XII – IP –NETWORKS (10 Marks)

2024.25 Syllabus

UNIT 3: Introduction to Computer Networks

Introduction to networks,

Types of network: PAN, LAN, MAN, WAN.

Network Devices: Modem, Hub, Switch, Repeater, Router, Gateway

Network Topologies: Star, Bus, Tree, Mesh.

Introduction to Internet, URL, WWW, and its applications- Web, email, Chat, VoIP.

Website: Introduction, difference between a website and webpage, static vs dynamic web page, web server and hosting of a website.

Web Browsers: Introduction, commonly used browsers, browser settings, add-ons and plug-ins, cookies.

MATERIAL
(From NCERT Text Book)

*****Full Forms also Very Important**

Network: A group of two or more similar things or people interconnected with each other is called network.

Ex: • Social network
- Mobile network
- Network of computers
- Airlines, railway, banks, hospitals networks.

Computer Network: A computer network is an interconnection among two or more computers or computing devices.

Such interconnection allows computers to share data and resources among each other.

A computer network can include different types of hosts (also called nodes) like server, desktop, laptop, cellular phones.

Apart from computers, networks include **networking devices** like switch, router, modem, etc. Networking devices are used to connect multiple computers in different settings.

Smaller chunks of data is called as **packets.**

Node: In a communication network, each device that is a part of a network and that can receive, create, store or send data to different network routes is called a node.

A node can be a device such as a modem, hub, bridge, switch, router, digital telephone handset, a printer, a computer or a server.

Uses of Networks:

- Interconnectivity of computing devices in a network
- allows us to exchange information simultaneously with many parties through email, websites, audio/video calls, etc.
- Network allows sharing of resources. For example, a printer can be made available to multiple computers through a network;
- A networked storage can be accessed by multiple computers.
- People often connect their devices through hotspot, thus forming a small personal network.

Types of Networks

There are various types of computer networks ranging from network of handheld devices (like mobile phones or tablets) connected through Wi-Fi or Bluetooth within a single room to the millions of computers spread across the globe. Some are connected wireless while others are connected through wires.

Based on the **geographical area** covered and data transfer rate, computer networks are broadly categorised as:

• LAN (Local Area Network)
• MAN (Metropolitan Area Network)
• WAN (Wide Area Network)

Network based on the method of connectivity and the nature of their use :

• PAN (Personal Area Network)

Local Area Network (LAN):

It is a network that connects computers, mobile phones, tablet, mouse, printer, etc., placed at a limited distance.

The geographical area covered by a LAN can range from a single room, a floor, an office having one or more buildings in the same premise, laboratory, a school, college, or university campus. The connectivity is done by means of wires, Ethernet cables, fibre optics, or Wi-Fi.

A Local Area Network (LAN) is shown as

Local Area Network

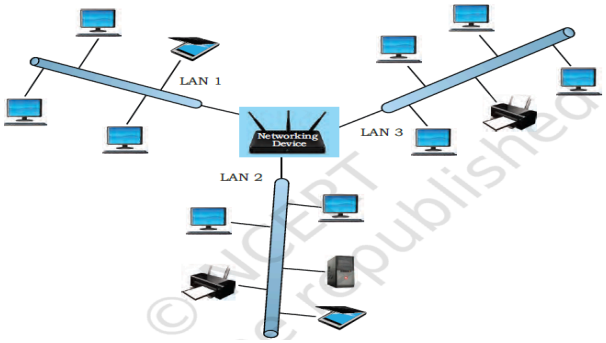
LAN is comparatively secure as only authentic users in the network can access other computers or shared

resources. Users can print documents using a connected printer, upload or download documents and software to and from the local server. Such LANs provide the short range communication with the high speed data transfer rates. These types of networks can be extended up to 1 km. Data transfer in LAN is quite high, and usually varies from 10 Mbps (called Ethernet) to 1000 Mbps (called Gigabit Ethernet), where Mbps stands for Megabits per second. Ethernet is a set of rules that decides how computers and other devices connect with each other through cables in a local area network or LAN.

Metropolitan Area Network (MAN)

Metropolitan Area Network (MAN) is an extended form of LAN which covers a larger geographical area like a city or a town. Data transfer rate in MAN also ranges in Mbps, but it is considerably less as compared to LAN.

Cable TV network or cable based broadband internet services are examples of MAN. This kind of network can be extended up to 30–40 km. Sometimes, many LANs are connected together to form MAN, as shown here

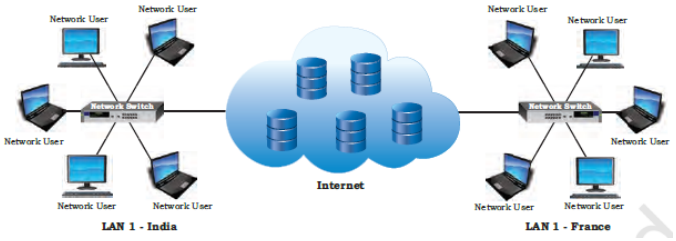


Metropolitan Area Network

Wide Area Network (WAN):

Wide Area Network (WAN) connects computers and others LANs and MANs, which are spread across different geographical locations of a country or in different countries or continents.

A WAN could be formed by connecting a LAN to other LANs (as in Figure) via wired or wireless media. Large business, educational and government organisations connect their different branches in different locations across the world through WAN. The Internet is the largest WAN that connects billions of computers, smartphones and millions of LANs from different continents.



Wide Area Network

Personal Area Network (PAN) :

A Personal Area Network is designed for personal use within a range of a few meters, typically not exceeding **10 meters**.

The primary purpose of a PAN is to facilitate the connection of personal devices for the individual's use, allowing data sharing, communication, and connectivity between devices like smartphones, tablets, laptops, and wearable devices within a close proximity.

Devices/technology connected to PAN: Bluetooth Connectivity, Smart Watches and Fitness Trackers, Smart Phones, etc.

NETWORK DEVICES

Network Devices: modem, hub, switch, repeater, router, gateway.

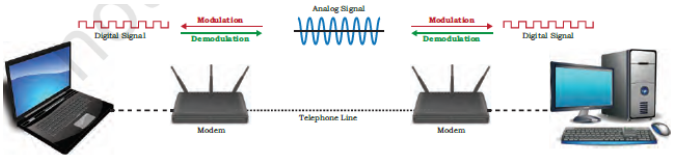
To communicate data through different transmission media and to configure networks with different functionality, we require different devices like Modem, Hub, Switch, Repeater, Router, Gateway, etc.

Modem :

Modem stands for 'MOdulator DEMolulator'. It refers to a device used for conversion between analog signals and digital bits. We know computers store and process data in terms of 0s and 1s. However, to transmit data from a sender to a receiver, or while browsing the internet, digital data are converted to an analog signal and the medium (be it free-space or a physical media) carries the signal to the receiver.

There are modems connected to both the source and destination nodes. The modem at the sender's end acts as a modulator that converts the digital data into analog signals. The modem at the receiver's end acts as a demodulator that converts the analog signals into digital data for the destination node to understand.

Following Figure shows connectivity using a modem:



Use of Modem

Ethernet Card:

Ethernet card, also known as Network Interface Card (**NIC** card in short) is a network adaptor used to set up a wired network. It acts as an interface between computer and the network. It is a circuit board mounted on the motherboard of a computer. The Ethernet cable connects the computer to the network through NIC. Ethernet cards can support data transfer between 10 Mbps and 1 Gbps (1000 Mbps). Each NIC has a MAC address, which helps in uniquely identifying the computer on the network.

Repeater :

Data are carried in the form of signals over the cable. These signals can travel a specified distance (usually about 100 m). Signals lose their strength beyond this limit and become weak. In such conditions, original signals need to be regenerated.

A repeater is an analog device that works with signals on the cables to which it is connected. The weakened signal appearing on the cable is regenerated and put back on the cable by a repeater.

Hub:

An Ethernet hub is a network device used to connect different devices through wires. Data arriving on any of the lines are sent out on all the others. The limitation of hub is that if data from two devices come at the same time, they will collide.

Switch:

A switch is a networking device that plays a central role in a Local Area Network (LAN). Like a hub, network switch is used to connect multiple computers or communicating devices. When data arrives, the switch extracts the destination address from the data packet and looks it up in a table to see where to send the packet.

Cables connected to a network switch

Thus it sends signals to only selected devices instead of sending to all. It can forward multiple packets at the same time. A switch does not forward the signals which are noisy or corrupted. It drops such signals and asks the sender to resend it.

Ethernet switches are common in homes and offices to connect multiple devices, thus creating LANs or to access the Internet.

Router :

A router is a network device that can receive the data, analyse it and transmit it to other networks. A router connects a local area network to the internet. Compared to a hub or a switch, a router has advanced capabilities as it can analyse the data being carried over a network, decide or alter how it is packaged, and send it to another network of a different type. For example, data has been divided into packets of a certain size. Suppose, these packets are to be carried over a different type of network which cannot handle bigger packets, in such a case, the data is to be repackaged as smaller packets and then sent over the network by a router.

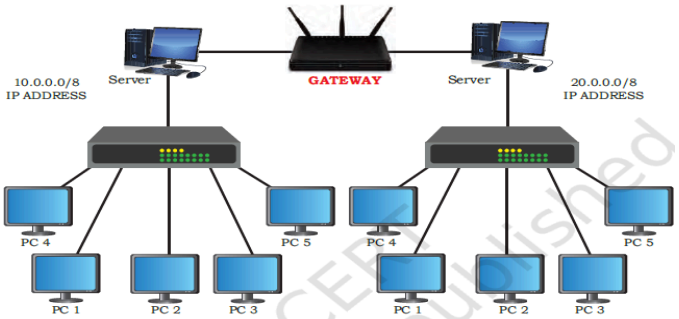
A router can be wired or wireless. A wireless router can provide Wi-Fi access to smartphones and other devices. Usually, such routers also contain some ports to provide wired Internet access. These days, home

Wi-Fi routers perform the dual task of a router and a modem or switch. These routers connect to incoming broadband lines, from ISP (Internet Service Provider), and convert them to digital data for computing devices to process.

Gateway:

As the term “Gateway” suggests, it is a key access point that acts as a “gate” between an organisation's network and the outside world of the Internet.

Gateway serves as the entry and exit point of a network, as all data coming in or going out of a network must first pass through the gateway in order to use routing paths. Besides routing data packets, gateways also maintain information about the host network's internal connection paths and the identified paths of other remote networks. If a node from one network wants to communicate with a node of a foreign network, it will pass the data packet to the gateway, which then routes it to the destination using the best possible route.



Network gateway

For simple Internet connectivity at homes, the gateway is usually the Internet Service Provider that provides access to the entire Internet. Generally, a router is configured to work as a gateway device in computer networks. A gateway can be implemented as software, hardware, or a combination of both. This is because a network gateway is placed at the edge of a network and the firewall is usually integrated with it.

NETWORK TOPOLOGIES

(Star, Bus, Tree, Mesh)

Networking Topologies: The arrangement of computers and other peripherals in a network is called its topology.

Star Topology:

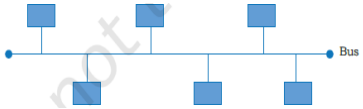
In star topology, each communicating device is connected to a central node, which is a networking device like a hub or a switch.

Star topology is considered very effective, efficient and fast as each device is directly connected with the central device. Although disturbance in one device will not affect the rest of the network, any failure in the central networking device may lead to the failure of complete network.

The central node can be either a broadcasting device means data will be transmitted to all the nodes in the network, or a unicast device means the node can identify the destination and forward data to that node only.

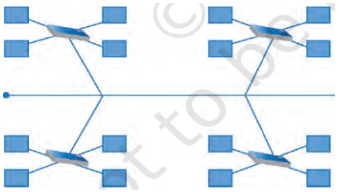
Bus Topology:

In bus topology, each communicating device connects to a transmission medium, known as bus. Data sent from a node are passed on to the bus and hence are transmitted to the length of the bus in both directions. That means data can be received by any of the nodes connected to the bus.



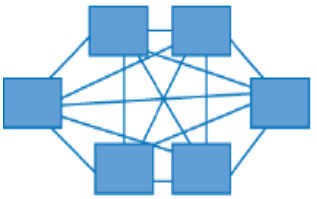
In this topology, a single backbone wire called bus is shared among the nodes, which makes it cheaper and easy to maintain. Both ring and bus topologies are considered to be less secure and less reliable.

Tree or Hybrid Topology:



It is a hierarchical topology, in which there are multiple branches and each branch can have one or more basic topologies like star, ring and bus. Such topologies are usually realised in WANs where multiple LANs are connected. Those LANs may be in the form of ring, bus or star. In the above figure, a hybrid topology is shown connecting 4 star topologies in bus. In this type of network, data transmitted from source first reaches the centralised device and from there the data passes through every branch where each branch can have link for more nodes.

Mesh Topology :



In this networking topology, each communicating device is connected with every other device in the network. Such a network can handle large amounts of traffic since multiple nodes can transmit data simultaneously. Also, such networks are more reliable in the sense that even if a node gets down, it does not cause any break in the transmission of data between other nodes.

This topology is also more secure as compared to other topologies because each cable between two nodes carries different data. However, wiring is complex and cabling cost is high in creating such networks, and there are many redundant or unutilised connections.

Introduction to Internet, URL, WWW, and its applications – Web, email, Chat and VoIP.

The Internet is the global network of computing devices including desktop, laptop, servers, tablets, mobile phones, other handheld devices as well as peripheral devices such as printers, scanners, etc.

In addition, it also consists of networking devices such as routers, switches, gateways, etc. Today, smart electronic appliances like TV, AC, refrigerator, fan, light, etc., can also communicate through the Internet. The list of such smart devices are always increasing e.g., drones, vehicles, door lock, security camera, etc.

The Internet is evolving everyday. Computers are either connected to a modem through a cable or wirelessly (Wi-Fi). A modem, be it wired or wireless,

is connected to a local Internet Service Provider (ISP) who then connects to a national network. Many such ISPs connect together forming a regional network and regional networks connect together forming a national network, and such country-wise networks form the Internet backbone.

The Internet today is a widespread network, and its influence is no longer limited to the technical fields of computer communications. It is being used by everyone in the society as is evident from the increasing use of online tools for education, creativity, entertainment, socialisation and e-commerce.

APPLICATIONS OF INTERNET

Following are some of the broad areas or services provided through Internet:

- The World Wide Web (WWW)
- Electronic mail (Email)
- Chat
- Voice Over Internet Protocol (VoIP)

1. The World Wide Web (WWW) :

The World Wide Web (WWW) or web in short, is an ocean of information, stored in the form of trillions of interlinked web pages and web resources. The resources on the web can be shared or accessed through the Internet.

Earlier, to access files residing in different computers, one had to login individually to each computer through the Internet. Besides, files in different computers were sometimes in different formats, and it was difficult to understand each other's files and documents. Sir Tim Berners-Lee — a British computer scientist invented the revolutionary World Wide Web in 1990 by defining three fundamental technologies that lead to creation of web:

- **HTML** — HyperText Markup Language or HTML is a language which is used to design standardised Web Pages so that the Web contents can be read and understood from any computer across the globe. It uses tags to define the way page content should be displayed by the web browser. Basic structure of every webpage is designed using HTML.
- **URI** — Uniform Resource Identifier or URI is a unique identifier to identify a resource located on the web. URI identifies a resource (hardware or software) either by its location or by its name or by both.
- **URL** is Uniform Resource Locator and provides the location and mechanism (protocol) to access the resource.

Examples of URI identifying resources using location (i.e., URL) are:

https://www.mhrd.gov.in,
http://www.ncert.nic.in,
http://www.airindia.in, etc.

URL is sometimes also called a web address. However, it is not only the domain name, but contains other information that completes a web address, as depicted below:

In the above URL, http is the protocol name, it can be https, http, FTP, Telnet, etc. www is a subdomain. ncert.nic.in is the domain name.

Note: These days it is not mandatory to mention protocol and subdomain while entering a URL. The browser automatically prefixes it.

URL: A Uniform Resource Locator (URL) is an address that indicates the location of a specific file or resource on the World Wide Web (WWW). A URL specifies the site of a target saved on a local or networked computer. A file, directory, HTML page, image, application, and more can all be the target.

Ex: https://www.cbse.gov.in/

Absolute Address: Absolute URLs offer a full address for a website or other resource on the Internet. All the details required to find a resource are in an absolute URL.

It employs the following structure:

scheme://server/path/resource,

Where the scheme specifies the resource's access method.

The server determines the computer's name on which the resource is stored.

The path specifies the order of directories leading to the target.

The last directory in the way is the target if the resource is omitted.

Ex: https://www.cbse.gov.in/cbsenew/cbse.html

Relative Address: A relative URL usually contains the path and, if present, the resource; it does not include the scheme or server.

The forward slash is the first character in the relative path, which directs the browser to stay on the current website. A relative URL would look like this –

Ex: /cbsenew/cbse.html

- **HTTP** — The HyperText Transfer Protocol is a set of rules which is used to retrieve linked web pages across the web. It's more secure and advanced version is HTTPS.

Many people confuse the web with the Internet. The Internet as we know is the huge global network of interconnected computers, which may or may not have any file or webpage to share with the world. The web on the other hand is the interlinking of a collection of

WebPages on these computers which are accessible over the Internet. WWW today gives users access to a vast collection of information created and shared by people across the world. It is today the most popular information retrieval system.

2. Electronic Mail (Email):

Email is the short form of electronic mail. It is one of the ways of sending and receiving message(s) using the Internet. An email can be sent anytime to any number of recipients at anywhere. The message can be either text entered directly onto the email application or an attached file (text, image audio, video, etc.) stored on a secondary storage. An existing file can be sent as an attachment with the email, so no need to type it again.

To use email service, one needs to register with an email service provider by creating a mail account. These services may be free or paid. Some of the popular email service providers are Google (gmail), Yahoo (yahoo mail), Microsoft (outlook), etc. However, many organisations nowadays get customised business email addresses for their staff using their own domain name.

For example, username@companyname.com.

