7 Computer Networks and Introduction to Internet

Fastrack Revision

- **Network:** A group of two or more similar things or people interconnected with each other is called network.
- **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.
- **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.
- **Packets:** Networking devices are used to connect multiple computers in different settings. For communication, data in a network is divided into smaller chunks called packets. These packets are then carried over a network. Devices in a network can be connected either through wired media like cables or wireless media like air.
- **Internet Protocol Address (IP Address):** It is the unique identifier for each connected device on a network. It is usually mounted on the LAN card or Ethernet card of a computer or device.
- **Types of Networks:** Based on the geographical area covered and data transfer rate, computer networks are broadly categorised as:
  - **Personal Area Network (PAN):** The smallest and most basic type of network, a PAN is made up of a wireless modem, a computer or two, phones, printers, tablets, etc. and revolves around one person in one building. Personal Area Network is a network arranged within an individual person, typically within a range of 10 metres.
  - **Local Area Network (LAN):** A Local Area Network (LAN) is a group of computer and peripheral devices which are connected in a limited area such as school, laboratory, home and office building. The simplest type of LAN network is to connect computers and a printer in someone's home or office. These types of networks can be extended up to a few kilometres.
  - **Metropolitan Area Network (MAN):** A Metropolitan Area Network (MAN) is consisting of a computer network across an entire city, college campus or a small region. This type of network is larger than LAN, which is mostly limited to a single building or site. 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.
  - **Wide Area Network (WAN):** It is another important computer network which spreads across a large geographical area. WAN network system could be a connection of an LAN which connects with other LAN's using telephone lines and radiowaves. It is mostly limited to an enterprise or an organisation.
- **Network Devices:** A computer network is not only made up of wires and computers, it contains many interconnecting devices that are used to combine smaller networks to form a bigger one. Let us discuss these components in detail.
  - **Repeater:** A repeater job is to regenerate the signal over the same network before the signal becomes too weak or corrupted so as to extend the length to which the signal can be transmitted over the same network.
  - **Hub:** A hub is basically a multiport repeater. Hub is a centralised device that connects multiple devices in a single LAN network. When Hub receives the data signals from a connected device on any of its port, except that port, it forwards those signals to all other connected devices from the remaining ports.
  - **Bridge:** A bridge is a repeater, with add on the functionality of filtering content by reading the MAC addresses of source and destination. It is also used for interconnecting two LANs working on the same protocol. It has a single input and single output port, thus making it a 2 port device.
  - **Switch:** A switch, like a hub, is a device that connects a number of computers together to make a LAN. A switch is more intelligent device than a hub. If it receives a message, it checks whom it is being addressed to and sends it to only specific computer.
  - **Routers:** A router is a device like a switch that routes data packets based on their IP addresses. Router is mainly a Network Layer device.
  - **Gateway:** A gateway, as the name suggests, is a passage to connect two networks together that may work upon different networking models. They basically work as the messenger agents that take data from one system, interpret it and transfer it to another system.
  - **Network Interface Card (NIC):** Without this device, networking cannot be done. This is also known as Network Adapter Card, Ethernet Card and LAN Card. NIC allows a networking device to communicate with the other networking device. NIC converts the data packets between two different data transmission technologies.
  - **Modem:** Modem stands for 'Modulator Demodulator'. Modem is a device that enables a computer to send or receive data over telephone or cable lines. The main function of the modem is to convert digital signal into analog and vice versa. Modem is a combination of two devices – modulator and demodulator. The modulator converts digital data into analog data when the data is being sent by the computer. The demodulator converts analog data signals into digital data when it is being received by the computer.
- **Networking Topologies:** The arrangement of computers and other peripherals in a network is called its topology. Common network topologies are mesh, ring, bus, star and tree.

- **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.
- **Ring Topology:** In ring topology, each node is connected to two other devices, one each on either side. The nodes connected with each other thus form a ring. The link in a ring topology is unidirectional. Thus, data can be transmitted in one direction only (clockwise or counterclockwise).
- **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.
- **Tree or Hybrid Topology:** It is a hierarchical topology. 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. This topology is also more secure as compared to other topologies because each cable between two nodes carries different data.

- **Internet:** It is a world-wide network, connecting millions of computers, together through telephone lines, cables and other means to form a network. The term 'Internet' is the short form for International Network.
- **World Wide Web (WWW):** It is an Internet based service, which uses common set of rules known as Protocols, to distribute documents across the Internet in a standard way. The World Wide Web was invented by a British scientist, Tim Berners-Lee in 1989.
- **Hypertext Markup Language (HTML):** It is a computer language that is used for creating web pages, which are displayed on World Wide Web. The HTML documents are created using text-based editors such as Notepad, Word Pad, etc., and HTML files are saved with **extension .html**.
- **Uniform Resource Locator:** URL's or 'Uniform Resource Locators', are the web browser addresses of Internet pages and files. It is the way to locate a file or document on the Internet.
- **Format of an URL:** Every URL has three parts to address a page or file:
  - **Protocol identifier** or **scheme** which ends with a '//:'
  - **Host computer** which ends with web extensions such as .com, .org, etc.
  - **Filename** or **page** name which displays the related information.

