personal computer, usually weighing from one to three kilograms. Using the technology from Symbionics Networks Ltd., a wireless LAN adapter can be made in a laptop or notebook computer to provide mobile computing.

II.   Tablet PC
A tablet PC is a notebook or slate-shaped mobile computer.
Its digitising tablet technology allows the user to operate the computer using a stylus or digital pen and a touch screen instead of the usual keyboard and mouse. Most Tablet PCs offer built-in support for wireless networks.

III. PDA

Personal digital assistants or PDAs are handheld devices that were originally designed as personal organisers but became much more versatile over the years. Many PDAs can access the Internet, intranets or extranets via Wi-Fi or Wireless Wide-Area Networks or WWANs

IV. Smart Phone

A smart phone is an electronic handheld device that integrates the functionality of a mobile phone and a personal digital assistant or PDA or other information appliance. This is often achieved by adding telephone functions to an existing PDA or PDA Phone or putting "smart" capabilities such as PDA functions into a mobile phone

2. *Describe a latest Internet Technology and Services*

VOICE OVER INTERNET PROTOCOL (VoIP)

Protocols used to carry voice signals over the IP network are commonly referred to as Voice over IP or VoIP. VoIP is one of the Internet technologies that allows a user to make telephone calls using a broadband Internet connection instead of a regular (or analog) phone line.

VoIP is a method for taking analog audio signals and turning them into digital data that can be transmitted over the Internet. There are three different VoIP services in common use today. They are Analog Telephone Adapter (ATA), IP Phones and computer-to-computer.

BLOGGING

A blog (web log or weblog) is one of the popular activities on the Internet. Most of these blogs are publicly shared and the authors frequently update the content on a regular basis. A blog is usually referred to the text produced by the author about his or her thoughts, experiences or interests.

The world of blogging is referred as blogosphere. Another new term is the blogonomics, which refers to people using the blogosphere to generate money. The posts to a blog are usually arranged in this order, the most recent entries will always be on top of the journal.

3. *Describe a latest Types of network*

PERSONAL AREA NETWORK (PAN)

A Personal Area Network (PAN) is a computer network used for communication among computer devices including PCs, laptops, printers, telephones, digital cameras, mobile phones, video game consoles and personal digital assistants, close to one person.

PAN may be wired with USB port, Firewire port, Infrared (IrDA) and Bluetooth technologies. Bluetooth is the popular wireless PAN used by most people, especially the mobile phone technologies, and it applies the IEEE 802.15.1 standards.

VIRTUAL PRIVATE NETWORK (VPN)

A Virtual Private Network (VPN) is a network that uses a public telecommunication infrastructure, such as the Internet, to remote offices or individuals with secure access to their organisation's private network.

VPN uses tunnelling mechanism to maintain privacy and security of the data. Tunnelling means transmitting data packets across a public network. VPN is often used by companies to provide access from their internal network resources to their home or mobile workers.

WIRELESS LAN (WLAN)

Wireless Local Area Network (WLAN) is a type of LAN that uses high-frequency radio waves to communicate between nodes. WLAN improves user mobility, speed and scalability to move around within a broad coverage area and still be connected to the network. The IEEE standard for Wireless LANs is 802.11

WORLDWIDE INTEROPERABILITY FOR MICROWAVE ACCESS (WiMAX)

Worldwide Interoperability for Microwave Access (WiMAX) is the industry term for broadband wireless access network that is developed based on the IEEE 802.16 standard.

WiMAX is a Wireless Metropolitan Area Network (MAN) technology that will connect WiFi hotspots to the Internet and provides a wireless extension to cable and DSL for larger broadband access.WiMAX would operate similar to WiFi but at higher speeds, over greater distances and for a greater number of users.

A WiMAX system will have two major parts:
- ❖ a WiMAX base station, similar in concept to a mobile phone tower
  a WiMAX receiver installed at home