Following are some of the common facilities available for an email user:

1. Creating an email, attaching files with an email, saving an email as draft for mailing later. Creating email is also termed as composing.
2. Sending and receiving mail. Same email can be sent to multiple email addresses, simultaneously.
3. Sending the copy of mail, as carbon copy (cc) or blind carbon copy (bcc).
4. Forwarding a received email to other user(s)
5. Filtering spam emails
6. Organising email in folders and sub folders
7. Creating and managing email ids of the people you know.
8. Setting signature/footer to be inserted automatically at the end of each email
9. Printing emails using a printer or saving as files.
10. Searching emails using email address or email subject text.

3. Chat :

Chatting or Instant Messaging (IM) over the Internet means communicating to people at different geographic locations in real time through text message(s). It is a forum where multiple people connect to each other, to discuss their common interests. Two individuals can also send messages instantly. The sender types a message and sends it; the receiver immediately receives the message and can read and revert through text message. All this happens in real time, as if the sender and receiver were sitting in the same place. For a successful chat session, the communicating parties should be online simultaneously, and use the same chat application.

With ever increasing internet speed, it is now possible to send image, document, audio, video as well through instant messengers. It means, the communicating parties can talk to each other through an audio call or through a video call. Moreover, it is also possible to chat through text, audio and video in a group. Thus, we can have group chat or group calls.

Applications such as WhatsApp, Slack, Skype, Yahoo Messenger, Google Talk, Facebook Messenger, Google Hangout, etc., are examples of instant messengers.

Some of these applications support instant messaging through all the modes — text, audio and video.

4. VoIP:

Voice over Internet Protocol or VoIP, allows us to have voice call (telephone service) over the Internet, i.e., the voice transmission over a computer network rather than through the regular telephone network. It is also known as Internet Telephony or Broadband Telephony.

But to avail the phone service over the Internet, we need to have an Internet connection with reasonably good speed.

VoIP works on the simple principle of converting the analogue voice signals into digital and then transmitting them over the broadband line. There are two major advantages of a VoIP—

• These services are either free or very economical, so people use them to save on cost. That is why these days even international calls are being made using VoIP.

• VoIP call(s) can be received and made using IP phones from any place having Internet access. Hence, VoIP has increased the portability and functionality of the voice calling system. Incoming phone calls can be automatically routed to the VoIP phone as soon as it is connected to the Internet.

The only disadvantage of VoIP is that its call quality is dependent on Internet connection speed. Slow Internet connection will lead to poor quality voice calls.

Website, Webpage & Types, Web Server, Hosting of a Website, Browser, Add-Ons & Plugins, Cookies.

Website :

Each one of us might have visited one or the other website. A website in general contains information organised in multiple pages about an organisation. A

website can also be created for a particular purpose, theme or to provide a service.

A website (usually referred to as a site in short) is a collection of web pages related through hyperlinks, and saved on a web server. A visitor navigates from one page to another by clicking on hyperlinks. Also, all the pages of a website are integrated under one domain name and have a common theme and template.

For example, the website of NCERT will have all the pages related to NCERT, viz., textbooks, syllabus, events, resource materials, etc., under one domain name and having a common design theme.

To access a website, one has to type the address of the website (URL) in the address bar of a browser, and press enter. The home page of the website will be displayed.

Purpose of a Website :

We are living in an Internet era where the whole world is connected. A website's purpose is to make the information available to people at large. For example, a company might like to advertise or sell its products, a government organisation may like to publish circulars, float tenders, invite applications or get feedback from various stakeholders.

A website is a means that helps to communicate with people in a specific, transparent and user friendly manner. Therefore, while developing a website, the first question to ask is why the website is being created, and what should be its pages so that it serves the required purpose.

Basically, a website should be user friendly and provide information to users with minimum efforts. A website should be designed keeping in mind different categories of people that will be visiting the site.

Some of the common purposes for which websites are designed are listed below:

- Selling products and delivering services
- Posting and finding information on the internet
- Communicating with each other
- Entertainment purposes
- Disseminating contents and software

Web Page:

A web page (also referred to as a page) is a document on the WWW that is viewed in a web browser. Basic structure of a web page is created using HTML (HyperText Markup Language) and CSS (Cascaded Style Sheet).

A web page is usually a part of a website and may contain information in different forms, such as:

- text in the form of paragraphs, lists, tables, etc.
- images
- audio
- video
- software application
- other interactive contents

Additionally, various styling and formatting are applied on a web page to make it attractive and organised. Further, program codes called scripts are used to define the manner in which the page will behave on different actions. Scripts make a web page interactive. JavaScript is the most popular and commonly used scripting language. However, Python and PHP are also used to apply scripting on a web page.

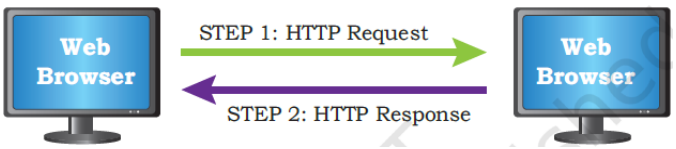
The first page of the website is called a **home page.** It generally contains information and links to all the related web pages. Each web page has a unique address that is visible on the address bar. Hence if we want to view a particular web page, its address has to be typed in the address bar of the browser. The web pages that are linked to form a website share a unique domain name.

For example, https://swayam.gov.in/ is a website by the Government of India to deliver online courses for School, College and University students and teachers. It is a collection of multiple web pages that link to different courses related information.

Static and Dynamic Web Pages:

A **web page** can be static or dynamic. A **static webpage** is one whose content always remains static, i.e., does not change for person to person. When a web server receives a request (from browser) for a static web page, it just locates the page on its storage media and sends it to the browser of the client. No additional processing is performed on the page.

Hence, a static web page remains the same for all users until someone changes its code manually. Static web pages are generally written in HTML, JavaScript and/or CSS and have the extension .htm or .html.



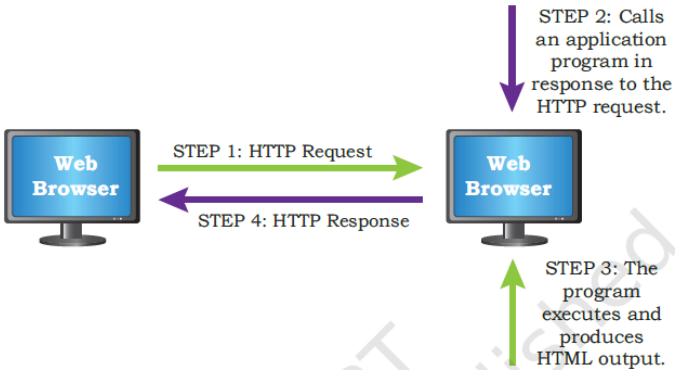
Working of a static web page

On the other hand, a **dynamic web page** is one in which the content of the web page can be different for different users. The difference in content may be because of different choices made by the user. When a request for a dynamic web page is made to the web server, it does not simply retrieve the page and send.

Before sending the requested web page, the server may perform some additional processes like getting information from the database, updating date and time, updating weather information, etc. The content of such pages changes frequently. They are more complex and thus take more time to load than static web pages.

Dynamic web pages can be created using various languages such as JavaScript, PHP, ASP.NET, Python, Java, Ruby, etc. These are complex to construct and design, as the code to perform the additional operations has to be added. Such server side code allows the server to change its content each time the page is loaded.

Further, most dynamic pages are linked to databases so that each time the page is uploaded, the required information from the databases is retrieved to update the web page. Few common examples of dynamic web pages are those web pages displaying the date, time, and weather report or having e-commerce applications.



Working of a dynamic web page

Web Server :

A **web server** is used to store and deliver the contents of a website to clients such as a browser that request it. A web server can be software or hardware. When talking about a web server as computer hardware, it stores web server software and a website's contents (HTML pages, images, CSS stylesheets, and JavaScript files).

The server needs to be connected to the Internet so that its contents can be made accessible to others. When talking about a web server as a software, it is a specialised program that understands URLs or web addresses coming as requests from browsers, and responds to those requests. The server is assigned a unique domain name so that it can be accessed from anywhere using the domain name.

To develop and test a website using a personal computer, we need to first install a web server on that computer. The web browser from the client computer sends a request (HTTP request) for a page containing the desired data or service. The web server then accepts, interprets, searches and responds (HTTP response) to the request made by the web browser. The requested web page is then displayed in the browser of the client. If the server is not able to locate the page, it sends a page containing the error message (Error 404 – page not found) to the client's browser.

Hosting of a Website :

Web hosting is a service that allows us to put a website or a web page onto the Internet, and make it a part of the World Wide Web. Once a website is created using a hardware server, we need to connect it to the Internet so that users across the globe can access. On the other hand, we can rent server resources (CPU, RAM, and storage) from a cloud service provider and host our locally created website there. This is done by uploading the files constituting the website (HTML, CSS, JavaScript, images, databases, etc.) from the local computer onto the space allocated on the server. For this, we have to avail the services of a web hosting service provider. These services for using the server's resources such as RAM, hard disk, bandwidth, etc., are usually paid and these resources can be increased or decreased as per the loads on the website.

A web server whether it is a local server or a cloud server when connected to the Internet is assigned a unique numeric address on the Internet called IP address. This IP address needs to be mapped to a textual name called domain name of the website. This is because it is not convenient for users to remember a numeric IP address.

Thus, for accessing a website, the user enters the domain through a browser (URL). The domain name has to be registered (purchased) with an authorised agency.

How to host a website?

To host a website, follow the steps given below:

• Select the web hosting service provider that will provide the web server space as well as related technologies and services such as database, bandwidth, data backup, firewall support, email service, etc. This has to be done keeping in mind the features and services
that we want to offer through our website.

• Identify a domain name, which best suits our requirement, and get it registered through domain name Registrar.

• Once we get web space, create logins with appropriate
rights and note down IP address to manage web space.

• Upload the files in properly organised folders on the allocated space.

• Get domain name mapped to the IP address of the web server.

The **domain name system** (DNS) is a service that does the mapping between domain name and IP address. When the address of a website is entered in a browser, the DNS finds out the IP address of the server corresponding to the requested domain name and sends the request to that server.

Web Browsers: Introduction, commonly used browsers, browser settings, add-ons and plug-ins, cookies.

Browser :

A browser is a software application that helps us to view the web page(s). In other words, it helps us to view the data or information that is retrieved from various web servers on the Internet. Some of the **commonly used web browsers** are Google Chrome, Internet Explorer, Mozilla Firefox, Opera, etc.

A web browser essentially displays the HTML documents which may include text, images, audio, video and hyperlinks that help to navigate from one web page to another.

The initial web browsers like Mosaic used to support HTML documents containing plain text (static website) only, but nowadays with the advancement of technology, modern web browsers allow us to view interactive and dynamic websites.

In addition to this, most modern browsers allow a wide range of visual effects, use encryption for advanced security and also have cookies that can store the browser settings and data.

Browser Settings:

Every web browser has got certain settings that define the manner in which the browser will behave. These settings may be with respect to privacy, search engine preferences, download options, auto signature, autofill and autocomplete feature, theme and much more.

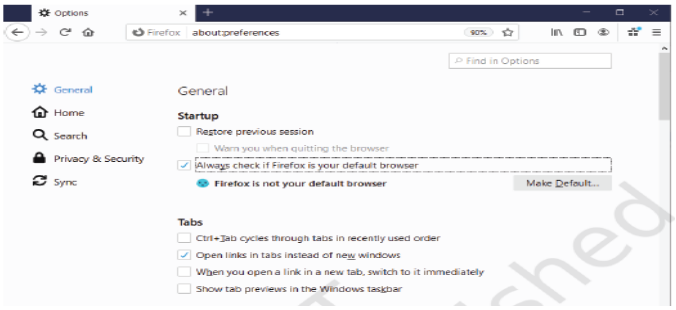
Each browser application allows us to change or customise its settings in a user friendly manner.

Change the browser settings using the open source browser, Mozilla Firefox :

Open Mozilla Firefox, and on the top right corner of the browser window, click the Menu button.

Mozilla Firefox Menu button

From the drop down button, select Options. The preferences and Options window will be displayed in the browser.



Preference and options page

On the left side, there are multiple Panels to choose from: General, Home, Search, Privacy and Security and Sync.

General Panel: Some of the options that the panel contains are as follows:

• setting the default browser
• language and appearance of text
• downloading files and applications
• firefox update settings
• browsing and network settings

Home Panel: This panel contains options to set the home page of the browser, browser window and tab settings.

Search Panel: This panel contains options to edit the settings of the search engine used by Firefox.

Privacy and Security Panel: This panel contains options to secure the browser and data. It includes the following:

• enhanced tracking protection
• forms and passwords
• history and address bar
• cookies and site data
•permission to view pop ups windows and install addons

Sync Panel: This panel contains options to set up and manage a Firefox account which is needed to access all services given by Mozilla. Make the desired settings and close the browser settings window. The changes made in the browser settings will be applied.

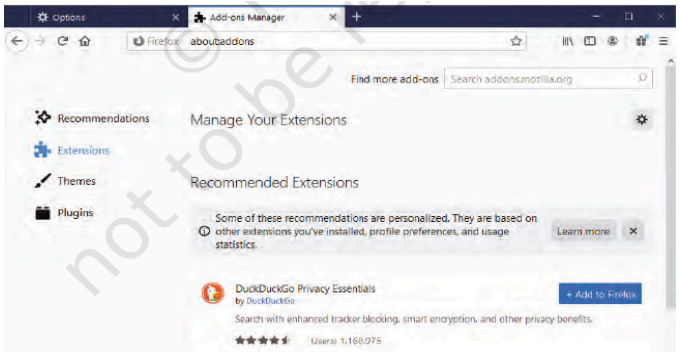
Add-Ons and Plug-ins

Add-ons and plug-ins are the tools that help to extend and modify the functionality of the browser.

Both the tools boost the performance of the browser, but are different from each other.

A Flash player is required to play a video in the browser.

Plug-ins	Add-Ons
A **plug-in** is a complete program or may be a third-party software.	**Add-on** is not a complete program and so is used to add only a particular functionality to the browser.
A plug-in is a software that is installed on the host computer and can be used by the browser for multiple functionalities and can even be used by other applications as well.	An add-on is also referred to as extension in some browsers.
Ex: Flash, Java	**Ex:** Ad blockers, Adding the functionality of a sound and graphics card is an example of an add-on.



Add-ons and plug-ins

To add an extension, click the Options button on the top right corner of the browser and select the Addons option. Click the Extensions Panel option on the left. On the right, options to Manage your Extensions will appear. There will be a list of enabled, disabled and recommended extensions. Make the desired selections and close the add-ons window.

Similarly, to add plug-ins, click Plug-ins options on the left side of the browser window. Make the desired selections to enable or disable the required plug-ins.

Cookies:

A **cookie** is a text file, containing a string of information, which is transferred by the website to the browser when we browse it. This string of information gets stored in the form of a text file in the browser.

The information stored is retransmitted to the server to recognise the user, by identifying pages that were visited, choices that were made while browsing various menu(s) on a particular website.

It helps in customising the information that will be displayed, for example the choice of language for browsing, allowing the user to auto login, remembering the shopping preference, displaying advertisements of one's interest, etc.

Cookies are usually harmless and they can't access information from the hard disk of a user or transmit virus or malware. It is the browser on our computer which stores and manages the cookies.

However, viruses can also be tricked as cookies and cause harm to a computer. One can disable cookies by changing the Privacy and Security settings of our browser.

SUMMARY

• A group of two or more similar things or people interconnected with each other is called **network**

• A **computer network** is an interconnection among two or more computers to share data and resources.

• Devices in a network can be connected either through **wired** or **wireless media**.

• Based on the geographical area covered and data transfer rate, computer networks are broadly categorised as **LAN**, **MAN** and **WAN**.

• The protocol or the set of rules that decide functioning of a LAN is called **Ethernet**.

• Local Area Network (**LAN**) is a network that connects digital devices placed at a limited distance of upto 1 km.

• Metropolitan Area Network (**MAN**) is an extended form of LAN which covers a larger geographical area like a city or a town.

• Wide Area Network (**WAN**) connects computers and other LANs and MANs, which are spread across different geographical locations of a country or in different countries or continents.

• A **repeater** is an electronic device that receives a weak signal and regenerates it.

• **Modem** (MOdulator DEMolulator) refers to any such device used for conversion between analog signals and digital bits.

• A **hub** is a network device used to connect multiple devices to form a network or to connect segment(s) of LAN.

• A **switch** is a networking device that filters network traffic while connecting multiple computers or communicating devices.

• A **router** is a network device that can receive the data, analyse it and transmit to other networks.

• A **gateway** is a device that connects the organisation's network with the outside world of the Internet.
• The physical organisation of computers, cables and other peripherals in a network is called its topology. Common network **topologies** are Bus, Star, Tree, Mesh, etc.
• In **bus topology**, each communicating device connects to a common central transmission medium, known as bus.
• In **star topology**, each communicating device is connected to a central node, which is a networking device like a hub or a switch, through separate cables.
• In **tree topology**, multiple star and bus topologies are connected to a central cable, also called the backbone of the network.
• In **mesh topology**, each communicating device is connected with every other device in the network.
• The **Internet** is the largest WAN that connects millions of computers across the globe.
• Some of the **services** provided through the Internet are information sharing, communication, data transfer, social networking, e-commerce, etc.
• A Uniform Resource Locator (**URL**) is a standard naming convention used for accessing resources over the Internet.
• **Electronic mail** is a means of sending and receiving message(s) through the Internet.
• **Chatting** is communicating in real time using text message(s).
• Voice over Internet Protocol (**VoIP**) allows you to have voice calls over digital networks.
• A **website** is a collection of related web pages.
• A **web page** is a document that is viewed in a web browser such as Google Chrome, Mozilla Firefox, Opera, Internet Explorer, etc. It can be static or dynamic.
• A **static web page** is one whose content does not change for requests made by different people.
• A dynamic **web page** is one in which the content of the web page displayed is different for different users.
• A **web server** is a program or a computer that provides services to other programs or computers called clients.
• **Web hosting** is a service that allows you to post the website created locally so that it is available for all internet users across the globe.
• Every **browser** has got certain **settings** that define the manner in which the browser will behave. These settings may be with respect to privacy, search engine preferences, download options, auto signature, autofill and autocomplete feature and much more.
• **Add-ons** and plug-ins are the tools that help to extend and modify the functionality of the browser.
• A **cookie** is a text file containing a string of information which stores browsing information on the hard disk of your computer.