  Example: Protocol identifier or scheme://site address/path/filename
- **Hypertext Transfer Protocol (HTTP):** It defines how messages are formatted and transmitted over the web.
- **Hypertext Transfer Protocol Secure (HTTPS):** It is an extension of Hypertext Transfer Protocol (HTTP). It is for secure communication over a computer network and is widely used on the Internet.
- **Website:** The collection of webpages on the World Wide Web that is accessed by its own Internet address is called a website. Thus, a website is a collection of related webpages.
- **Web page:** A web page is a document that contains information that travels over the web. It may contain different types of information such as text, audio, video, images, hyperlinks, etc.
- **Static Web page:** A static web page often called a **flat** page or stationary page. A static web page displays the same information for all users, such versions are available and the server is configured to do so.
- **Dynamic Web page:** A dynamic web page is a web page which needs to be refreshed every time whenever it opens in any of the web browsers to display the updated content of the site.
- **Web Server:** It is a program or a computer that provides services to other programs or computers called clients.
- **Web Hosting:** It is a service that allows you to post the website created locally so that it is available for all Internet users across the globe.
- **Web Browser:** A Web Browser is an application software that lets you view web pages, graphics and the online content. Browser software is specifically designed to convert HTML and XML into readable documents.
- **Add-ons and Plug-ins:** They are the tools that help to extend and modify the functionality of the browser.
- **Cookie:** It is a text file containing a string of information which stores browsing information on the hard disk of your computer.
- **E-mail:** It is the short form of Electronic Mail. It is one of the ways of sending and receiving messages using the Internet. An e-mail can be sent anytime to any number of recipients at anywhere. The message can be either text entered directly onto the e-mail application or an attached file (text, image, audio, video, etc.) stored on a secondary storage.
- **Chat:** Chatting or Instant Messaging (IM) over the Internet means communicating to people at different geographic locations in real time through text message(s).
- **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.

Practice Exercise

Multiple Choice Questions

Q 1. Two devices are in network if:
a. a process in one device is able to exchange information with a process in another device
b. a process is running on both devices
c. the processes running of different devices are of same type
d. None of the above

Q 2. What is a stand alone computer?
a. A computer that is not connected to a network
b. A computer that is being used as a server
c. A computer that does not have any peripherals attached to it
d. A computer that is used by only one person

Q 3. Central computer which is powerful than other computers in the network is called as .....
a. Client b. Server
c. Hub d. Switch

Q 4. Which of these components is internal to a computer and is required to connect the computer to a network?
a. Wireless Access Point b. Network Interface Card
c. Switch d. Hub

Q 5. A ..... is a device that connects the organisation's network with the outside world of the Internet. *[CBSE SQP 2023-24]*
a. Hub b. Modem
c. Gateway d. Repeater

Q 6. Which of the following topologies is very efficient and all nodes are connected to a central Hub? *[CBSE 2023]*
a. Star b. Tree
c. Bus d. Ring

Q 7. The device that can operate in place of a hub is a:
a. switch b. bridge
c. router d. gateway

Q 8. A repeater takes a weak and corrupted signal and ..... it.
a. amplifies b. regenerates
c. resembles d. reroutes

Q 9. Which network topology requires a central controller or Hub?
a. Star b. Bus
c. Mesh d. Tree

Q 10. Which topology requires a multipoint connection on a single cable?
a. Star b. Bus
c. Mesh d. Tree

Q 11. Which of the following topologies contains a backbone cable running through the whole length of the network?
a. Star b. Bus
c. Mesh d. Tree

Q 12. Which of the following devices can be used at the centre of a star topology?
a. Router b. Repeater
c. Modem d. Hub

Q 13. If a computer connected to a star topology fails, the entire network will .....
a. also fail b. work unaffectedly
c. only server will work d. None of these

Q 14. A combination of bus and star topologies is called a ..... topology.
a. combination b. hybrid
c. mesh d. tree

Q 15. Internet is an example of ..... topology.
a. star b. bus
c. mesh d. tree

Q 16. Data is converted in a form so as to travel over telephone lines using this device.
a. Modem b. Hub
c. Switch d. Router

Q 17. Network device that regenerates and retransmits the whole signal is .....
a. modem b. hub
c. repeater d. bridge

Q 18. Network device which connects networks of similar types (same protocols).
a. Hub b. Router
c. Bridge d. Gateway

Q 19. Network device which connects dissimilar networks (different protocols).
a. Hub b. Router
c. Bridge d. Gateway

Q 20. Networks devices that sends the data over optimising paths through connected hops is:
a. hub b. router
c. bridge d. gateway

Q 21. A website is a collection of:
a. HTML documents b. graphic files
c. audio and video files d. All of these

Q 22. Collection of hyper linked documents available on the internet is known as ..... *[CBSE SQP 2023-24]*
a. Website b. Web page
c. Web Server d. Web Hosting

Q 23. When you visit on a website, it will open the page set as ..... of the website.
a. website b. home page
c. e-mail d. ISP

Q 24. The first page on a website that allows you to navigate to other pages *via* menu system or links, is known as:
a. front page b. primary page
c. home page d. first page

Q 25. Which amongst the following is not an example of browser? *[CBSE SQP 2020-21]*

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

Q 26. ..... is not a FOSS tool. *[CBSE SQP 2023-24]*

a. Libre Office b. Mozilla Firefox
c. Goggle Chrome d. Python

Q 27. Which of the following is not a web browser? *[CBSE 2023]*

a. Opera b. Google Chrome
c. Linux d. Mozilla Firefox

Q 28. Which of these is not a part of URL?

a. IP Address b. Port Number
c. Domain Name d. None of these

Q 29. Which portion of the URL below records the directory or folder of the desired resource?
http://www.somestore.com/firstfloor/shoes. htm

a. http b. firstfloor
c. shoes.htm d. www.somestore.com

Q 30. In URL, http://www.pacein.com/pr/main.htm, which component identifies the protocol or type of the server?

a. http b. www.pacein.com
c. /pr/main.htm d. None of these

Fill in the Blanks Type Questions

Q 31. A computer network that spans a relatively large geographical area is called .....

Q 32. WAN stands for .....

Q 33. A computer part of a computer network is called a .....

Q 34. A network having a span within a building is called a .....

Q 35. A network having a span of city, is called a .....

Q 36. Computers connected by a network across different cities is an example of .....

Q 37. ..... network device is known as an intelligent hub. *[CBSE SQP 2020-21]*

Q 38. The ..... is a central connection point where all network cables are concentrated.

Assertion & Reason Type Questions

Directions (Q. Nos. 39-50): *In the questions given below, there are two statements marked as Assertion (A) and Reason (R). Read the statements and choose the correct option.*

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.

Q 39. Assertion (A): The Internet is a collection of interconnected computer networks, linked by Transmission medium such as copper wires, fibre-optic cables, wireless connections, etc.
Reason (R): World Wide Web is a collection of interconnected documents.

Q 40. Assertion (A): The IETF looks after the long term research issues and problems concerning the effective working and management of the Internet.
Reason (R): The IAB is the primary association that approves the standards and allocates different resources.

Q 41. Assertion (A): A Server computer is a core component of the network, which provides services to the clients and controls access to hardware, software and other resources.
Reason (R): Clients are the computers that normally request and receive information or the services over the network.

Q 42. Assertion (A): The World Wide Web, often called as the Web, is a collection of information arranged in the form of documents that may contain text, hyperlinks and multimedia.
Reason (R): Sir Tim Berners-Lee, led the development of the World Wide Web in the late 1980s and early 1990s.

Q 43. Assertion (A): HTML uses different types of tags for creating web pages.
Reason (R): HTML is Mark-Up Language.

Q 44. Assertion (A): Web pages are the host computers that store all the web content.
Reason (R): A web browser is an application program installed at client's computer that sends the request to a web server for viewing the web content, for example, the Internet Explorer, Mozilla Firefox, Baidu, Google Chrome, etc.

Q 45. Assertion (A): Apache Web Server can be installed on almost all the operating systems such as Linux, Unix, Windows, Mac OS X and many more.
Reason (R): Apache Web Server is a platform independent server.

Q 46. Assertion (A): Nginx Web Server can be used freely, without any payment.
Reason (R): Nginx Web Server is an open source software.

Q 47. Assertion (A): A web browser is an application software that is installed on a web client.
Reason (R): A web server sends the request for accessing a website through web browser software only.

Q 48. Assertion (A): Safari, a web browser created by Apple, is commonly and popularly used on the Macintosh systems since 2003.
Reason (R): Lynx web browser is especially meant for the CUI-based (Character User Interface) operating system such as UNIX. It contains features to access web pages.

Q 49. Assertion (A): MODEM stands for modulator-demodulator.
Reason (R): It is a computer hardware device that converts data from a digital format to analog and *vice-versa*. *[CBSE SQP 2023-24]*

Q 50. 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. *[CBSE 2023]*

Answers

1. (a)	**2.** (a)	**3.** (b)	**4.** (b)	**5.** (c)
6. (a)	**7.** (a)	**8.** (b)	**9.** (a)	**10.** (b)
11. (b)	**12.** (d)	**13.** (b)	**14.** (d)	**15.** (c)
16. (a)	**17.** (c)	**18.** (c)	**19.** (d)	**20.** (b)
21. (d)	**22.** (a)	**23.** (b)	**24.** (c)	**25.** (a)
26. (c)	**27.** (c)	**28.** (a)	**29.** (b)	**30.** (a)

31. WAN **32.** Wide Area Network
33. node/host **34.** LAN
35. MAN **36.** MAN
37. Switch **38.** hub

39. (b)	**40.** (d)	**41.** (b)	**42.** (b)	**43.** (a)
44. (d)	**45.** (a)	**46.** (a)	**47.** (d)	**48.** (b)
49. (a)	**50.** (b)			

Case Study Based Questions

Case Study 1

Ramanpreet has to work on his science project which deals with electromagnetic waves. A lot of research work is required by him for the same. He uses Google Chrome to search for the relevant matter.

Q 1. Google Chrome is an example of a:
a. Website b. Web browser
c. Web page d. None of these

Q 2. 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

Q 3. 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

Q 4. 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

Q 5. HTML stands for .....
a. Hyper Text Markup Link
b. Hyper Text Markup Language
c. Hybrid Text Markup Language
d. Hyper Text Manipulation Language

Answers

1. (b) **2.** (c) **3.** (d) **4.** (a) **5.** (b)

Case Study 2

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 e-mail account and interact with her friends and family. Her granddaughter created an e-mail 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 e-mails are sent, how to create an e-mail 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.

Q 1. Unsolicited e-mail advertising is known as:
a. newsgroup b. junk ads
c. spam d. None of these

Q 2. Which of the following is the correct format of e-mail address?
a. name@website@info
b. name@website.info
c. www.nameofwebsite.com
d. name.website.com

Q 3. Mail access starts with client when user needs to download e-mail from the:
a. mail box
b. mail server
c. IP server
d. Internet

Q 4. To use e-mail service, one needs to register with:
a. Internet service provider
b. e-mail service provider
c. a company
d. no need to register

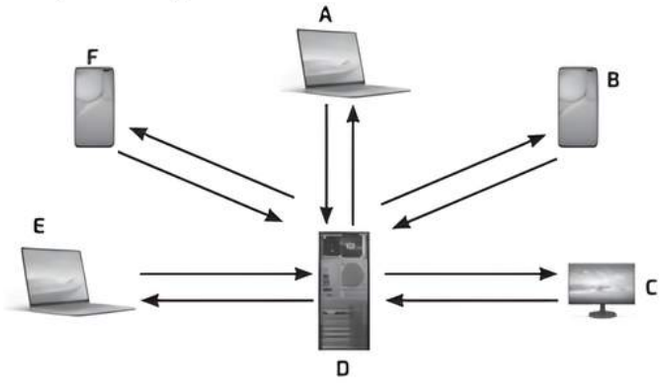
Q 5. BCC stands for to send the copy of mail.
a. Black Carbon Copy
b. Blue Carbon Copy
c. Blind Carbon Copy
d. Block Chain Copy