EXERSIZE

1. Fill in the blanks:

a) To transmit data for sharing on a network, it has to be divided into smaller chunks called _____.
b) The set of rules that decide the functioning of a network is called _____.
c) A LAN can be extended up to a distance of ____km.
d) The _____ connects a local area network to the internet.
e) The _____ topology is of hierarchical nature.
f) _____ is a standard naming convention used for accessing resources over the Internet.
g) _____ is a collection of related web pages.
h) A _____ is a computer that provides services to other programs or computers.

2. Expand the following:

a) ARPANET b) ISP c) URL

3. Name the device for the following:

a) It stands for Modulator Demodulator
b) It regenerates the signals.

4. Differentiate between:

a) MAN and WAN b) Website and web page
c) Router and Gateway d) Bus and Star topology
e) Static and Dynamic web pages

5. Define a network. What is the need of forming a network?
6. Give any two examples of networks.
7. Give any three applications on the Internet.
8. Name any two mail service providers.
9. Explain VoIP. **10.** What is DNS?
11. Identify the type of topology from the following:
a) Each node is connected with the help of a single cable.
b) Each node is connected with central switching through independent cables.
12. Sahil, a Class X student, has just started understanding the basics of Internet and web technologies. He is a bit confused in between the terms "World Wide Web" and "Internet". Help him in understanding both the terms with the help of suitable examples of each.
13. Murugan wants to send a report on his trip to the North East to his mentor. The report contains images and videos. How can he accomplish his task through the Internet?

14. Mampi is planning to open a company that deals with rural handicrafts. She wants to advertise about handicrafts on a social platform. Which Internet service she should use and why?

15. Ruhani wants to edit some privacy settings of her browser. How can she accomplish her task?

16. Shubham wants to play a video in his browser but he is not able to do so. A message on the screen instructs him to install the Adobe Flash Player plugin. Help him to add it in his browser.

17. When Joe typed a URL in the address bar of his browser, Error 404 was displayed? Why did this happen? What can be done to avoid it?

Other Important Points from NCERT Text Book

- **Think and Reflect:** It is possible to access your bank account from any part of the world. Find if the bank's network is a LAN, MAN, WAN or any other type.
- An Internet service provider (ISP) is any organisation that provides services for accessing the Internet.
- Find and list a few ISPs in your region.
- To build a fully connected mesh topology of n nodes, it requires n (n-1)/2 wires.
- **Think and Reflex:** How will a bus and ring topology behave in case a node is down?
- Search Engine(s) like google.co.in, bing.com, duckduckgo.com, in.yahoo.com, etc., can be used to search and retrieve information when the address of the web page is not known.
- Visit NCERT, SWAYAM or any other website and note down URLs of some of the specific pages of that website.
- Find out some of the Web hosting service providers from both categories — free and paid.
- Mosaic was the first web browser developed by the National Centre for Supercomputing Application (NCSA).
- Mozilla Firefox is an open source web browser which is available free of cost and can be easily downloaded from the Internet.

Think and Reflect: Can we compare Addons and Plug-ins with utility software?

- First cookie software was created in 1994 at Netscape, for determining whether the person is a first time visitor or a re-visitor of their site.

1.CBSE ADDITIONAL PRACTICE PAPER::2023.24

3. _____ is a networking device which ca n analyse the data being carried over a network, decide or alter how it is packaged, and send it t o another network of a different type

a. Modem b. Hub c. Router d. Switch

Ans. c

7. Which network topology typically results in less wire length usage as compared to others?

a. Star topology b. Mesh topology

c. Bus topology d. Hybrid topology

10. Assertion (A): Cookies are small text files stored locally by the client's web browser to remember the "name-value pair" that identifies the client.

Reason (R) : Cookies are primarily used to track users' physical locations.

a. Both A and R are true and R is the correct explanation for A

b. Both A and R are true but R is not the correct explanation for A

c. A is True but R is False

d. A is false but R is True

Ans. c

23. Briefly explain the term URL. Also give one example of it.

Ans. URL stands for Uniform Resource Locator. It provides the location and mechanism (protocol) to access the resource, available on the web. URL is sometimes also called a web address.

Example: http://www.ncert.nic.in

34. A large educational campus with multiple departments and buildings is planning to establish an efficient network infrastructure to connect its various facilities. The campus comprises five main buildings, each with specific distance and computer requirements:

Distance between various buildings:

Building A to Building B: **50** meters
Building B to Building C: **30** meters
Building C to Building D: **30** meters
Building D to Building E: **35** meters
Building E to Building C: **40** meters
Building D to Building A: **120** meters
Building D to Building B: **145** meters
Building E to Building B: **65** meters

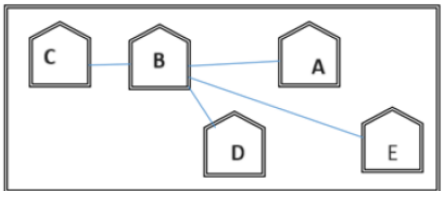
Each building hosts a varying number of computers:

Building A: **55** computers
Building B: **180** computers
Building C: **60** computers
Building D: **55** computers
Building E: **70** computers

Based on the above specifications, answer the following questions:

(a) Suggest a possible cable layout for connecting the buildings in an efficient and effective way.

Ans.



(b) Name the topology used for above cable layout.

Ans. Star

(c) Suggest the most suitable place to install the server of this organisation.
Ans. Building B as it has maximum number of computers.
(d) Suggest the placement of the following devices.
(i) Hub/Switch
Ans: Hub/Switch should be placed in each building.
(ii) Repeater
Ans. Repeater is placed between Building B to building D
(e) The company wants to link its head office in 'A' building to its Office in Sydney What type of network this connection result into?
Ans. WAN

2.CBSE SAMPLE PAPER::2023.24

1. A _____is a device that connects the organisation's network with the outside world of the Internet.

i. Hub **ii.** Modem
iii. Gateway **iv.** Repeater

15. Collection of hyper linked documents available on the internet is known as ------

i. Website **ii.** Webpage
iii. Web Server **iv.** Web Hosting

17. Assertion (A):- MODEM stands for modulator-demodulator.
Reasoning (R): - It is a computer hardware device that converts data from a digital format to analog and vice versa.
i. Both A and R are true and R is the correct explanation for A
ii. Both A and R are true and R is not the correct explanation for A
iii. A is True but R is False
iv. A is false but R is True

19. Briefly explain the basic concepts of a web server and web hosting.

OR

Rati is doing a course in networking. She is unable to understand the concept of URL. Help her by explaining it with the help of suitable example.

34. XYZ Media house campus is in Delhi and has 4 blocks named Z1, Z2, Z3 and Z4. The tables given below show the distance between different blocks and the number of computers in each block.

Block Z1 to Block Z2	80 metres
Block Z1 to Block Z3	65 metres
Block Z1 to Block Z4	90 metres
Block Z2 to Block Z3	45 metres
Block Z2 to Block Z4	120 metres
Block Z3 to Block Z4	60 metres

Block	Number of Computers
Z1	135
Z2	290
Z3	180
Z4	195

The company is planning to form a network by joining these blocks.
i. Out of the four blocks on campus, suggest the location of the server that will provide the best connectivity. Explain your response.
ii. For very fast and efficient connections between various blocks within the campus, suggest a suitable topology and draw the same.
iii. Suggest the placement of the following devices with justification
(a) Repeater **(b)** Hub/Switch
iv. VoIP technology is to be used which allows one to make voice calls using a broadband internet connection. Expand the term VoIP.
v. The XYZ Media House intends to link its Mumbai and Delhi centers. Out of LAN, MAN, or WAN, what kind of network will be created? Justify your answer.

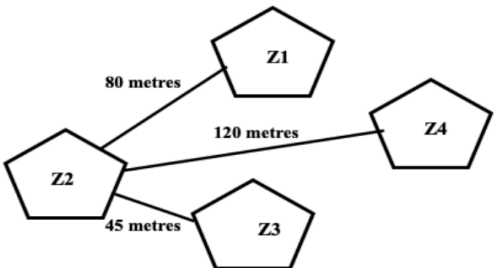
Answers

1. (iii) Gateway
15. (i) Website
17. i. Both A and R are true and R is the correct explanation for A
19. Web server: A web server is used to store and deliver the contents of a website to clients such as a browser that request it. A web server can be software or hardware.
Web hosting: It is a service that allows to put a website or a web page onto the Internet, and make it a part of the World Wide Web.

OR

URL: It stands for Uniform Resource Locator. It provides the location and mechanism (protocol) to access the resources over the internet. URL is sometimes also called a web address. It not only contains the domain name, but other information as well that completes a web address.
Examples:
https://www.cbse.nic.in, https://www.mhrd.gov.in, http://www.ncert.nic.in, http://www.airindia.in, etc.

34. i. Z2 as it has maximum number of computers.
ii. For very fast and efficient connections between various blocks within the campus suitable topology: Star Topology



iii. Repeater: To be placed between Block Z2 to Z4 as distance between them is more than 100 metres.
Hub/Switch: To be placed in each block as each block has many computers that needs to be included to form a network.
iv. Voice Over Internet Protocol

v. WAN as distance between Delhi and Mumbai is more than 40kms.

3. CBSE BOARD COMPARTMENT PAPER::2022.23

1. A is a network device that can receive the data, analyse it and transmit it to other networks.

(a) Modem **(b)** Switch
(c) Repeater **(d)** Router

13. _____ is a service that allows to put a website or a web page on the Internet.

(a) Web Server **(b)** Web Browser
(c) Web Hosting **(d)** Domain Name System

For Questions number 17 and 18, two statements are given - one labelled as Assertion(A) and the other labelled as Reason (R). Select the correct answer to these questions from the code(a),(b), (c) and (d) as given below:

(a) Both Assertion (A) and Reason(R) are true and Reason (R) is the correct explanation of Assertion (A).
(b) Both Assertion (A) and Reason(R) are true, but Reason (R) is **not** the correct explanation of Assertion (A).
(c) Assertion (A) is true but Reason (R) is false.
(d) Assertion (A) is false but Reason (R) is true.

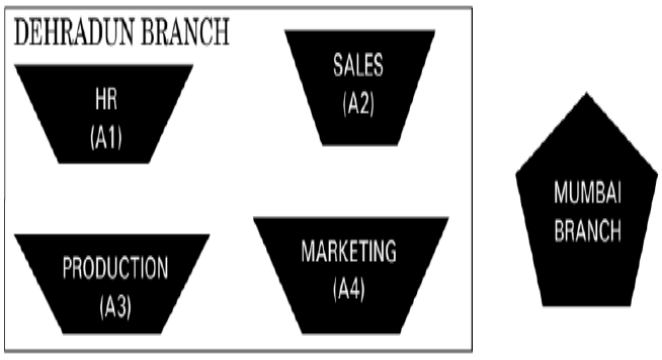
17. Assertion (A): Modem stands for 'Modulator Demodulator'
Reason (R): The modem at the sender's end acts as a demodulator that converts the digital data into analogue signals and at the receiver's end acts as a modulator that converts analogue signals into digital data.

19. Write any one main advantage and one main disadvantage of Star Topology.

OR

With reference to browsing the websites, briefly explain the term cookie. Also mention any two points of significance of it.

34. AWESOME Private Ltd, Dehradun is a company that deals with hardware components. They have different divisions HR (A1), Sales (A2), Production (A3) and Marketing (A4). The layout of the Dehradun branch is :



The company also has a branch in Mumbai. The management wants to connect all the divisions as well as the computers of each division (A1, A2, A3, A4).

Distance between the wings are as follows:

A3 to A1	32m
A1 to A2	53m
A2 to A4	29m
A4 to A3	110m
A3 to A2	750m
A1 to A4	200m
Dehradun Head Office to Mumbai Office	1656 KM

Number of computers in each wing:

A1	70
A2	140
A3	55
A4	70

Based on the above specifications, answer the following questions :

(a) Suggest the topology and draw the most efficient cable layout for connecting all the divisions of the Dehradun branch.
(b) Suggest the kind of network required (out of LAN, MAN, WAN) for connecting Production (A3) with Sales (A2).
(c) Suggest the placement of the server. Explain the reasons for your selection.
(d) Suggest the placement of the Switch/Hub with justification.
(e) The company wants to do a collaborative project where the employees of Dehradun and Mumbai would collaborate and do the project. Therefore, the HR planned a series of webinars that employees could attend from their devices being online. Suggest the protocol that helped to send the voice signals over the Internet.
Also, give an example of a video conferencing software that helps to connect all the employees.

Answers

1. (d) Router **13. (c)** Web Hosting
17. (c) Assertion(A) is true but Reason(R) is false.
19. One main advantage of Star Topology:
Centralized control and management makes it easy to monitor, troubleshoot, and scale the network.
Other points to be accepted:
- reliable – if one cable or device fails then all the others will still work.
- high-performing as no data collisions can occur.
- Easier to install.
- Easy fault detection.
- No disruptions to the network when connecting or removing devices.

One main disadvantage of Star Topology :
Dependence on the central hub or switch. If the central hub fails, the entire network becomes inaccessible.
Other points to be accepted:
- More Cable required
- More expensive.

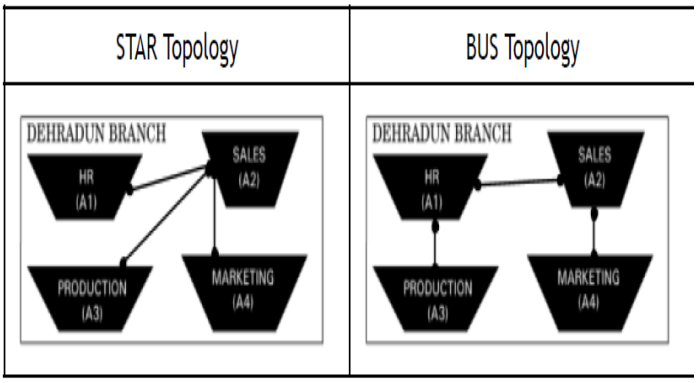
OR

A **cookie** is a small piece of data that a website sends to a user's web browser.
The browser stores this data and sends it back to the website each time the user visits it again.

Significance of cookies from the following:

1. Helps in analyzing the user's browsing pattern/interests.
2. Helps in recognizing the user's computer activity(website's loginids, shopping carts)
3. Helps in customizing the website's experience for a user.

34.a)



b) LAN

c) Placement : SALES (A2)

It has maximum number of computers.

d) One switch/hub in each division.

A switch/hub will be placed in each division to interconnect devices present in that division.

(e) Protocol: VoIP or Voice over Internet protocol

Example of video conferencing software: Google Meet, Zoom, Webex, MS Teams, Whereby, etc

4. CBSE BOARD PAPER::2022.23

1. Which of the following topologies is very efficient and all nodes are connected to a central hub?

(i) Star **(ii)** Tree
(iii) Bus **(iv)** Ring

13. Which of the following is **not** a web browser ?

(i) Opera **(ii)** Google Chrome
(iii) Linux **(iv)** Mozilla Firefox

Q. 17 and 18 are ASSERTION (A) and REASONING (R) based questions.

Mark the correct choice as

(i) Both (A) and (R) are true and (R) is the correct explanation for (A).

(ii) Both (A) and (R) are true and (R) is not the correct explanation for (A).

(iii) (A) is true and (R) is false.

(iv) (A) is false but (R) is true.

17. Assertion (A) : A static webpage does not change for each person visiting the web page.

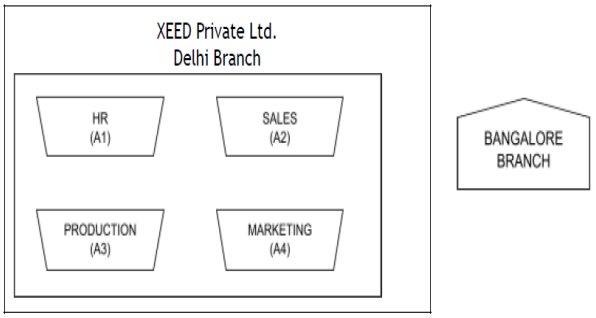
Reason (R) : When a web server receives a request for a dynamic web page, it locates and updates the page and sends it to the browser of the client.

19. What is a web server ? How is it different from web browser ? **OR**

What do you understand by the term cookies ? Give any two benefits of cookies.

32. XEED Private Ltd., Delhi is a company that deals with educational toys. They have different divisions HR(A1), Sales(A2), Production(A3) and Marketing(A4).

The layout of the Delhi branch is:



The company also has a branch in Bangalore. The management wants to connect all the divisions as well as all the computers of each division (A1,A2, A3, A4).

Distance between the wings are as follows:

A3 to A1	25 m
A1 to A2	40 m
A2 to A4	25 m
A4 to A3	20 m
A3 to A2	30 m
A1 to A4	170 m
Delhi Head Office to Bangalore Office	2154 KM

Number of computers in each of the wing:

A1	50
A2	40
A3	110
A4	60

Based on the above specifications, answer the following questions:

(i) Suggest the topology and draw the most suitable cable layout for connecting all the divisions of Delhi branch.

(ii) Suggest the kind of network required (out of LAN, MAN, WAN) for connecting Production (A3) with the Bangalore branch.

(iii) Which device can be used to connect the network of Delhi branch to the internet? This device should be able to receive data, analyse it and then transmit it to the network.

(iv) Suggest the placement of Switch/Hub with justification.

(v) Many employees were finding it difficult to cope up with work pressure and hence were showing stress related symptoms. In order to improve the mental health of its employees, HR planned to conduct an online session with a mental health expert from Mumbai. Out of the options given below, suggest the protocol that will help to send the voice signals over Internet to conduct the session successfully.

(a) FTP **(b)** SMTP **(c)** VOIP **(d)** POP

ANSWERS

1. (i) Star

13.(iii) Linux

17. (ii) Both (A) and (R) are true but (R) is not the correct explanation for (A).