Answers

1. (c) **2.** (b) **3.** (a) **4.** (a) **5.** (c)

Case Study 3

Refer to the following diagram and answer the questions given below:



Q 1. Which of the following devices acts as a server?
a. A b. B
c. C d. D

Q 2. The arrow from device D pointing to A represents:
a. HTTP request
b. HTTP response
c. HTTP request and response
d. All of the above

Q 3. Which of the following device(s) can have IP Address?
a. A b. D
c. F d. All of these

Q 4. Identify the network topology of the above network:
a. Ring b. Star
c. Bus d. None of these

Q 5. ..... 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 these

Answers

1. (d) **2.** (b) **3.** (d) **4.** (b) **5.** (b)

Case Study 4

Network devices are the components that help us to connect computers or other electronic devices together, so that they can share data or resources, like printers or scanners. Hubs, switches, routers, bridges, repeaters and gateways are examples of networking devices that let you connect one or more computers to other computers or even other networks.

Q 1. How is the data transferred on a computer network?

Q 2. Define router.

Q 3. What receives a signal and retransmits it with a higher level or a higher power so that the signal can travel longer distances before fading out?

Q 4. Define IP Address.

Q 5. What are gateway in computer network?

Answers

1. In the form of packets.
2. A router is a network device which is responsible for routing data traffic from one jammed network to another free network.
3. Repeater
4. An IP address is a unique address that identifies a device on the Internet or a local network. IP stands for "Internet Protocol" which is the set of rules governing the format of data sent via the Internet or local network.
5. A gateway is a network node that forms a passage between two networks operating with different transmission protocols. The most common type of gateways, the network gateway operates at layer 3 i.e. network layer of the OSI (Open Systems Interconnection) model.

Case Study 5

Types of Computer Network: Generally, networks are classified on the basis of geographical area covered. A network can be as small as the distance between your mobile phone and its Bluetooth headphone, and can be as large as the Internet covering the whole earth. Computer networks can be classified on the basis of geographical area covered by a network, into the following categories.

(i) Personal Area Network
(ii) Local Area Network
(iii) Metropolitan Area Network
(iv) Wide Area Network

Q 1. Define PAN.

Q 2. Which of network the network inside the school's computer lab or a network within a small office is an example?

Q 3. What is PAN's connectivity range?

Q 4. Which is the biggest type of network available for the computer systems?

Q 5. What do you mean by the term bluetooth?

Answers

1. Personal Area Network (PAN) is a computer network that connects computers/devices within the range of an individual person. As PAN provides a network range within a person's range typically within a range of 10 metres (33 feet) it is called as Personal Area Network.
2. LAN
3. 10 metres
4. WAN (WIDE AREA NETWORK)
5. Bluetooth is a short-range wireless technology standard that is used for exchanging data between fixed and mobile devices over short distances using UHF radio waves in the ISM bands, from 2.402 GHz to 2.48 GHz and building personal area networks.

Very Short Answer Type Questions

Q 1. What is a network? What are its goals?

Ans. **Goals:** A network is an interconnected collection of autonomous computers that can share and exchange information.

Goals of Network: Its goal is to share data, files and resources.

Q 2. Give any two examples of networks.

Ans. ARPANET, NSFNET.

Q 3. Expand the following:

(i) ARPANET (ii) ISP (iii) URL (iv) HTTP

Ans. (i) Advanced Research Projects Agency Network
(ii) Internet Service Provider
(iii) Uniform Resource Locator
(iv) Hypertext Transfer Protocol

Q 4. International Tour and Travels company has set up its new branch office in Jaipur where different buildings are spanned over in the radius of 900 metre in Jaipur. Name the network formed in the following situations:

(i) The branch office is connected with the regional office in New Delhi.

(ii) All the buildings of branch office are connected to each other. *[CBSE SQP 2019-20]*

Ans. (I) WAN (II) LAN

Q 5. What is a Hub?

Ans. A hub is a hardware device used to connect several computers together.

Q 6. What is the purpose of using router?

Ans. A router can work like a bridge and can also handle different protocols. A router can locate the destination required by sending the traffic to another router, if the destination is unknown to itself.

Q 7. Name the device for the following:

(i) It stands for Modulator Demodulator.

(ii) It regenerates the signals.

Ans. (i) Modem (ii) Repeater

Q 8. Which of the following is not a network topology: Star, Mesh, Tree, Bug, Bus? *[CBSE SQP 2020-21]*

Ans. Bug is not a network topology.

Q 9. Identify the type of topology from the following:

(i) Each node is connected with the help of a single cable.

(ii) Each node is connected with central switching through independent cables.

Ans. (i) Bus topology
(ii) Star topology

Q 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?

(i) Static web page

(ii) Dynamic web page *[CBSE SQP 2020-21]*

Ans. (ii) Dynamic web page

Q 11. Ruhani wants to edit some privacy settings of her browser. How can she accomplish her task?

Ans. The privacy settings of a browser can be changed by opening the settings of a web browser and then opening *Privacy* and *security* subgroup of the settings.

Q 12. Write the URL of any one e-governance website. *[CBSE SQP 2019-20]*

Ans. India.gov.in

Q 13. ..... network device is known as an intelligent hub. *[CBSE SQP 2020-21]*

Ans. Switch

Q 14. 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?

Ans. Murugan can send these things *via* and e-mail or can also share them through cloud services like drive.

Q 15. Give any three applications of the internet.

Ans. E-mail, Chat, Video conferencing,

Q 16. Name any two mail service providers.

Ans. Gmail, Yahoo Mail

Q 17. What is DNS?

Ans. DNS expands to Domain Name Server. DNS is a standard protocol that helps internet users discover websites using human readable addresses, e.g., www.edupillar.com into IP addresses like: 198.20.90.34

Q 18. What is Internet?

Ans. Internet is a computer-based world wide information network. The Internet is composed of a large number of smaller interconnected networks.

On internet, each connected individual can communicate with anyone else on the Internet, can publish ideas, and can sell products with a minimum overhead cost.

Q 19. Mention some uses of Internet.

Ans. (i) Business use internet to carry out electronic commerce.
(ii) Internet is used for voice and video conferencing and other forms of communication.

Q 20. What do you understand by term URL?

Ans. **URL:** The full form of URL is Uniform Resource Locator. A URL refers to an address on the Internet. Billions of documents/multimedia files can be accessed on Internet through their URLs.

Q 21. Explain the following terms:

(I) Web page (ii) Home page

Ans. **(I) Web page:** A document using http and that resides on a website is known as a web page.

(ii) Home page: It is the top-level web page of a website. This is the page that gets displayed first of all when a website is opened.

Q 22. Identify domain name(s) and URL(s) from the following list:

(i) yoga@yoga.com
(ii) do YogaEveryday.com
(iii) www.doYogaEveryday.com/old/index.html
(iv) www.PerformingArts_schools.org/backlink.htm
(v) 192.168.0.1
(vi) http://cbse.nic.in

Ans. (ii) and (vi) are domain names.
(iii) and (iv) are URLs.

Q 23. Which of the following entries is different from others? Why?
Safari, Chrome, Netscape, Facebook

Ans. Facebook: It is a social networking site while others are web browsers.

Q 24. 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 plug-in. Help him to add it in his browser.

Ans. Shubham can click on the installation link to go to the adobe site and then download and install the required flash player plug-in.

Short Answer Type-I Questions

Q 1. Write applications of a network.

Ans. The applications of a network are as follows:

(i) **Resource Sharing:** Through a network, data, software and hardware, resources can be shared irrespective of the physical location of the resources and the user.

(ii) **Reliability:** A file can have its copies on two or more computers of the network, so if one of them is unavailable, the other copies could be used that makes a network more reliable.

Q 2. What are the different types of networks? What is the geographical scope of LAN, MAN and WAN?

Ans. Networks vary widely in their size, complexity and geographical spread. On the basis of geographical spread, networks can be classified into three categories:

(i) **Local Area Networks (LANs):** These are computer networks confined to a localised area such as an office or a factory.

(ii) **Metropolitan Area Networks (MANs):** These are the networks that link computer facilities within a city.

(iii) **Wide Area Networks (WANs):** These are the networks spread over large distances, say across countries or even continents. It can even include a group of LANs connected together.

Q 3. Discuss and compare various types of networks.

Ans. The various types of networks are as follows:

(i) **Server-based Network:** Server-based networks provide centralised control of network resources and rely on server computers to provide security and network administration.

(ii) **Peer-to-peer Network:** Peer-to-peer network, computers can act as both servers sharing resources and as clients using the resources.

Q 4. Explain in brief the capabilities and services supported by LAN.

Ans. Small computer networks that are confined to a localised area (*e.g.*, an office, a building or a factory) are known as Local Area Networks (LANs). The key purpose of a LAN is to serve its users in resource sharing. The hardware as well as software resources are shared through LANs. For example, LAN users can share data, information, programs, printer, hard disks, modems, etc. One node has a printer connected to it and other nodes on the LAN can communicate with it in order to print files and hence allowing expensive peripherals to be shared among number of users.

Q 5. (i) Give two examples of PAN and LAN type of networks. *[CBSE 2016]*

(ii) Differentiate between PAN and LAN types of networks. *[CBSE 2016]*

Ans. (i) Examples of PAN

(a) Network formed by connecting smartphones of family members to laptop *via* bluetooth.

(b) Network formed by connecting devices like printer, laptop, smartphone, digital recorder, etc.

Examples of LAN

(a) Network formed by computers in an office.

(b) Network formed by computers in a bank.

(ii) Difference between PAN and LAN

S.No.	Basis of Difference	PAN	LAN
1.	Full form	PAN expands to Personal Area Network.	LAN expands to Local Area Network.
2.	Meaning	A PAN is a computer network organised around an individual person where a small network is formed by connecting various devices of the individual.	LAN interconnects some standalone computers within a confined physical area upto a kilometre.
3.	Examples	A laptop, a printer, a smart phone, digital recorder, etc.	A LAN inside a university or a LAN inside a hospital, etc.

Q 6. Differentiate between MAN and WAN.

Ans. Metropolitan Area Networks (MANs): These are the networks that link computer facilities within a city.
Wide Area Networks (WANs): These are the networks spread over large distance, say across countries or even continents. It can even include a group of LANs connected together.

Q 7. Differentiate between router and gateway.

Ans. A Gateway is a network device that regulates traffic between two dissimilar networks, while routers regulate traffic between similar networks. A router connects a local network to the Internet and ensures that the traffic local to the LAN remains there only and the traffic not intended for your local network stays outside of it, on the Internet.

Q 8. What is a web server? How is it different from web browser? *[CBSE 2023]*

Ans. Web server is a program or a computer that provides services to other programs or computers called clients.

On the other hand, a web browser is an application software that lets us view the web pages, graphics and the online content. It is specifically designed to convert HTML and XML documents into readable documents.

Q 9. Briefly explain the basic concepts of a web server and web hosting. *[CBSE SQP 2023-24]*

Ans. 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.