19. A web server is used to store and deliver the contents to clients that request it.

Web Browser	Web Server

A web browser sends requests to the server for content.	Web server receives requests from the web browser and sends the requested content in response.

OR

A cookie is a small piece of data that is transferred to the user's computer along with the content requested by the user.

Benefits :

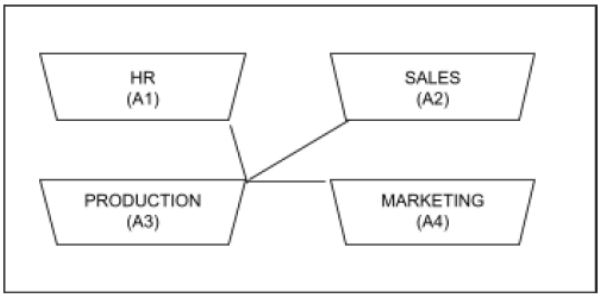
A. To analyze how the user is using the website

B. To enhance the website's usability.

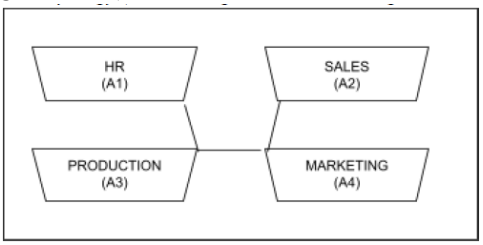
C. To help the website recognize the user's computer activity (website's login ids, shopping carts, surfing activity)

D. To customize the website's experience for a user

32 (i) Star topology (Connecting from the building with max. number of computers)



Bus Topology (considering minimum building to building distance)



(ii) WAN **(iii)** Router

(iv) Switch/Hub should be placed in all the buildings to interconnect nodes in each building

(v) (c) VOIP

5. CBSE SAMPLE PAPER::2022.23

1. Television cable network is an example of:

i. LAN **ii.** WAN

iii. MAN **iv.** Internet

13. Which amongst the following is **not** an example of a browser?

i. Chrome ii. Firefox

iii. Avast iv. Edge

Q17 and 18 are ASSERTION AND REASONING based questions. Mark the correct choice as

i. Both A and R are true and R is the correct explanation for A

ii. Both A and R are true and R is not the correct explanation for A

iii. A is True but R is False

iv. A is false but R is True

17. Assertion (A): - Internet cookies are text files that contain small pieces of data, like a username, password and user's preferences while surfing the internet.

Reasoning (R):- To make browsing the Internet faster & easier, its required to store certain information on the server's computer.

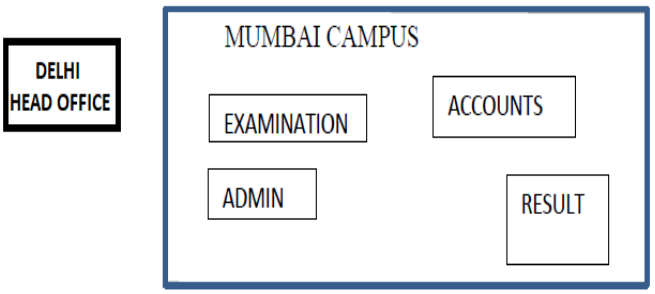
19. Explain the terms Web page and Home Page.

OR

Mention any four networking goals.

32. Prime Computer services Ltd. is an international educational organization. It is planning to set up its India campus at Mumbai with its head office in Delhi. The Mumbai office campus has four main buildings-ADMIN, ACCOUNTS, EXAMINATION and RESULT.

You as a network expert have to suggest the best network related solutions for their problems raised in (i) to (v), keeping in mind the distances between the buildings and other given parameters.



Shortest distances between various buildings:

ADMIN TO ACCOUNTS	55 m
ADMIN TO EXAMINATION	90 m
ADMIN TO RESULT	50 m
ACCOUNTS TO EXAMINATION	55 m
ACCOUNTS TO RESULT	50 m
EXAMINATION TO RESULT	45 m
DELHI Head Office to MUMBAI campus	2150 m

Number of computers installed at various buildings are as follows:

ADMIN	110
ACCOUNTS	75
EXAMINATION	40
RESULT	12
DELHI HEAD OFFICE	20

(i) Suggest the most appropriate location of the server inside the MUMBAI campus (out of the four buildings) to get the best connectivity for maximum number of computers. Justify your answer.

(ii) Suggest and draw cable layout to efficiently connect various buildings within the MUMBAI campus for a wired connectivity.

(iii) Which networking device will you suggest to be procured by the company to interconnect all the computers of various buildings of MUMBAI campus?

(iv) Company is planning to get its website designed which will allow students to see their results after registering themselves on its server. Out of the static or dynamic, which type of website will you suggest?

(v) Which of the following will you suggest to establish the online face to face communication between the people in the ADMIN office of Mumbai campus and Delhi head office?

a) Cable TV **b)** Email
c) Video conferencing **d)** Text chat

ANSWERS

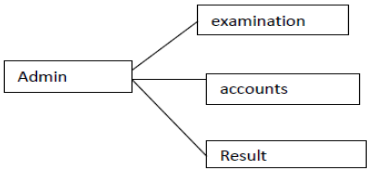
1. iii. MAN
13. iii. Avast
17. iii. A is True but R is False
19. Web Page: A Web Page is a part of a website and is commonly written in HTML. It can be accessed through a web browser.
Home Page: It is the first web page you see when you visit a website.

OR

Four networking goals are:

i. Resource sharing ii. Reliability
iii. Cost effective iv. Fast data sharing

32. i. Server should be installed in Admin department as it has maximum number of computers.
ii.



Star topology

iii. Hub/Switch **iv.** Dynamic
v. Video conferencing

6. CBSE COMPARTMENT PAPER::2022 (Term2)

1.a) Arshiya is a web developer and one of her clients wants her to design a web page to accept donations for an NGO. Which type of web page (static/dynamic) will she create ?

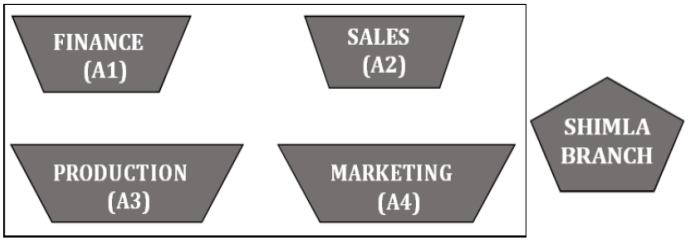
OR

b) Danny has created a website on Python resources on his laptop. Now, he wants that others should be able to access his website and use the resources. What should he do to achieve his objective ?

2.a) Define a web browser.
b) Give examples of any two network devices.
4. Define the following terms :
a) Plug-ins **b)** Add-ons

13) ABC Private Ltd., Bangalore has different divisions, Finance (A1), Sales (A2), Production (A3) and Marketing (A4).

The layout of the Bangalore branch is :



The company also has a branch in Shimla. The management wants to connect all the divisions as well as all the computers of each division (A1, A2, A3, A4).

Distance between the branches are as follows:

A3 to A1	25 m
A1 to A2	40 m
A2 to A4	25 m
A4 to A3	120 m
A3 to A2	990 m
A1 to A4	170 m

The number of computers in each branch is as follows:

A1	50
A2	40
A3	110
A4	60

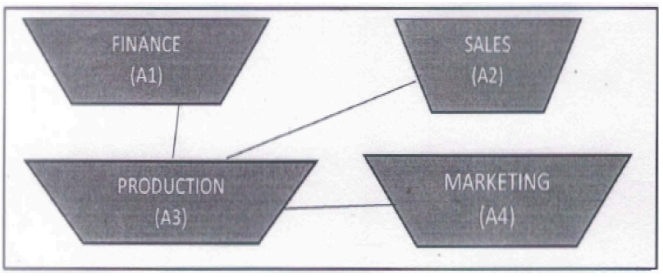
Based on the above specifications, answer the following questions :

(a) Suggest the topology and draw the most suitable cable layout for connecting all the divisions of Bangalore branch.
(b) Suggest the kind of network required (out of LAN, MAN, WAN) for connecting Production (A3) with Shimla branch.
(c) Suggest the placement of the following devices:
(i) Repeater **(ii)** Switch/Hub
(d) The company wanted to develop a healthy relation among the employees, therefore the HRA planned an online session with everyone so that they could play games from their devices. Suggest the protocol that helped to send the voice signals over Internet.

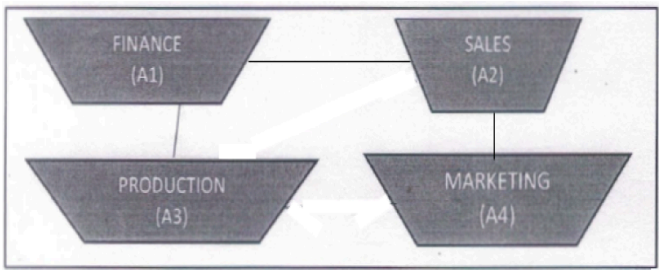
ANSWERS

1. a) Dynamic Webpage.
b) Web Hosting / Publishing the website / Uploading the Website on Webserver
2.a) It is a software/tool, which allows us to view/access the content of WebPages.
b) Modem, Repeater, Router, NIC Card, Hub, Switch
4.a) Plug-ins are complete software/third party software Plug-ins are software components that add a specific feature to an existing computer program. Plug-ins enable customization in a supported program.
4.b) Add-ons are not complete software/third party software. Add-ons are software that can be added to a computer program to increase its capabilities or a program utility.

13.a) As per direct connectivity with the server:



As per shortest distance:



(b) WAN

(c) (i) Repeater should be placed between A3 and A2 wings

(ii) Switch/Hub should be placed in all divisions A1, A2, A3 and A4

(d) VoIP (Voice over Internet Protocol)

7. CBSE BOARD PAPER::2021.22 (Term2)

1. Rushil thought "WWW" and "Internet" are synonyms i.e., they meant same and can be used interchangeably. But the teacher said that they are not same. Help him to understand the meaning of both the terms with the help of a suitable example of each.

OR

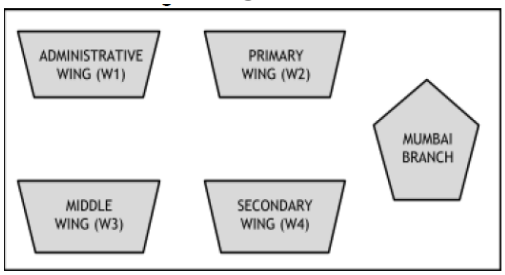
What are cookies? How can we disable cookies?

2. (i) What is the function of a Gateway?

(ii) Give examples of any two Plug-ins.

4. Give one advantage and disadvantage each of Bus and Star topology.

13. ABC International School, Delhi has different wings Administrative Wing (W1), Primary Wing (W2), Middle Wing (W3) and Secondary Wing (W4) as shown in the diagram:



The school also has a branch in Mumbai. The school management wants to connect all the wings as well as all the computers of each wing (W1, W2,W3, W4).

Distance between the wings are as follows:

W3 to W1	85 m
W1 to W2	40 m
W2 to W4	25 m
W4 to W3	120 m
W3 to W2	150 m
W1 to W4	170 m

Number of computers in each of the wing:

W1	125
W2	40
W3	42
W4	60

Based on the above specifications, answer the following questions :

(i) Suggest the topology and draw the most suitable cable layout for connecting all the wings of Delhi branch.

(ii) Suggest the kind of network required (out of LAN, MAN, WAN) for connecting

(a) Administrative Wing (W1) with Middle Wing (W3)

(b) Administrative Wing (W1) with the Mumbai branch

(iii) Suggest the placement of the following devices with justification: **(a)** Repeater **(b)** Switch/Hub

(iv) Due to pandemic school had to adopt Online classes. Suggest the protocol that is used for sending the voice signals over internet. Also, give an example of an application of WWW that helped the teachers to send messages instantly to the students.

ANSWERS

1. The Internet is a system of linked networks that are worldwide in scope and facilitate data communication services such as remote login, file transfer, electronic mail, the World Wide Web and newsgroups.

OR

It is a network of networks spread across the globe, all of which are connected to each other.

OR

The Internet is a public network of devices like desktop computers, laptops, servers, tablets, mobile phones, other handheld devices, printers, scanners etc.

Example: Network of computers to perform E-commerce, E-Governance etc.

WWW can be defined as a hypertext information retrieval system on the Internet.

OR

WWW is the universe of the information available on the internet. **OR**

WWW consists of web pages, which use HTML to interchange information on the internet.

OR

The World Wide Web (WWW) or web in short is a collection of information stored in the form of hyperlinked web pages and web resources.

Example, www.google.com

OR (Choice Question)

A) This is a small text file which contains the name of the website that it has come from and a unique ID tag.

OR

A cookie is a text file created by the web server while browsing websites and gets stored on the user's computer.

We can disable cookies by changing the Privacy and Security settings of the browser.

OR

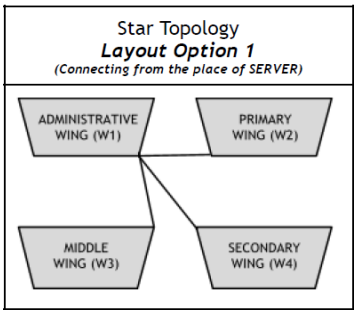
We can disable cookies by selecting the Do Not Allow option when prompted whether to allow cookies for a website.

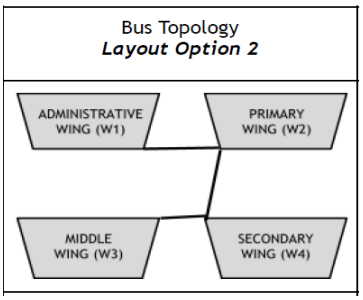
2. (i) A gateway is a network device that establishes an intelligent connection between a local network and external networks with completely different

structures **OR**
It is a network device that connects two dissimilar networks.
(ii) Java, Flash, Adobe Acrobat, Quicktime

4. Advantage of BUS Topology :
Minimum cable length required
Disadvantage of BUS Topology :
If there is any problem in the main cable the entire network fails.
Advantage of STAR Topology :
Considered faster than other topologies, as each device is directly
connected with the central hub/device.
Disadvantage of STAR Topology :
More cable length is required compared to Bus topology.

13. i)





(ii) (a) LAN **(b)** WAN
(iii) (a) Repeater to be placed based on layout drawn in part(i), between two physically connected buildings wherever the distance between the **two buildings is more**.
(b) Switch/Hub to be placed in all wings W1, W2, W3 and W4 as each of the buildings has more than one computer.
(iv) Protocol name : VoIP (Voice Over Internet Protocol)
Example of an application of WWW that helped the teachers to send messages instantly to the students: WhatsApp, Slack, Skype, Yahoo Messenger, Google Talk, Facebook Messenger, Google Hangout, Instant Messenger, etc

8. CBSE SAMPLE PAPER :: 2021.22 (Term 2)

1. Aman, a freelance web site developer, has been assigned a task to design few web pages for a book shop. Help Aman in deciding out of static web page and dynamic web page, what kind of web pages should be designed by clearly differentiating between static and dynamic web pages on at least two points
OR
Priyanka, a beginner in IT field has just started learning web technologies. Help her in understanding the difference between website and web pages with the help of a suitable general example of each.

2.i) I : (1)
- am a small text file
- created on a user's computer
- contain small pieces of data – like a username, password and user's browsing history as well as preferences.
- May help to improve user's web browsing experience.
- Who am I?

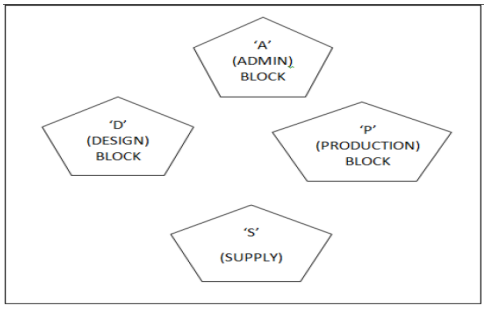
2.ii) Name any two popular web browsers. (1)

4) Navya has just created a website for her company and now need to host it. Briefly discuss the role of a web server in hosting a website. (2)

13. "Anutulya Creations"-A start-up fashion house has set up its main centre at Kanpur, Uttar Pradesh for its dress designing, production and dress supplying activities. It has 4 blocks of buildings.(4)
Distance between the various blocks is as follows:

A to D	50 m
A to P	60 m
A to S	110 m
D to S	60 m
P to S	50 m
P to D	150 m

Numbers of computers in each block:
Block A - 20
Block D - 80
Block P - 15
Block S - 8



Based on the above specifications, answer the following questions:
(a) Out of LAN, WAN and MAN, what type of network will be formed if we interconnect different computers of the campus? Justify.
(b) Suggest the topology which should be used to efficiently connect various blocks of buildings within Kanpur centre for fast communication.
Also draw the cable layout for the same.
(c) Suggest the placement of the following device with justification i. Repeater ii. Hub/Switch
(d) Now a day, video-conferencing software is being used frequently by the company to discuss the product details with the clients. Name any one video conferencing software.

'Also mention the protocol which is used internally in video conferencing software.

ANSWERS

1. Differentiation between static and dynamic web pages:

Static Web Page	Dynamic Web Page
1. Content of this type of webpage cannot be changed at run time.	1. Content of this type of webpage can be changed at run time.
2. No interaction with server's database is possible in case of static web pages.	2.Interaction with server's database is possible in case of dynamic web pages.

OR

The difference between a website and a web page is that a website is a collection of different web pages containing information on a particular topic. A web page is an individual page of a big website usually containing more specific information. If we compare a website with a book, then a webpage can be compared with a single page of that book.

2.i) Cookies

2.ii) Mozilla Firefox, Google Chrome

(OR) Any other correct name

4) Role of web server in hosting a website:

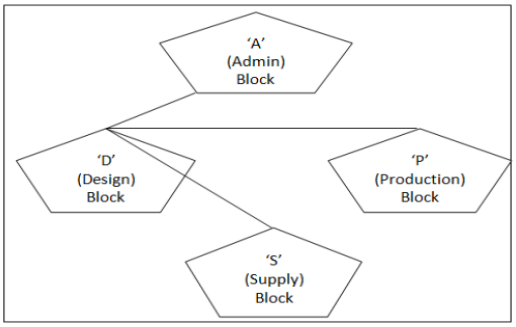
A web server is the main centralized computer system that hosts and runs the websites. It has a computer program that distributes web pages as they are requisitioned. The basic role of the web server is to store, process and deliver the web pages to the users as and when required.