Q 10. 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. *[CBSE SQP 2023-24]*

Ans. 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.

Q 11. 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. *[CBSE SQP 2022 Term-2]*

Ans.

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

Q 12. 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. *[CBSE SQP 2022 Term-2]*

Ans. 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 web page can be compared with a single page of that book.

Q 13. (i) I :

- **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?

(ii) Name any two popular web browsers.

[CBSE SQP 2022 Term-2]

Ans. (i) Cookies

(ii) Mozilla Firefox and Google Chrome

Q 14. 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.

[CBSE SQP 2022 Term-2]

Ans. A web server is the main centralised 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.

Q 15. Differentiate between bus and star topology.

Ans. Bus Topology: In this topology, all devices on network are connected to a single continuous cable called a bus. Transmission from any station travels the length of the bus in both directions and can be received by all other stations. The destination device, on identifying the address on data packet copies the data on its disk. When the data packet reaches at either end the transmitter on that end absorbs the signal, removing it from the bus.

Star Topology: In this topology, each workstation is directly linked to central node. Devices can be easily plugged or unplugged to the central node, as need dictates. Any communication between the stations must pass through the central node.

Q 16. Write advantages and disadvantages of bus topology.

Ans. Advantages of the Bus/Linear Topology

(i) Resilient Architecture: The bus/linear architecture has an inherent simplicity that makes it very reliable from a hardware point of view. There is a single cable through which all the data propagates and to which all nodes are connected.

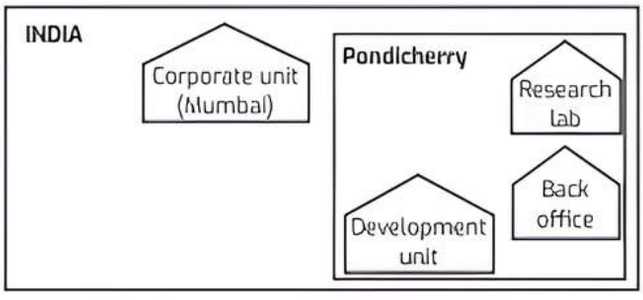
(ii) **Easy to Extend:** Additional nodes can be connected to an existing bus network at any point along its length. More extensive additions can be achieved by adding extra segments connected by a type of signal amplifier known as repeater.

Disadvantages of the Bus/Linear Topology

(i) **Repeater Configuration:** When bus type network has its backbone extended using repeaters. reconfiguration may be necessary.

(ii) **Nodes must be Intelligent:** Each node on the network is directly connected to the central bus. This means that some way of deciding who can use the network at any given time must be performed in each node.

Q 17. "Bias Methodologies" is planning to expand their network in India, starting with three cities in India to build infrastructure for research and development of their chemical products. The company has planned to setup their main office in Pondicherry-at three different locations and have named their offices as "Back Office", "Research Lab" and "Development Unit." The company has one more Research office namely "Corporate Office" in "Mumbai". A rough layout of the same is as follows:



Approximate distance between these offices are as follows:

From	To	Distance
Research Lab	Back Office	110 km
Research Lab	Development Unit	16 km
Research Lab	Corporate Unit	1800 km
Back Office	Development Unit	13 km

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

Research Lab	158
Back Office	79
Development Unit	90
Corporate Unit	51

(i) Suggest the kind of network required (out of LAN, MAN, WAN) for connecting each of the following office units:

(a) Research Lab and Back Office

(b) Research Lab and Development Unit

(ii) Which one of the following devices will you suggest for connecting all the computers within each of their office units?

(a) Switch/Hub (b) Modem

(c) Telephone

Ans. (i) Between Research Lab and Back office – LAN
Between Research Lab and Development Unit – MAN

(ii) Switch/hub

Q 18. Software Development Company has set up its new center at Raipur for its office and web based activities. It has 4 blocks of buildings named Block A, Block B, Block C and Block D.

Number of Computers		Shortest Distances Between Various Blocks in Metres	
Block A	25	Block A to Block B	60 m
Block B	50	Block B to Block C	40 m
Block C	125	Block C to Block A	30 m
Block D	10	Block D to Block C	50 m

(i) Suggest the type of network to connect all the blocks with suitable reason.

(ii) The company is planning to link all the blocks through a secure and high speed wired medium. Suggest a way to connect all the blocks.

[CBSE SQP 2019]

Ans. (i) LAN (ii) Star topology

Q 19. What are hubs? What are its types?

Ans. A hub is a hardware device used to connect several computers together.
It is mainly two types:
(i) Active hubs. (ii) Passive hubs.

Q 20. Briefly discuss the role of following devices in the context of networking:

(i) Router (ii) Bridge (iii) Gateway (iv) Switch

Ans. (i) Router: A router works like a bridge but can handle different protocols.

(ii) Bridge: Device that links two networks together.

(iii) Gateway: Device that connects dissimilar network.

(iv) Switch: A switch is responsible for filtering i.e., transforming data in a specific way and for forwarding packets between LAN segments.

Q 21. What is a modem? What is its function?

Ans. A modem is a computer peripheral that connects a workstation to other workstations via telephone lines and facilitates communications. It is short form for Modulation/Demodulation.
Modem converts digital signals to A/F (Audio Frequency) tones which are in the frequency range that the telephone lines can transmit and also it can convert transmitted tones back to digital information.

Q 22. What are two types of modems?

Ans. Modems comes in two varieties:

(i) **Internal Modems:** These are the modems that are fixed within the computer.

(ii) **External Modems:** These are the modems that are connected externally to a computer as other peripherals are connected.

Q 23. What are the important topologies for networks?

Ans. Important network topologies are:

(i) **Bus Topology:** In this, each computer is directly connected to primary network cable in a single line.