13. (a) LAN

As computers are placed with-in the same campus with-in a small range.

(b) Star topology

Cable Layout:



c) i. Repeater should be placed in between Block 'D' (Design) and Block 'P' as distance is more.

ii. Hub/Switch should be placed in each building to connect various computers together.

d) Video Conferencing software: Teams, Zoom, Skype etc. (Any one)

Protocol of Video Conferencing software: **VOIP**

9.CBSE COMPARTMENT 2021

7. Which of the following topologies needs least cable length ?

(A) Star **(B)** Tree

(C) Bus **(D)** None of the above

10. Which of the following is a web browser ?

(A) Microsoft Windows **(B)** Android

(C) Microsoft Edge **(D)** Ubuntu

15. A _____ is a collection of interconnected _____ designed with a goal in mind.

(A) webpage, website

(B) web browser, webpage

(C) server, client

(D) website, webpage

16. In the _____ field of the e-mail, enter the recipients whose address you want to hide from other recipients.

(A) Carbon Copy **(B)** To

(C) Blind Carbon Copy **(D)** All of the above

20. What is the type of network for long distance communication ?

(A) LAN **(B)** MAN

(C) WAN **(D)** PAN

21. _____ helps to enhance the functionality of the web browsers.

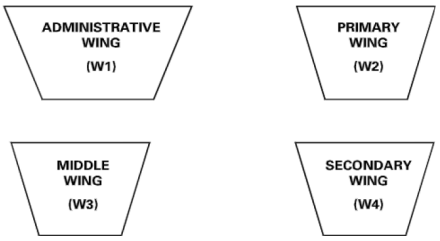
(A) Extension **(B)** Plugin

(C) Add-on **(D)** All of the above

31. What do you understand by the term VoIP ? Give two examples of software/apps based on VoIP.

33. Expand URL. Explain URL with the help of an example.

40. ABC International School, Delhi has different wings as shown in the diagram:



Distance between the wings are as follows:

W3 to W1	70 m
W1 to W2	40 m
W2 to W4	15 m
W4 to W3	100 m
W3 to W2	120 m
W1 to W4	80 m

Number of computers in each of the wings:

W1	125
W2	40
W3	42
W4	60

Based on the above information, answer the following questions :

(a) Suggest the most suitable cable layout for the above connections.

(b) In which wing would you place the server ? Explain the reason for your selection.

(c) Suggest the kind of network required (out of LAN, MAN, WAN) for connecting Administrative Wing and Middle Wing.

(d) Suggest the placement of the following devices with justification :

(i) Repeater **(ii)** Switch/Hub

(e) There is one more branch of ABC International School in Mussoorie. The schools want to link ABC International School, Delhi with ABC International School, Mussoorie. Suggest the software(s) or app(s) to share the files and videos.

Questions for visually impaired students only :

With reference to computer networking, answer the following questions briefly :

(a) What is the significance of a switch in a computer network ?

(b) Mention the name of any two network topologies.

(c) What is MODEM ?

(d) Explain Gateway briefly.

(e) Expand VoIP.

ANSWERS

1.C) Bus

10. (C) Microsoft Edge

15. (D) website, webpage

16. (C) Blind Carbon Copy

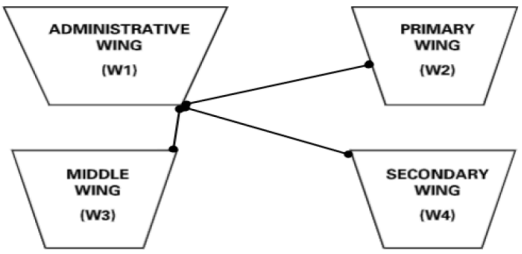
20. (C) WAN

21. (D) All of the above

31. VoIP stands for Voice over Internet Protocol.
It is an Internet service which makes audio and video calls possible from any Internet connected device.

33. Uniform Resource Locator
Each website has a unique address called URL.
For example: https://cbse.nic.in

40. a)



b) Administrative Wing.
It has the maximum number of computers

c) LAN

d) (i) Not required

OR

W1 to W4 (as the distance > 70m)

(ii) In each building

(e) Google Drive, Whatsapp, Email attachments, Microsoft Onedrive, etc **(Any one)**

Questions for visually impaired students only :

(a) It is an intelligent networking device used to connect multiple computers in a network

(b) STAR, BUS

(c) It stands for Modulator-Demodulator used to convert analogue signals to digital signals and vice versa

(d) Gateway is a key access point that acts as a gate between an organisation's network (Intranet) and outer network (Internet).

(e) Voice over Internet Protocol.

10.CBSE SAMPLE PAPER ::2020.21

7. To prevent unauthorized access to and / or from the network, a system known as _____, can be implemented by hardware and / or software. (1)

9. Which of the following is not a network topology:
Star, Mesh , Tree, Bug , Bus (1)

10. For web pages where the information is changed frequently, for example, stock prices, weather information which out of the following options would you advise ?

a) Static web page **b)** Dynamic web page

Justify your answer.

14. I can keep you signed in. (1)
I can remember your site preferences.
I can give you locally relevant content.
Who am I ?

15. Which amongst the following is not an example of browser ?

a. Chrome b. Firefox
c. Avast d. Edge

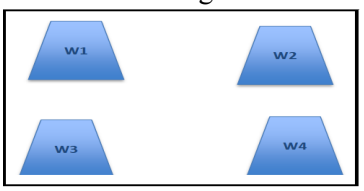
16. A mail or message sent to a large number of people indiscriminately without their consent is called_____ (1)

20. _____ network device is known as an intelligent hub .

21. Receiving irrelevant and unwanted emails repeatedly is an example of _____.

31. Expand the following terms related to Computer Networks: a. SMTP b. POP
c. FTP d. VoIP

40. A company in Mega Enterprises has 4 wings of buildings as shown in the diagram :



Center to center distances between various Buildings:

W3 to W1 - 50m
W1 to W2 - 60m
W2 to W4 - 25m
W4 to W3 - 170m
W3 to W2 - 125m
W1 to W4 - 90m

Number of computers in each of the wing:

W1 - 150
W2 - 15
W3 - 15
W4 - 25

Computers in each wing are networked but wings are not networked The company has now decided to connect the wings also.

i. Suggest a most suitable cable layout for the above connections.

ii. Suggest the most appropriate topology of the connection between the wings.

iii. The company wants internet accessibility in all the wings. Suggest a suitable technology .

iv. Suggest the placement of the following devices with justification if the company wants minimized network traffic

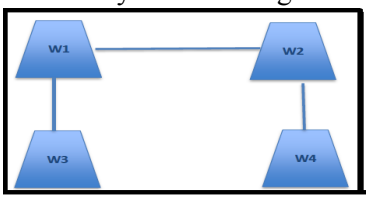
a)Repeater **b)**Hub / switch

v. The company is planning to link its head office situated in New Delhi with the offices in hilly areas. Suggest a way to connect it economically.

ANSWERS

7. Firewall
9. Bug
10. Dynamic Web Page
14. Cookies
15. c. Avast
16. Spam
20. Switch
21. Spam (or) spamming
31. a. SMTP: Simple Mail Transfer Protocol
b. POP: Point to Point Protocol
c. FTP: File Transfer Protocol
d. VoIP: Voice over Internet Protocol

40. i) Most suitable layout according to distance is:



ii) Star Topology
iii) Broadband.
iv). a) Not required. Repeaters may be skipped as per above layout
(because distance is less than 100 m)
(But as per some text books information, we require to arrange a Repeater if the distance is more than 70 m)
b) In every wing
iv) Radio Waves

Note : No Questions in 2019.20 Paper.
(Syllabus was different)

CBSE QUESTION BANK

5. Samarth is the harware engineer of "Happy School". He has been given the task of installing a network in the school lab which has around 40 computers.

i. Suggest the most suitable type of network topology he should use in order to maximise speed and make each computer indepenent of network breakdowns.
a. Bus Topology b. Star Topology
c. Ring Topology d. Mesh Topology
answer : b**.** In order to allow data transfer from server to only the intended computers which network device is required in the lab to connect the computers?
a. Switch b. Hub
c. Router d. Gateway
answer : a

iii. After setting up the lab and internet in the lab, Samarth is now required to enable videos and animations to be played on the web browser for students of multimedia class. Which browser tool /service can be used for the same?
a. Plug ins b. Add ons
c. Control Panel d. Download Settings
answer: b

iv. During an international exchange programme the students need to connect to a classroom in Russia using Skype. Samarth helps the students to connect. Which type of network service is being used ?
a. Instant messaging b. Email messaging
c. VoIP d. WWW
answer: c

v. Samarth has asked students of class 7 to identify different parts of URL. Help the students to choose the correct option for label 1 and 2.

a. 1- Domain Name
2-Protocol
b. 1- Protocol
2-Domain Name
c. 1. Domain name
2. subdomain
d. 1-Protocol
2-subdomain
answer : b

Q.10. The school offers Wi-Fi to the students of Class XII. For communication, the network security-staff of the school is having a registered URL **"schoolwifi.edu"**. On 17th September 2017, emails were received by all the students regarding expiry of their passwords. Instructions were also given renew their password within 24 hours by clicking on particular URL provided.
On the bases of the above case study, answer the questions given below:

i. Specify which type of cybercrime is it.
a) Spamming b) Phishing
c) Identity Theft d) Hacking
Answer: (b) Phishing

ii. URL stands for_____
a) Universal Resource Loader
b) Uniform Resource Locator
c) United Research Loader
d) Uniform Resource Loader
Answer: (b) Uniform Resource Locator

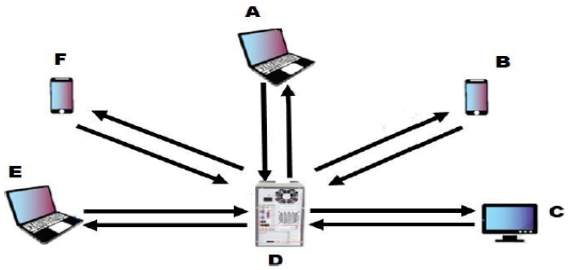
iii. Unsolicited commercial email is known as:
a) Malware b) Virus
c) Spam d) Spyware
Answer: (c) Spam

iv. WiFi stands for _____
a) Wireless Internet Frequent Interface
b) Wireless Functioning

c) Wireless Fidelity
d) Wire Free Internet
Answer: c Wireless Fidelity

v. Ideally, what characters should be used in a password to make it strong?
a) Letters and numbers only
b) Mixed Case (Upper and Lower)
c) Special characters
d) All of above
Answer: (d) All of the above

Q.13. Refer to the following diagram and answer the questions given below.



i. Which of the following devices acts as a server?
a. A b. B c. C d. D
Answer : (d) D

ii. The arrow from device D to pointing to A represents?
a. HTTP request b. HTTP response
c. HTTP request & response d. All of the above
Answer (b) HTTP response

iii. Which of the following device(s) can have IP Addresses?
a. A b. D c. F d. All of the above
Answer: (d) All of the above

iv. Identify the network topology of the above network : a. Ring b. Star c. Bus d. None of the above
Answer: (b) Star

v. is a protocol (set of rules) used when transmitting files (data) over the world wide web.
a. FTP b. HTTP
c. SMP d. None of the above
Answer: (b) HTTP

Q.14. Vidya Devi, a retired school principal, was inspired by her granddaughter who uses technology for her day to day activities. Being a learner and teacher all her life, she wanted to open an email account and interact with her friends and family. Her granddaughter created an email account for her and gradually she started sending mails to her friends and family. This was a big achievement for her. Her granddaughter explained how emails are sent, how to create an email address, what protocols are used. Some of these details were too technical for her, but she never gave up. There are few doubts/misconceptions in her mind which you can help her with.

i. Unsolicited e-mail advertising is known as
a. newsgroup
b. junk ads
c. spam
d. none of the above
answer (c) spam

ii. Which of the following is the correct format of email address?
a. name@website@info
b. name@website.info
c. www.nameofwebsite.com
d. name.website.com
answer: (b) name@website@info

iii. Mail access starts with client when user needs to download email from the
a. mail box b. mail server
c. IP server d. Internet
Answer:(a) mail box

iv. To use email service, one needs to register with
a. Internet Service Provider
b. Email Service Provider
c. A company
d. No need to register
Answer: (a) Internet Service Provider

v. Bcc stands for to send the copy of mail.
a. Black carbon copy
b. Blue carbon copy
c. Blind carbon copy
d. Block chain copy
Answer: (c) Blind Carbon Copy

Q.17. Ramanpreet has to work on his science project which deals with electromagnetic waves. A lot of research workis required by him for the same. He uses Google Chrome to search for the relevant matter.
i. Google chromeis an example of a
a. Website b. Web browser
c. Web Page d. Web Page
Ans. (b)

ii. He finally locates some useful information and clicks on the link provided to access the website. The link is actually known as a_____.
a. Domain name b. Web Page
c. URL d. IP address
Ans. (c)

iii. As Ramanpreet works on his project, he collects and curates information. Whenever he clicks on the link the same piece of information is shown and the content is not clickable. Ramanpreet is accessing a/an _____ website.
a. Dynamic b. Textual
c. Outdated d. Static
Ans. (d)

iv. A web cookie is a small piece of data that is _____
a. sent from a website and stored in user's web browser while a user is browsing a website
b. sent from user and stored in the server while a user is browsing a website
c. sent from root server to all servers
d. sent from the root server to other root servers
Ans. (a)

v. HTML stands for_____
a. Hyper Text Markup Link
b. Hyper Text Markup Language
c. Hybrid Text Markup Language
d. Hyper Text Manipulation Language
Ans. (c)

RELATED QUESTIONS FROM OLD COMPUTER SCIENCE PAPERS

1) Mention one advantage of networking.
Ans: Advantages/Need for networking (Network Goals):
(i) Resource Sharing: Hardware Resources like printers, Softwares can be shared between all computers in the network.
(ii) Reliability: A file can have copies in two or more computers.
(iii) Cost Factor
(iv) Communication Medium: Using a network, it is possible for managers, working far apart, to prepare financial report of the company, etc

LAN,MAN,WAN,PAN

1.Assume that 50 employees are working in an organization. Each employee has been allotted a separate workstation to work. In this way, all computers are connected through the server and all these workstations are distributed over two floors. In each floor, all the computers are connected to a switch. Identify the type of network?
Ans: LAN(Local Area Network)
2) Daniel has to share the data among various computers of his two offices branches situated in the same city. Name the network (out of LAN, WAN, PAN and MAN) which is being formed in this process.
Ans : MAN
3.Differentiate between PAN and LAN types of networks.

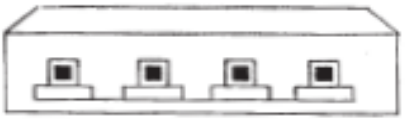
PAN (Personal Area Network)	LAN (Local Area Network)
A personal area network PAN is a computer network organized around an individual person.	LAN interconnects a high number of access or node points or stations within a confined physical area upto a kilometer

4. Which type of network (out of LAN, PAN and MAN) is formed, when you connect two mobiles using Bluetooth to transfer a Video.
Ans: PAN (Personal Area Network)

5. In networking, what-is WAN? How is it different from LAN?
Ans A WAN (wide area network), is not restricted to a geographical location, although it might be confined within the bounds of a state or country. A WAN connects several LANs, and may be limited to an enterprise (a corporation or an organization) or accessible to the public. The technology is high speed and relatively expensive. The Internet is an example of a worldwide public WAN.

A LAN (local area network) is a group of computers and network devices connected together, usually within the same building or campus.

6) What is the difference between LAN and WAN?
Ans LAN (Local Area Network):
Interconnects a high number of access or node points or stations within a confined physical area. An example is the territory covered in a single office building that houses various departments/offices. All these areas are interconnected using a LAN.



WAN (Wide Area Network)
It is used to connect systems with no limitation of geographical area. It is used to serve many locations distributed over a large geographical area. A system of overnight teller machines used by a banking organisation covering the North of India is an example of a WAN. Internet is also an example of the same.

7) What is the difference between MAN and WAN?

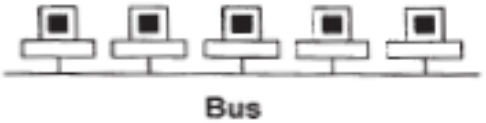
8) What is the difference between LAN and WAN?

LAN	WAN
Diameter of not more than a few kilometers.	Span entire countries
A total data rate of atleast several Mbps	Data rate less than 1 Mbps(Megabits per Second)
Complete ownership by a single organization	Owned by multiple organization
Very low error rates	Comparatively higher error rates

9) What is the difference between LAN and MAN?

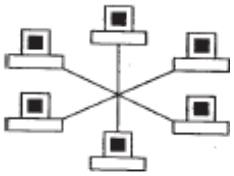
TOPOLOGIES

1) Differentiate between Bus Topology and Star Topology of Networks. What are the advantages and disadvantages of Star Topology over Bus Topology?
Ans:
Bus Topology: It is characterised by common transmission medium shared by all the connected hosts, managed by dedicated nodes. It offers simultaneous flow of data and control.



Bus

Star Topology: It is characterised by central switching node (communication controller) and unique path (point to point link) for each host. It is easy to add and remove additional hosts by upgrading the centralised node.



Star

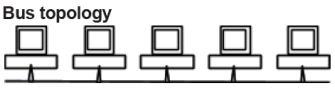
Advantages of Star Topology over Bus Topology: ● Faster communication as compared to Bus topology
● Independent line of connection allows freedom of removing or adding nodes from the network
● Fault detection is easy.
● Fault isolation is easy.