Advantage: Inexpensive, easy to install, simple to understand, easy to extend.

(ii) **Star Topology:** In this, all computers are connected using a central hub.

Advantage: Can be inexpensive, easy to install and reconfigure and easy to troubleshoot physical problems.

(iii) **Ring Topology:** In this, all computers are connected in loop.

Advantage: All computers have equal access to network media, installation can be simple, and signal does not degrade as much as in other topologies because each computer regenerates it.

Q 24. Define bus topology.

Ans. Bus Topology: In this topology, all devices on network are connected to a single continuous cable called a bus. Transmission from any station travels the length of the bus in both directions and can be received by all other stations. The destination device, on identifying the address on data packet copies the data onto its disk. When the data packet reaches at either end the terminator on that end absorbs the signal, removing from the bus. This topology can be used for smaller networks.

Q 25. Compare and contrast: Star and Bus topologies.

Ans. Star Topology: In this topology, each workstation is directly linked to a central node. Devices can be easily plugged or unplugged to the central node, as need dictates. Any communication between the stations must pass through the central node.

Bus or Linear Topology: In this topology, all devices on network are connected to a single continuous cable called a bus. Transmission from any station travels the length of the bus in both directions and can be received by all other stations. The destination device, on identifying the address on data packet copies the data onto its disk. When the data packet reaches at either end the terminator on that end absorbs the signal, removing from the bus. This topology can be used for smaller networks.

Q 26. Compare and contrast: Star and Tree topologies.

Ans. Star Topology: In this topology, each workstation is directly linked to a central node. Devices can be easily plugged or unplugged to the central node, as need dictates. Any communication between the stations must pass through the central node.

Tree Topology: In this topology, the network is shaped as an inverted tree with the central root branching and sub-branching to the extremities of the network. Transmission in this topology takes place in the same way as in bus topology.

Q 27. Write advantages and disadvantages of tree topology.

Ans. Advantages of the Tree Topology:

(i) It uses point-to-point wiring for individual segments.

(ii) It is supported by several hardware and software vendors.

Disadvantages of the Tree Topology:

(i) Overall length of each segment is limited by the type of cabling used.

(ii) If the backbone line breaks, the entire segment goes down.

Q 28. 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. *[CBSE 2022 Term-2]*

Ans. WWW stands for Word Wide Web. It is an ocean of information stored in the form of trillions of interlinked web pages and web resources. These resources can be accessed *via* Internet.

The internet is network of networks. It is global network of various computing devices.

So, WWW is collection of web documents, whereas internet is a collection of various devices.

Q 29. What are Cookies? How can we disable Cookies? *[CBSE 2022 Term-2]*

Ans. A Cookie generally contains 2 bits of data: ID for every user and a website name.

Cookies alter websites to retrieve this information after you return them, in order that they'll keep in mind you and your preferences and tailor page content for you supported this information.

In Chrome

(i) On your computer, open Chrome.

(ii) At the top right, click More More and then Settings.

(iii) Under "Privacy and Security," click Site settings.

(iv) Click Cookies.

(v) From here, you can: Turn on cookies: Next to "Blocked," turn on the switch. Turn off Cookies: Turn off Allow sites to save and read cookie data.

Q 30. What do you understand by the term cookies? Give any two benefits of cookies. *[CBSE 2023]*

Ans. Cookies are text files containing string of information which stores browsing information on the hard disk of the computer.

The two benefits of cookies are:

(i) They are extremely user-friendly.

(ii) Cookies can set to be made available for a longer period of time.

Q 31. (i) What is the function of a Gateway?
(ii) Give examples of any two plug-ins.
[CBSE 2022 Term-2]

Ans. (i) Gateway is used to connect two dissimilar network.

(ii) Java, Adobe Flash Player, Shockwave, Silverlight.

Q 32. Give one advantage and disadvantage to each of Bus and Star topology. *[CBSE 2022 Term-2]*

Ans. Start Topology:
Advantage: Easy to install
Disadvantage: More cables required
Bus Topology:
Advantage: Short Cable length
Disadvantage: Difficult to detect a fault.

Short Answer Type-II Questions

Q 1. What is a network? Why is it needed?
Or
Mention one advantage of networking.

Ans. A network is an interconnected collection of autonomous computers that can share and exchange information. Major reasons that emphasize on the need of networks are:

(i) Resource Sharing: Through a network, data, software and hardware resources can be shared irrespective of the physical location of the resources and the user.

(ii) Reliability: A file can have its copies on two or more computers of the network, so if one of them is unavailable, the other copies could be used that makes a network more reliable.

(iii) Reduced Costs: Since resources can be shared, it greatly reduces the cost.

(iv) Fast Communication: With networks, it is possible to exchange information at very fast speeds.

Q 2. What are the different types of networking/inter-networking devices?

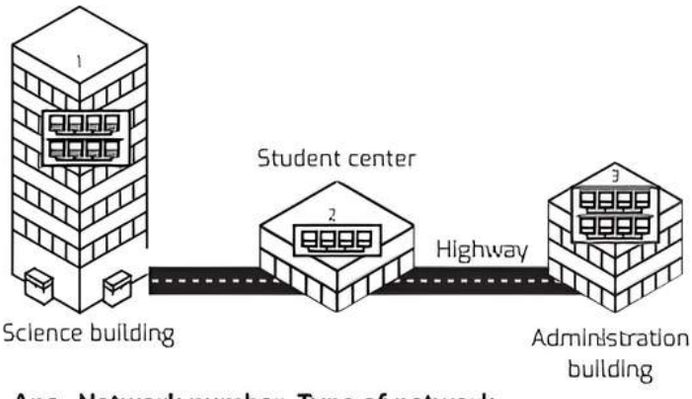
Ans. Different types of networking/inter-networking devices are:

(i) Repeater: Also called a regenerator, it is an electronic device that operates only at physical layer. It receives that signal in the network before it becomes weak, regenerates the original bit pattern and puts the refreshed copy back into the link.