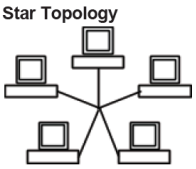
Disadvantages of Star Topology over Bus Topology:
● Expensive as compared to Bus topology
● Long cable length

2) Write two advantages and two disadvantages for STAR topology?
3) Write one advantage and one disadvantage of the following topologies in network:
i)STAR Topology ii)BUS Topology
4) Mention one difference between Linear and Star topologies in networking.
5) Write the two advantages and two disadvantages of BUS Topology in network?
7) Give two advantages and disadvantages of following network topologies:
i)BUS ii) Tree

8) Identify the type of topology on the basis of the following:
a. Since every node is directly connected to the server, a large amount of cable is needed which increases the installation cost of the network.
b. It has a single common data path connecting all the nodes.
Ans: a. Star Topology b. Bus Topology

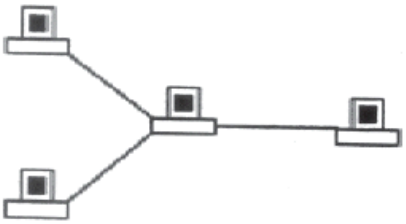
9. Illustrate the layout for connecting 5 computers in a Bus and a Star topology of Networks.





OR any valid illustration of Bus and Star Topology.

10) Write one advantage of Bus Topology of network. Also, illustrate how 4 computers can be connected with each other using star topology of network.
Ans Cable length required for this topology is the least compared to other networks.
Illustration of 4 computers connected with each other using star topology of network.



Theory Question : Communication Devices
1)What is the purpose of using a repeater in the context of networking?
2) What are repeaters?
A) A repeater is a network device that amplifies and restores signals for long distance transmission.
It is used in long network lines, which exceed the maximum rated distance for a single run.
Repeaters are of two types:
(i)Amplifier : amplifies all incoming signals over the network. (it amplifies both the signal and any concurrent noise)
(ii) Repeater : collected inbound packet and then retransmits the packet as if it were starting form the source station.
3) What is a Hub?
Ans)A Hub is an unintelligent network device, used for a central connection between two or more computers on a network. It will do broadcast.
Hubs are of two types:
(i) Active hubs: electrically amplify the signal as it moves from one connected device to another.
(ii) Passive hubs: allow the signal to pass from one computer to another without any change.
3) What is a Modem?
Ans) Modem is a Modulation Demodulation device that converts analog signal to digital signal and vice versa.
4) What is the purpose of using a MODEM?
7) What are Routers?
A) A router is a network device that is used to separate different segments in a network to improve performance and reliability. A router works like a bridge but can handle different protocols.
Compared to hubs and switches, routers are smarter still. Routers use a more complete packet address to determine which router or workstation should receive each packet next. Based on a network road map called a routing table routers can help ensure that packets are travelling the most efficient paths to their destination. If a link between routers fails, the sending router can determine an alternate route to keep traffic moving.

4Marks Problem : Model 1(All in a single city)

1.Jonathan and Jonathan Training Institute is planning to set up its centre in Amritsar with four specialized blocks for Medicine, Management, Law courses alongwith an Admission block in separate buildings. The physical distances between these blocks and the number of computers to be installed

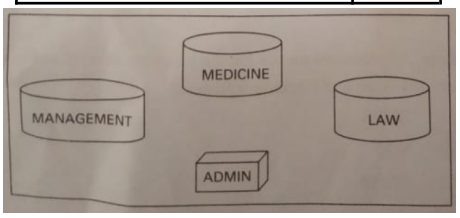
in these blocks are given below. You as a network expert have to answer the queries as raised by their board of directors as given in (i) to (iv).

Shortest distances between various locations in metres:

Admin Block to Management Block	60
Admin Block to Medicine Block	40
Admin Block to Law Block	60
Management Block to Medicine Block	50
Management Block to Law Block	110
Law Block to Medicine Block	40

Number of Computers installed at various locations are as follows:

Admin Block	150
Management Block	70
Medicine Block	20
Law Block	50



(i) Suggest the most suitable location to install the main server of this institution to get efficient connectivity.

Ans) Admin Block

(ii) Suggest the devices to be installed in each of these buildings for connecting computers installed within the building out of the following:

Modem Switch Gateway Router

Ans) Switch

(iii) Suggest by drawing the best cable layout for effective network connectivity of the blocks having server with all the other blocks.

Ans)

(iv) Suggest the most suitable wired medium for efficiently connecting each computer installed in every building out of the following network cables:

Co-axial cable Ethernet Cable

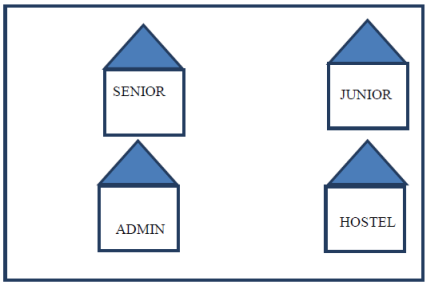
Single Pair Telephone Cable.

Ans)

2. Multipurpose Public School, Bangluru is Setting up the network between its Different Wings of school campus. There are 4 wings

Named as SENIOR(S),JUNIOR(J), ADMIN(A) and HOSTEL(H).

Multipurpose Public School, Bangluru



Distance between various wings are given below:

WingAtoWingS	100m
WingAtoWingJ	200m
WingAtoWingH	400m
WingStoWingJ	300m
WingStoWingH	100m
WingJtoWingH	450m

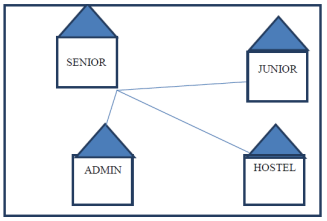
Number of Computers installed at various wings are as follows:

Wings	NumberofComputers
WingA	20
WingS	150
WingJ	50
WingH	25

(i) Suggest the best wired medium and draw the cable layout to efficiently connect various wings of Multipurpose PublicSchool, Bangluru.

Answer:

Best wired medium: Optical Fibre OR CAT5 OR CAT6 OR CAT7 OR CAT8 OR Ethernet Cable



(ii) Name the most suitable wing where the Server should be installed. Justify your answer.

Answer:

Wing Senior(S)- Because it has maximum number of computers.

(iii) Suggest a device/software and its placement that would provide data security for the entire network of the School.

Answer: Firewall - Placed with the server at Senior

(iv) Suggest a device and the protocol that shall be needed to provide wireless Internet access to all smartphone/laptop users in the campus of Multipurpose Public School, Bangluru.

Answer:

Device Name: WiFi Router OR WiMax OR RF Router OR Wireless Modem OR RFTransmitter

Protocol : WAP OR 802.16 OR TCP/IP OR VOIP OR MACP OR 802.11

3) CASE STUDY BASED QUESTION:

Ayurveda Training Educational Institute is setting up its centre in Hyderabad with four specialized

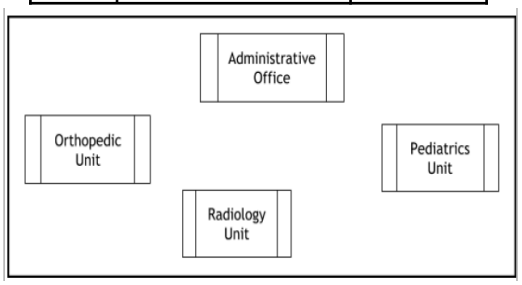
departments for Orthopedics, Neurology and Pediatries along with an administrative office in separate buildings. The physical distances between these department buildings and the number of computers to be installed in these departments and administrative office are given as follows. You, as a network expert, have to answer the queries as raised by them in (i) to (iv)

Shortest distances between various locations in meters:

Administrative office to Orthopedics Unit	55
Neurology Unit to Administrative Office	30
Orthopedics Unit to Neurology Unit	70
Pediatrics Unit to Neurology Unit	50
Pediatrics Unit to Administrative Office	40
Pediatrics Unit to Orthopedics Unit	110

Number of Computers installed at various locations are as follows:

Pediatrics Unit	40
Administrative Office	140
Neurology	50
Orthopedics Unit	80

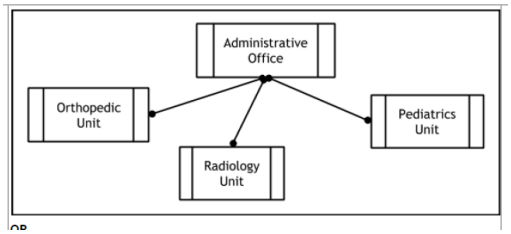


(i) Suggest the most suitable location to install the main server of this institution to get efficient connectivity.

Ans: **Administrative Office**

(ii) Suggest the best cable layout for effective network connectivity of the building having server with all the other buildings.

Ans:



OR

Administrative Office is connected to Orthopedic, Radiology, Pediatrics units directly in a Star Topology

(iii) Suggest the devices to be installed in each of these buildings for connecting computers installed within the building out of the following:

* Gateway * Modem * Switch

Ans: Switch

(iv) Suggest the topology of the network and network cable for efficiently connecting each computer installed in each of the buildings out of the following:

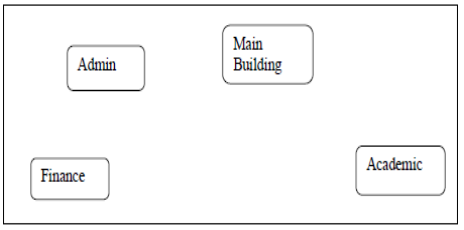
Topologies: Bus Topology, Star Topology

Network Cable: Single Pair Telephone, Coaxial Cable, Ethernet Cable.

Topology : Star Topology

Network Cable: Ethernet Cable / Coaxial Cable

4) Sanskar University of Himachal Pradesh is setting up a secured network for its campus at Himachal Pradesh for operating their day-to-day office & web based activities. They are planning to have network connectivity between four buildings. Answer the question (i) to (iv) after going through the building positions in the campus & other details which are given below:



The distances between various buildings of university are given as:-

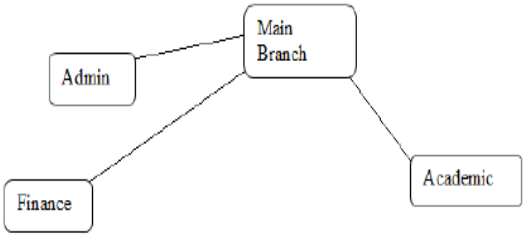
Building 1	Building 2	Distance(in mtrs.)
Main	Admin	50
Main	Finance	100
Main	Academic	70
Admin	Finance	50
Finance	Academic	70
Admin	Academic	60

Building	No. of Computers
Main	150
Admin	75
Finance	50
Academic	60

As a network expert, you are required to give best possible solutions for the given queries of the university administration:-

(a) Suggest cable layout for the connections between the various buildings,

Ans) Star topology



(b) Suggest the most suitable building to house the server of the network of the university,

Ans) Server should be placed at Main Building as it has the maximum number of computers.

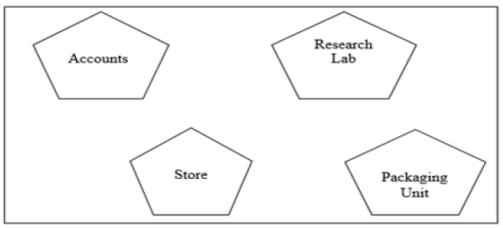
(c) Suggest the placement of following devices with justification: 1. Switch/Hub 2. Repeater

Ans) Hub/Switch each would be needed in all the buildings to interconnect the group of cables from the different computers in each building

A repeater needs to be placed along the wire between main building & finance building as the distance between them is more than 70 mtr.

(d) Suggest the technology out of the following for setting-up very fast Internet connectivity among buildings of the university
1. Optical Fibre 2. Coaxial cable 3. Ethernet Cable
Ans) Optical Fibre

5) Rehaana Medicos Center has set up its new center in Dubai. It has four buildings as shown in the diagram given below:



Distances between various buildings are as follows:

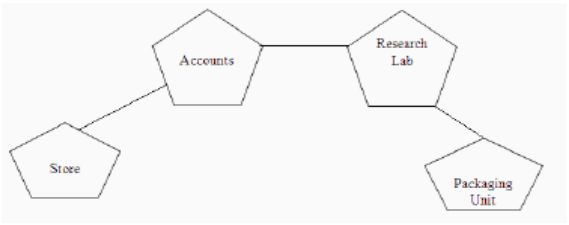
Accounts to Research Lab	55 m
Accounts to Store	150 m
Store to Packaging Unit	160 m
Packaging Unit to Research Lab	60 m
Accounts to Packaging Unit	125 m
Store to Research Lab	180 m

Number of Computers

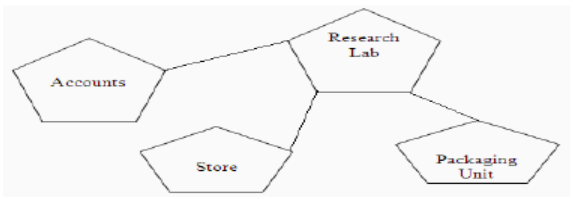
Accounts	25
Research Lab	100
Store	15
Packaging Unit	60

As a network expert, provide the best possible answer for the following queries:
i) Suggest a cable layout of connections between the buildings.

(i) Layout 1

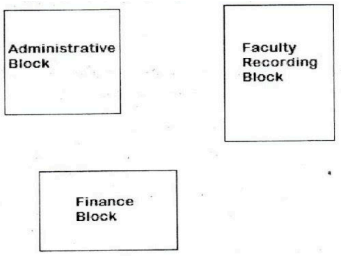


Layout 2



ii) Suggest the most suitable place (i.e. buildings) to house the server of this organization.
Ans) The most suitable place/ building to house the server of this organization would be building Research Lab, as this building contains the maximum number of computers.
iii) Suggest the placement of the following device with justification: a) Repeater b) Hub/Switch
a) For layout1, since the cabling distance between Accounts to Store is quite large, so a repeater would ideally be needed along their path to avoid loss of signals during the course of data flow in this route. For layout2, since the cabling distance between Store to Research Lab is quite large, so a repeater would ideally be placed.
b) In both the layouts, a Hub/Switch each would be needed in all the buildings to interconnect the group of cables from the different computers in each building.
iv) Suggest a system (hardware/software) to prevent unauthorized access to or from the network.
A) Firewall

6) Rovenza Communication International (RCI) is an online corporate training provider company for IT related courses. The company is setting up their new campus in Kolkata. You as a network expert have to study the physical locations of various blocks and the number of computers to be installed. In the planning phase, provider the best possible answer for the queries (i) to (iv) raised by them. 2013



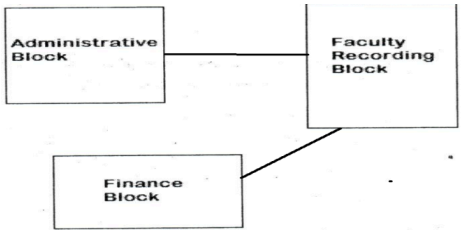
Block to Block distance (in Mtrs.)

From	To	Distance
Administrative Block	Finance Block	60
Administrative Block	Faculty Recording Block	120
Finance Block	Faculty Recording Block	70

Expected computers to be installed in each block

Block	Computers
Administrative Block	**30**
Finance Block	**20**
Faculty Recording Block	**100**

(i) Suggest the most appropriate block, where RCI should plan to install the server.
A) Faculty Recording Block is most appropriate block to install the server.
(ii) Suggest the most appropriate layout to connect all three blocks for efficient communication.



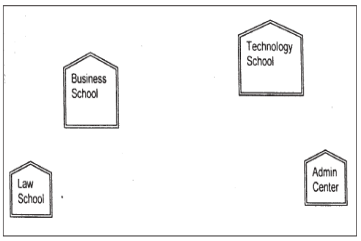
(iii) Which type of network out of the following is formed by connecting the computers of these three blocks?
LAN MAN WAN
A)LAN

(iv) Which wireless channel out of the following should be opted by RCI to connect to students from all over the world?

Infrared Microwave Satellite

A) Satellite.

7.Great Studies University is setting up its Academic schools at Sunder Nagar and planning to set up a network. The university has 3 academic schools and one administration center as shown in the diagram below:



Center to center distances between various buildings is as follows :

Law School to Business School	60m
Law School to Technology School	90m
Law School to Admin Center	115m
Business School to Technology School	40m
Business School to. Admin Center	45m
Technology School to Admin Center	25m

Number of Computers in each of the Schools/Center is follows:

Law School	25
Technology School	50
Admin Center	125
Business School	35

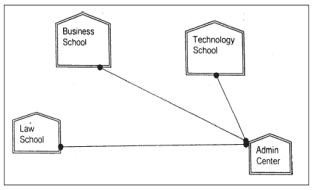
(i) Suggest the most suitable place (i.e. School/ Center) to install the server of this university with a suitable reason. 1

Ans Option 1 : Admin center as it has the most number of computers

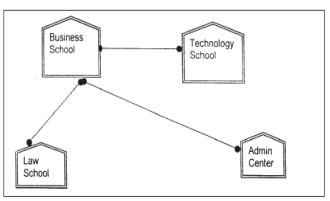
Option 2.Business School as it will require minimum cable length to connect other blocks

(ii) Suggest an ideal layout for connecting these schools/ center for a wired connectivity. 1

Ans Option 1:



Option 2:



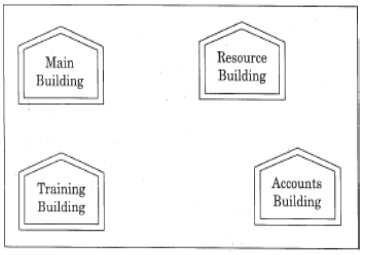
(iii) Which device will you suggest to be placed/installed in each of these schools /center to efficiently connect all the computers within these schools / center?

Ans Switch

(iv) The university is planning to connect its admission office in the closest big city, which is more than 350 km from the university. Which type of network out of LAN, MAN or WAN will be formed? Justify your answer.1

Ans WAN as the distance is more than the range of LAN or MAN.

8) "Vidya for All" is an educational NGO. It is setting up its new campus at Jaipur for its web-based activities. The campus has four buildings as shown in the diagram below:



Center to center distances between various buildings as per architectural drawings (in meters) is as follows:

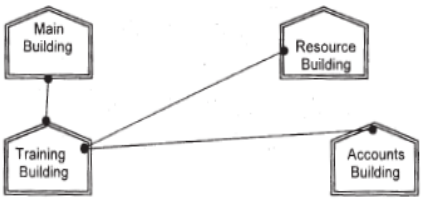
Main Building to Resource Building	120 m
Main Building to Training Building	40 m
Main Building to Accounts Building	135 m
Resource Building to Training Building	125 m
Resource Building to Accounts Building	45 m
Training Building to Accounts Building	110 m

Expected Number of Computers in each Building is as follows:

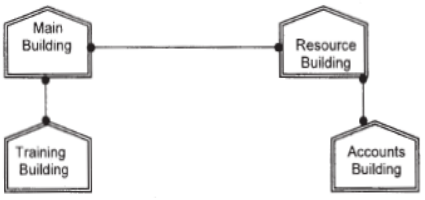
Main Building	15
Resource Building	25
Training Building	250
Accounts Building	10

(el) Suggest a cable layout of connections between the buildings.

Ans.



OR



(e2) Suggest the most suitable place (i.e. building) to house the server for this NGO. Also, provide a suitable reason for your suggestion.

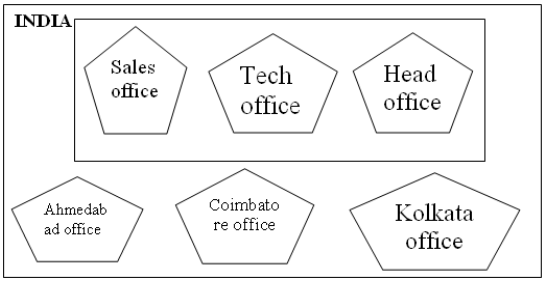
Ans. Training Building as it contains maximum number of computers.

(e3) Suggest the placement of the following devices with justification: (i) Repeater(ii) Hub/Switch

Ans. (i) A Repeater should be placed when the distance between any two connecting buildings exceeds 70 m.
(ii) Every building will need one Hub / Switch, to send signals to all of the workstations connected to it

(e4) The NGO is planning to connect its International office situated in Delhi. Which out of the following wired communication links, will you suggest for a very high speed connectivity ?
(i) Telephone Analog Line (ii) Optical Fiber
(iii) Ethernet Cable
Ans. (ii) Optical Fibre

9) "Hindustan Connecting World Association "is planning to start their offices in four major cities in India to provide regional IT infrastructure support in the field of Education & Culture. The company has planned to set up their head office in New Delhi in three locations and have named their New Delhi offices as "Sales Office ","Head Office "and "Tech Office ".The company's regional offices are located at "Coimbatore","Kolkata"and "Ahmadabad". A rough layout of the same is as follows:



Approximate distance between these offices as per network survey team is as follows

Place From	Place To	Distance
Head Office	Sales Office	10 KM
Head Office	Tech Office	70 KM
Head Office	Kolkata Office	1291KM
Head Office	Ahmadabad Office	790 KM
Head Office	Coimbatore Office	1952KM

In continuation of the above, the company experts have planned to install the following number of computers in each of their offices:

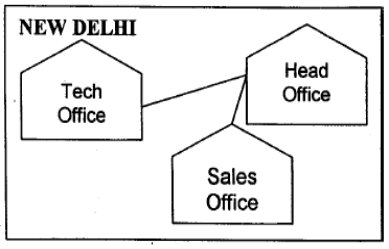
Head Office	100
Sales Office	20
Tech Office	50
Kolkata Office	50
Ahmadabad Office	50
Coimbatore Office	50

1) Suggest network type(out of LAN,MAN,WAN) for connecting each of the following set of their offices:
Head Office and Tech Office
Head Office and Coimbatore Office
Ans) Head Office and Tech Office: **LAN**
Head Office and Coimbatore Office: **WAN**

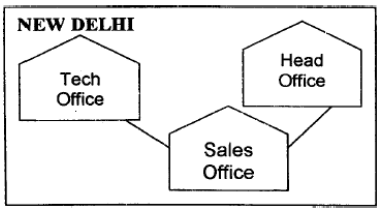
2) Which device you will suggest to be produced by the company for connecting all the computers with in each of their offices out of the following devices?
Modem Telephone Switch/Hub
Ans) Switch / Hub

3) Which of the following communication media, will suggest to be procured by the company for connecting their local offices in New Delhi for very effective and fast communication?
Ethernet Cable, Optical Fibre, Telephone Cable
Ans) Optical Fibre O

4) Suggest a cable/writing layout for connecting the company's local offices located in New Delhi. Also, suggest an effective method /technology for connecting the company's regional offices at "Kolkata","Coimbatore"and "Ahmadabad".
Ans) Optical Fiber/Star Topology
Wireless



OR



10) INDIAN PUBLIC SCHOOL in Darjeeling is setting up the network between its different wings. There are 4 wings named as SENIOR(S), JUNIORS (J), ADMIN (A) and HOSTEL (H).
Distance between various wings is given below:
Number of Computers

Wing A	10
Wing S	200
Wing J	100
Wing H	50

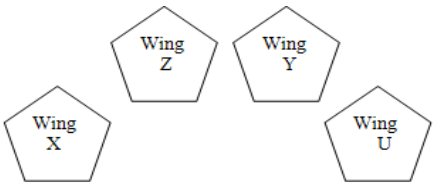
i) Suggest a suitable Topology for networking the computer of all wings.
Ans) Star Topology **OR** Bus Topology

ii) Name the wing where the server to be installed. Justify your answer.
Ans) Wing S as it has the maximum number of computers

iii) Suggest the placement of Hub/Switch in the network.
Ans) Inside all the four wings

iv) Mention in economic technology to provide internet accessibility to all wings.
Ans: Any one of the following:
Dialup, TCP/IP, DSL, Modem, Broadband, Cable, ISDN, Telephone Line, Co-axial, Ethernet Cable, Radiowave

11) The Cyber Mind Organization has set up its new Branch at Mizoram for its office and web based activities. It has 4 Wings of buildings as shown in the diagram



Center to center distances between various blocks

Wing X to Wing Z	40 m
Wing Z to Wing Y	60 m
Wing Y to Wing X	135 m
Wing Y to Wing U	70 m
Wing X to Wing U	165 m
Wing Z to Wing U	80 m

Number of computers

Wing X	50
Wing Z	130
Wing Y	40
Wing U	15

1) Suggest a most suitable cable layout of connections between the Wings, and topology.

2) Suggest the most suitable place (i.e., Wing) to house the server of this organization with a suitable reason, with justification.

Ans) Wing Z as it has largest number of computers

3) Suggest the placement of the following devices with justification:

(i)Repeater (ii) Hub/Switch

4) The organization is planning to link its head office situated in Delhi with the offices at Srinagar.1m Suggest an economic way to connect it; the company is ready to compromise on the speed of connectivity. Justify your answer.

Ans) TCP/IP Dial Up (Most Suitable answer 1)

OR

Telephone Link (Most Suitable answer 2)

OR

Microwave

OR

Radio Link/Radio Wave

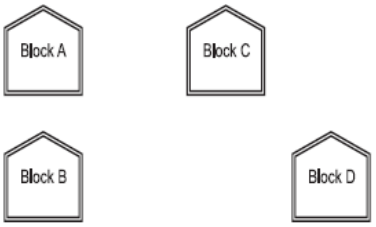
OR

Satellite Link

OR

WAN

12)Knowledge Supplement Organisation has set up its new center at Mangalore for its office and web based activities. It has 4 blocks of buildings as shown in the diagram below:



Center to center distances between various blocks

Black A to Block B	50 m
Block B to Block C	150 m
Block C to Block D	25 m
Block A to Block D	170 m
Block B to Block D	125 m
Block A to Block C	90 m

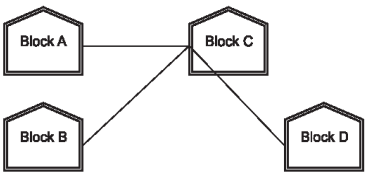
Number of Computers

Black A	25
Block B	50
Block C	125
Block D	10

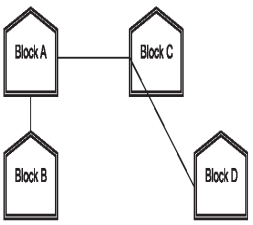
e1) Suggest a cable layout of connections between the blocks.

Ans)

Layout Option 1:



Layout Option 2: Since the distance between Block A and Block B is quite short



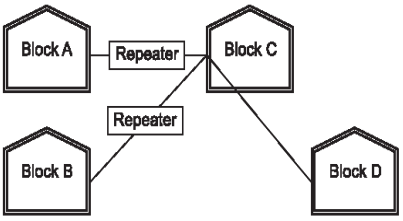
e2) Suggest the most suitable place (i.e. block) to house the server of this organization with a suitable reason.

Ans) The most suitable place / block to house the server of this organisation would be Block C, as this block contains the maximum number of computers, thus decreasing the cabling cost for most of the computers as well as increasing the efficiency of the maximum computers in the network.

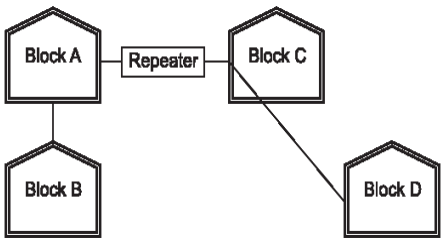
e3) Suggest the placement of the following devices with justification

(i) Repeater (ii) Hub/Switch

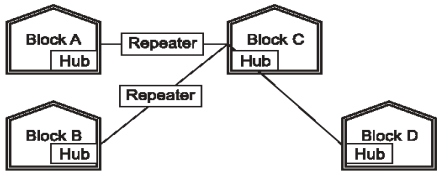
Ans) (i) For Layout 1, since the cabling distance between Blocks A and C, and that between B and C are quite large, so a repeater each, would ideally be needed along their path to avoid loss of signals during the course of data flow in these routes.

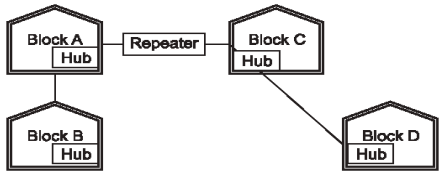


For layout 2, since the distance between Blocks A and C is large so a repeater would ideally be placed in between this path.



(ii) In both the layouts, a hub/switch each would be needed in all the blocks, to interconnect the group of cables from the different computers in each block.

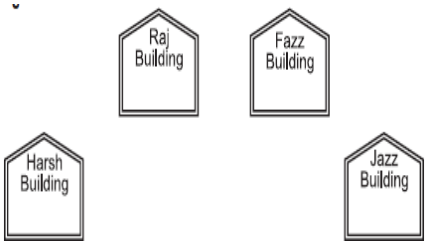




e4) The organization is planning to link its front office situated in the city in a hilly region where cable connection is not feasible, suggest an economic way to connect it with reasonably high speed?

Ans) The most economic way to connect it with a reasonable high speed would be to use radio wave transmission, as they are easy to install, can travel long distances, and penetrate buildings easily, so they are widely used for communication, both indoors and outdoors. Radio waves also have the advantage of being omni directional, which is they can travel in all the directions from the source, so that the transmitter and receiver do not have to be carefully aligned physically.

13) Ravya Industries has set up its new center at Kaka Nagar for its office and web based activities. The company compound has 4 buildings as shown in the diagram below:

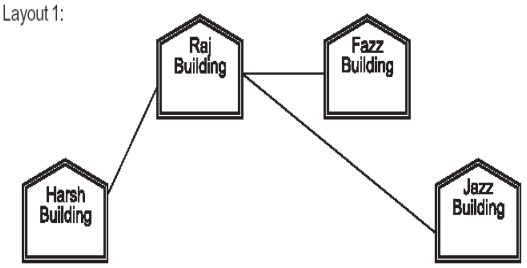


Center to center distances between various buildings is as follows:	
Harsh Building to Raj Building	50 m
Raz Building to Fazz Building	60 m
Fazz Building to Jazz Building	25 m
Jazz Building to Harsh Building	170 m
Harsh Building to Fazz Building	125 m
Raj Building to Jazz Building	90 m
Number of Computers in each of the buildings is follows:	
Harsh Building	15
Raj Building	150
Fazz Building	15
Jazz Bulding	25

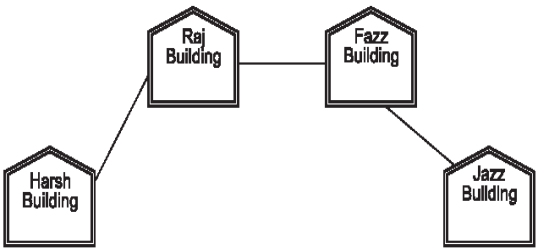
e1) Suggest a cable layout of connections between the buildings.

Ans)

Layout 1:



Layout 2: Since the distance between Fazz Building and Jazz Building is quite short



e2) Suggest the most suitable place (i.e. building) to house the server of this organization with a suitable reason.

Ans) The most suitable place / block to house the server of this organisation would be Raj Building, as this block contains the maximum number of computers, thus decreasing the cabling cost for most of the computers as well as increasing the efficiency of the maximum computers in the network.

e3) Suggest the placement of the following devices with justification:

(i) Internet Connecting Device/Modem

(ii) Switch

Ans)(i)Raj Building

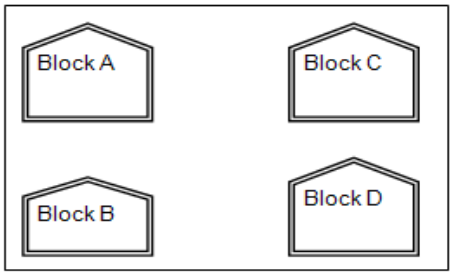
(ii) In both the layouts, a hub/switch each would be needed in all the buildings, to interconnect the group of cables from the different computers in each block

e4) The organisation is planning to link its sale counter situated in various parts of the same city, which type of network out of LAN, MAN or WAN will be formed? Justify your answer.

Ans) The type of network that shall be formed to link the sale counters situated in various parts of the same city would be a MAN, because MAN (Metropolitan

Area Networks) are the networks that link computer facilities within a city.

14)Knowledge Supplement Organisation has set up its new center at Mangalore for its office and web based activities. It has 4 blocks of buildings as shown in the diagram below:



Center to center distances between various blocks

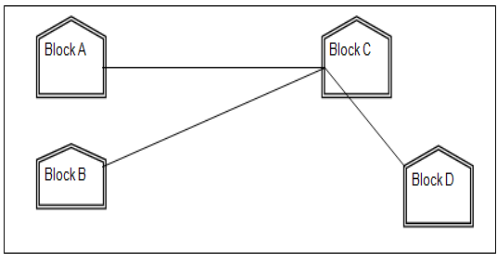
Black A to Block B	50 m
Block B to Block C	150 m
Block C to Block D	25 m
Block A to Block D	170 m
Block B to Block D	125 m
Block A to Block C	90 m

Number of Computers

Black A	25
Block B	50
Block C	125
Block D	10

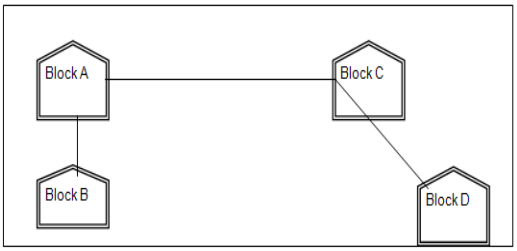
e1) Suggest a cable layout of connections between the blocks.1

Ans) Layout 1:



Layout Option 2:

Since the distance between Block A and Block B is quite short



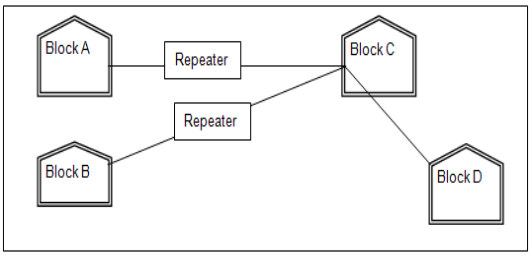
e2) Suggest the most suitable place (i.e. block) to house the server of this organisation with a suitable reason.

Ans) The most suitable place / block to house the server of this organisation would be Block C, as this block contains the maximum number of computers, thus decreasing the cabling cost for most of the computers as well as increasing the efficiency of the maximum computers in the network.

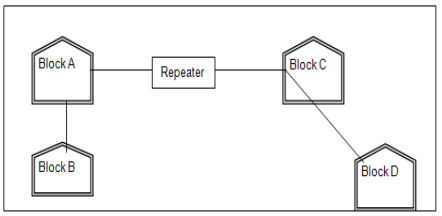
e3) Suggest the placement of the following devices with justification

i)Repeater ii)Hub/Switch

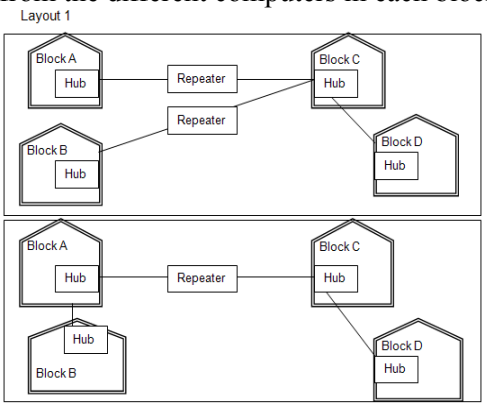
Ans) For Layout 1, since the cabling distance between Blocks A and C, and that between B and C are quite large, so a repeater each, would ideally be needed along their path to avoid loss of signals during the course of data flow in these routes



For layout 2, since the distance between Blocks A and C is large so a repeater would ideally be placed in between this path



In both the layouts, a hub/switch each would be needed in all the blocks, to interconnect the group of cables from the different computers in each block



e4) The organization is planning to link its front office situated in the city in a hilly region where cable connection is not feasible, suggest an economic way to connect it with reasonably high speed?

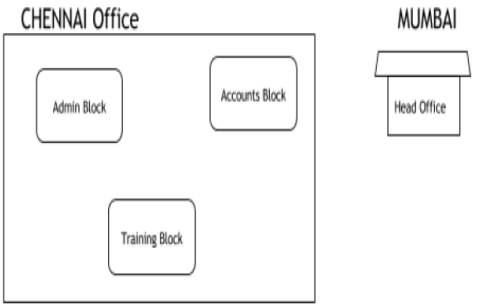
Ans) The most economic way to connect it with a reasonable high speed would be to use radio wave transmission, as they are easy to install, can travel long distances, and penetrate buildings easily, so they are widely used for communication, both indoors and outdoors. Radio waves also have the advantage of being omni directional, which is they can travel in all the directions from the source, so that the transmitter and receiver do not have to be carefully aligned physically.

Model 2 : Between 2 distant places

1) Hi Standard Tech Training Ltd is a Mumbai based organization which is expanding its office set-up to Chennai. At Chennai office compound, they are planning to have 3 different blocks for Admin, Training and Accounts related activities. Each block has a number of computers, which are required to be

connected in a network for communication, data and resource sharing.

As a network consultant, you have to suggest the best network related solutions for them for issues/problems raised by them in (i) to (iv), as per the distances between various blocks/locations and other given parameters.



Shortest distances between various blocks/locations:

Admin Block to Account Block	300 Metres
Accounts Block to Training Block	150 Metres
Admin Block to Training Block	200 Metres
MUMBAI Head Office to CHENNAI Office	1300 KM

Number of computers installed at various blocks are as follows:

Training Block	150
Accounts Block	30
Admin Block	40

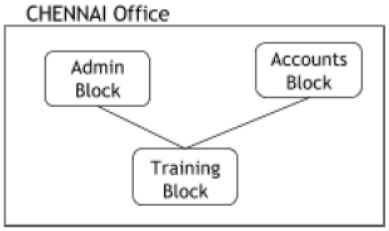
i) Suggest the most appropriate block/ location to house the SERVER in the CHENNAI Office (out of the 3 blocks) to get the best and effective connectivity. Justify your answer.

Ans) Training Block - Because it has maximum number of computers.

ii) Suggest the best wired medium and draw the cable layout (Block to Block) to efficiently connect various blocks within the CHENNAI office compound.

Ans) Best wired medium:

Optical Fibre **OR** CAT5 **OR** CAT6 **OR** CAT7 **OR** CAT8 **OR** Ethernet Cable



iii) Suggest a device/software and its placement that would provide data security for the entire network of the CHENNAI office.

Ans) Firewall - Placed with the server at the Training Block **OR**

Any other valid device/software name

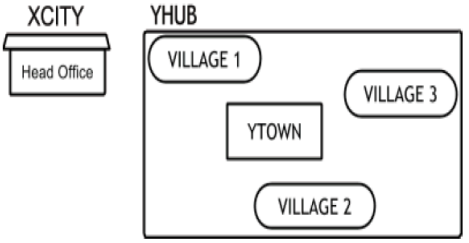
iv) Suggest a device and the protocol that shall be needed to provide wireless Internet access to all smartphone/laptop users in the CHENNAI office(1)

A)Device Name: WiFi Router **OR** WiMax **OR** RF Router **OR** Wireless Modem **OR** RF Transmitter

Protocol : WAP **OR** 802.16 **OR** TCP/IP **OR** VOIP **OR** MACP **OR** 802.11

2)Intelligent Hub India is a knowledge community aimed to uplift the standard of skills and knowledge in the society. It is planning to setup its training centers in multiple towns and villages pan India with its head offices in the nearest cities.They have created a model of their network with a city, a town and 3 villages as follows:

As a network consultant, you have to suggest the best network related solutionsfor their issues/problems raised in (i) to (iv), keeping in mind the distances between various locations and other given parameters.



Shortest distances between various locations:

VILLAGE 1 to YTOWN	2 KM
VILLAGE 2 to YTOWN	1.5 KM
VILLAGE 3 to YTOWN	3 KM
VILLAGE 1 to VILLAGE 2	3.5 KM
VILLAGE 1 to VILLAGE 3	4.5 KM
VILLAGE 2 to VILLAGE 3	3.5 KM
CITY Head Office to YHUB	30 Km

Number of Computers installed at various locations are as follows:

YTOWN	100
VILLAGE 1	10
VILLAGE 2	15
VILLAGE 3	15
CITY OFFICE	5

Note: In Villages, there are community centers, in which one room has been given as training center to this organization to install computers.The organization has got financial support from the government and top IT companies.

(i) Suggest the most appropriate location of the SERVER in the YHUB (out of the 4 locations), to get the best and effective connectivity. Justify your answer. 1

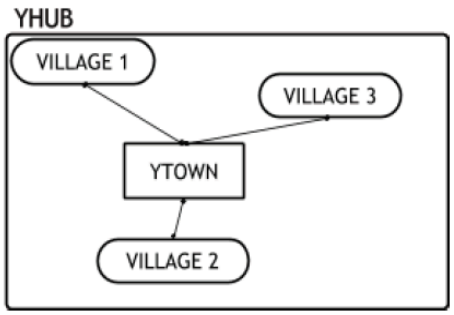
Ans YTOWN

Justification

- Since it has the maximum number of computers.
- It is closest to all other locations.

(ii) Suggest the best wired medium and draw the cable layout (location to location) toefficiently connect various locations within the YHUB.

Ans Optical Fiber



(iii) Which hardware device will you suggest to connect all the computers within each location of YHUB? 1

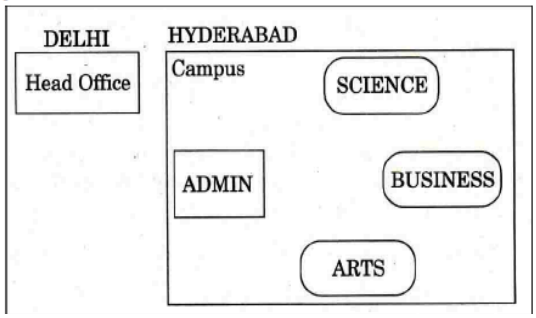
Ans Switch OR Hub

(iv) Which service/protocol will be most helpful to conduct live interactions of Experts from Head Office and people at YHUB locations?

Ans Videoconferencing OR VoIP OR any other correct service/protocol

3) Xcelencia Edu Services Ltd. is an educational organization. It is planning to set up its India campus at Hyderabad with its head office at Delhi. The Hyderabad campus has 4 main buildings - ADMIN, SCIENCE, BUSINESS and MEDIA.

You as a network expert have to suggest the best network related solutions for their problems raised in (i) to (iv), keeping in mind the distances between the buildings and other given parameters.



Shortest Distances between various buildings:

ADMIN to SCIENCE	65M
ADMIN to BUSINESS	100m
ADMIN to ARTS	60M
SCIENCE to BUSINESS	75M
SCIENCE to ARTS	60M
BUSINESS to ARTS	50M
DELHI Head Office to HYDERABAD Campus	1600KM

Number of Computers installed at various building are as follows:

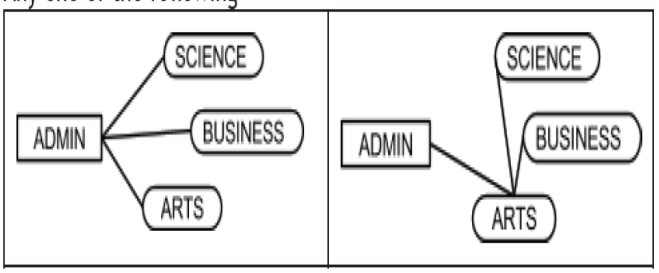
ADMIN	100
SCIENCE	85
BUSINESS	40
ARTS	12
DELHI Head Office	20

(i) Suggest the most appropriate location of the server inside the HYDERABAD campus (out of the 4 buildings), to get the best connectivity for maximum no. of computers. Justify your answer.

Ans ADMIN (due to maximum number of computers)

(ii) Suggest and draw the cable layout to efficiently connect various buildings 'within the HYDERABAD campus for connecting the computers.

Any one of the following



(iii) Which hardware device will you suggest to be procured by the company to be installed to protect and control the intemet uses within the campus?1

Ans Firewall OR Router

(iv) Which of the following will you suggest to establish the online face-to-face communication between the people in the Admin Office of HYDERABAD campus and DELHI Head Office?

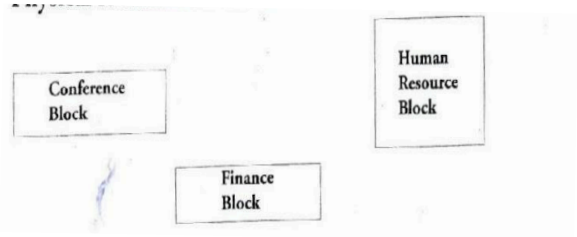
(a) E-mail (b) Text Chat (c) Video Conferencing

(d) Cable TV

Ans Video Conferencing

4) Tech Up Corporation (TUC) is a professional consultancy company. The company is planning to set up their new offices in India with its hub at Hyderabad. As a network adviser, you have to understand their requirement and suggest them the best available solutions. Their queries are mentioned as (i) to (iv) below:

Physical locations of the blocks of TUC



Block to Block distances (in Mtrs.)

Block (From)	Block (To)	Distance
Human Resource	Conference	60
Human Resource	Finance	120
Conference	Finance	80

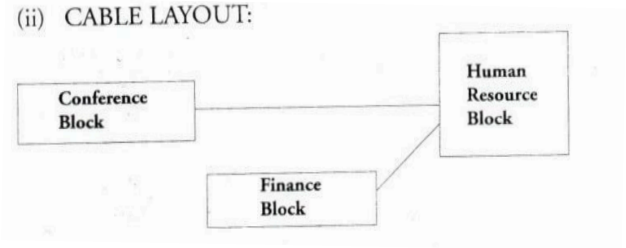
Expected Number of Computer to be installed in each bloc

Block	Computers
Human Resource	125
Finance	25
Conference	60

(i) What will be the most appropriate block, where TU should plan to install their server?

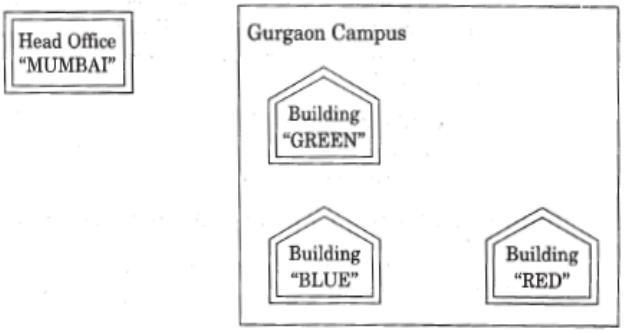
Ans) Human Resource Block is appropriate to install server.

(ii) Draw a cable layout to connect all the buildings in the most appropriate manner for efficient communication.



(iii) What will be the possible connectivity out of the following you will suggest to connect the new setup of offices Hyderabad with its London based office.
Infrared Satellite Link Ethernet Cable
Ans) Satellite Link.
(iv)
Ans) Switch

5)Workalot Consultants are setting up a secured network for their office campus at Gurgaon for their day-to-day office and web-based activities. They are planning to have connectivity between 3 buildings and the head office situated in Mumbai Answer the questions (i) to (iv) after going through the building positions in the campus and other details, which are given below:



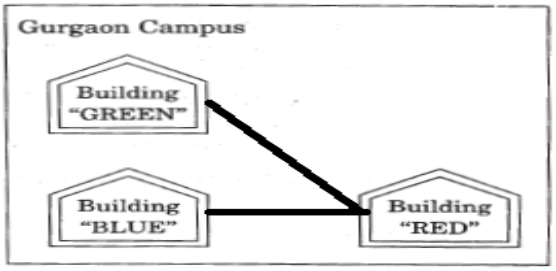
Distances between various buildings

Building "GREEN" to Building "RED"	110 m
Building "GREEN" to Building "BLUE"	45 m
Building "BLUE" to Building "RED"	65 m
Gurgaon Campus to Head Office	1760 KM

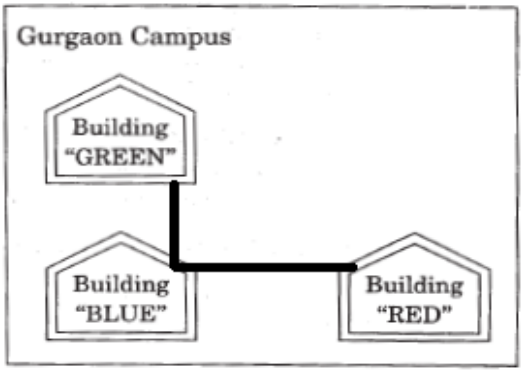
Number of Computers

Building "GREEN"	32
Building "RED"	150
Building "BLUE"	45
Head Office	10

(i) Suggest the most suitable place (Le. building) to house the server of this organization. Also give a reason to justify your location.
Ans Building "RED", since it contains maximum number of computers **OR**
Building "BLUE", since it is closest to "GREEN" and "RED"
(ii) Suggest a cable layout of connections between the buildings inside the campus.
Ans Layout 1:

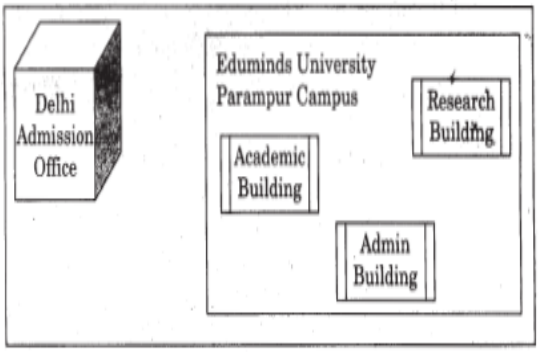


Layout 2



(iii) Suggest the placement of the following devices with justification:
(1) Switch (2) Repeater
Ans (1) Switch:
In each of the buildings, since a network switch is a networking device that joins multiple computers together within one local area network (LAN).
(2) Repeater:
For the Layout 1 drawn in (e2)- Between buildings "GREEN" and "RED", since distance between these two buildings is greater than 70 m which will otherwise lead to loss of signal intensity for data to be transferred.
For the Layout 2 drawn in (e2): Repeater is not needed, since distance between both the buildings connected to "Ganga" is less than 70 m, not leading to any signal loss **OR**
Any other placement of Repeater with proper justification
(iv) The organization is planning to provide a high speed link with its head office situated in the MUMBAI using a wired connection. Which of the following cable will be most suitable for this job?
(i) Optical Fibre (ii) Co-axial Cable (iii) Ethernet Cable
Ans (i) Optical Fibre

6) Eduminds University of India is starting its first campus in a small town Parampur of Central India with its center admission office in Delhi. The university has 3 major buildings comprising of Admin Building, Academic Building and Research Building in the 5 KM area Campus. As a network expert, you need to suggest the network plan as per (E1) to (E4) to the authorities keeping in mind the distances and other given parameters.



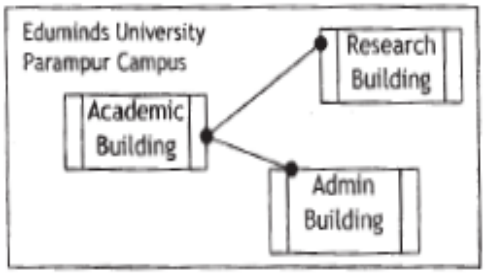
Expected Wire distances between various locations:

Research Building to Admin Building	90m
Research Building to Academic Building	80m
Academic Building to Admin Building	15m
Delhi Admission Office to Parampur Campus	1450 km

Expected number of computers to be installed at various locations in the university are as follows:

Research Building	20
Academic Building	150
Admin Building	35
Delhi Admission Office	5

(E1) Suggest to the authorities, the cable layout amongst various buildings inside the university campus for connecting the buildings.



Ans)

(E2) Suggest the most suitable place (i.e. building) to house the server of this organisation, with a suitable reason.

Ans Academic Building as it contains maximum number of computers.

(E3) Suggest an efficient device from the following to be installed in each of the buildings to connect all the computers :

(i) GATEWAY (ii) MODEM (iii) SWITCH

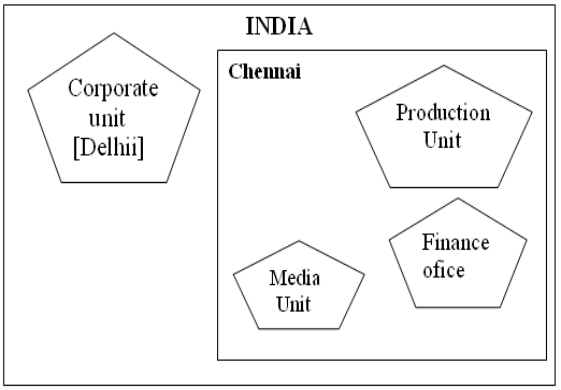
Ans SWITCH

(E4) Suggest the most suitable (very high speed) service to provide data connectivity between Admission Building located in Delhi and the campus located in Par am pur from the following options:

_ Telephone line
_ Fixed-Line Dial-up connection
_ Co-axial Cable Network
_ GSM
_ Leased line
_ Satellite Connection

Ans Satellite Connection **OR** Leased line

7) "China Middleton Fashion" is planning to expand their network in India, starting with two cities in India to provide infrastructure for distribution of their product. The company has planned to setup their main office in Chennai at three different locations and have named their offices as "Production Unit", "Finance Unit" and "Media Unit ".The Company has its corporate unit in Delhi. A rough layout of the same is as follows:



Approximate distance between these Units is as follows:

From	To	Distance
Production Unit	Finance Unit	70 Mtr
Production Unit	Media Unit	15 KM
Production Unit	Corporate Unit	2112 KM
Finance Unit	Media Unit	15 KM

In continuation of the above, the company experts have planned to install the following number of computers in each of their offices:

Production Unit	158
Finance Unit	79
Media Unit	90
Corporate Unit	51

1) Suggest the kind of network required (out of LAN, MAN, WAN) for connecting each of the following office units: i) Production Unit and Media Unit
ii) Production Unit and Finance Unit

Ans) Production Unit and Media Unit : **MAN**
Production Unit and Finance Unit : **LAN**