(ii) Bridges: These operate both in the physical and data link layers of LANs of same type. They divide a larger network into smaller segments. They contain logic that allow them to keep the traffic for each segment separate and thus are repeaters that relay a frame only the side of the segment containing the intended recipient and control congestion.

(iii) Routers: They relay packets among multiple interconnected networks (*i.e.*, LANs of different type). They operate in the physical, data link and network layers. They contain software that enable them to determine which of the several possible paths is the best for a particular transmission.

Q 3. Government of Delhi has computer networks inside each of its buildings. It has now interconnected the networks of Administration Building and of Student Center Building. The networks so formed are marked below as numbers. Mention which types of networks is each of these?



Ans.

Network number	Type of network
1, 2, 3	LAN
4	WAN (It is connecting only networks 2 and 3)

Q 4. What is the difference between Hub, Switch and Router?

Ans. Difference between Hub, Switch and Router

S.No.	Hub	Switch	Router
1.	Hub is the least expensive, least intelligent and least complicated of the three. It broadcasts all data to every port which may cause serious security and reliability concern.	Switches work similarly like Hubs but in a more efficient manner. It creates connections dynamically and provides information only to the requesting port.	The router is smartest and most complicated out of these three. It comes in all shapes and sizes. Routers are similar like little computers dedicated for routing network traffic.
2.	In a Network, hub is a common connection point for devices connected to the network. Hub contains multiple ports and is used to connect segments of LAN.	Switch is a device in a network which forwards packets in a network.	Routers are located at gateway and forwards data packets.

Q 5. What are repeaters and routers?

Ans. (i) Repeater: A repeater is a device that amplifies a signal being transmitted on the network. It is used in long network lines, which exceed the maximum rated distance for a single run.

Over distance, the cables connecting a network lose the signal transmitted. If the signal degrades too much, it fails to reach the destination. Or if it does arrive, the degradation of the message makes it useless. Repeaters can be installed along the way to ensure that data packets reach their destination.

Repeaters are of two kinds-amplifier and signal repeater.

The *first* merely amplifies all incoming signals over the network. However, it amplifies both the signal and any concurrent noise. The *second* type collects the inbound packet and then retransmits the packet as if it were starting from the source station.

(ii) Router: A device that works like a bridge but can handle different protocols, is known as a *router*. For example, a router can link Ethernet (Ethernet is a very popular and widely accepted method of linking local stations to one another (*i.e.*, a LAN) for sharing data, program and equipment resources) to a mainframe.

If the destination is unknown to a router, it sends the traffic (bound to unknown destination) to another router (using logical addresses) which knows the destination.

Knowledge BOOSTER

A router differs from a bridge in a way that former uses logical addresses and the latter uses physical addresses.

Q 6. Explain any three various mostly used topologies.

Ans. Mostly used topologies are:

(i) Ring Topology: A LAN using the ring topology is connected in the closed loop. The data packets transmitted, circulate along the ring. The destination station copies the packet content on recognising its address on the packet. After a packet travels a full circle, it is removed at the source station.

(ii) Star Topology: In this topology, each workstation is directly linked to a central node. Devices can be easily plugged or unplugged to the central node, as need dictates. Any communication between the stations must pass through the central node.

(iii) Tree Topology: In this topology, the network is shaped as an inverted tree with the central root branching and sub-branching to the extremities of the network. Transmission in this topology takes place in the same way as in bus topology.

Q 7. Discuss the factors that govern the selection of a topology for a network.

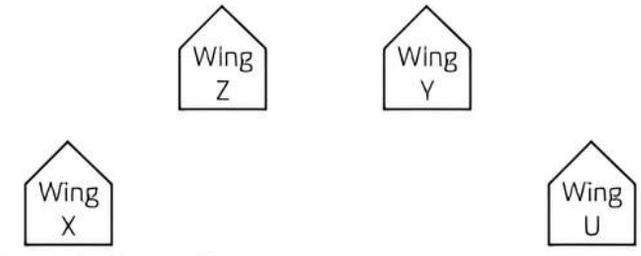
Ans. The factors that govern the selection of a topology for a network are as follows:

(i) Cost: For a network to be cost effective, one would try to minimise installation cost. This may be achieved by using well understood media and also, to a lesser extent, by minimising the distances involved.

(ii) Flexibility: Because the arrangement of furniture, internal walls, etc. in offices is often subject to change, the topology should allow for easy reconfiguration of the network. This involves moving existing nodes and adding new ones.

(iii) Reliability: Failure in a network can take two forms. Firstly, an individual node can malfunction. This is not nearly as serious as the second type of fault where the network itself fails to operate. The topology chosen for the network can help by allowing the location of the fault to be detected and to provide some means of isolating it.

Q 8. The Great Brain Organisation has set up its new branch at Srinagar 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	50 m
Wing Z to Wing Y	70 m
Wing Y to Wing X	125 m
Wing Y to Wing U	80 m
Wing X to Wing U	175 m
Wing Z to Wing U	90 m

Number of Computers

Wing X	50
Wing Z	30
Wing Y	150
Wing U	15

(i) Suggest the most suitable cable layout of connections between the wings and topology.

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

Ans. (i) Bus Topology

(ii) (a) As per suggested layout separate repeaters need not be installed as each building/wing will be having a hub that acts as a repeater.

(b) One hub per wing.

Q 9. Write two advantages and two disadvantages for star topology.

Ans. Advantages of the Star Topology:

(i) Ease of Service: The star topology has a number of concentration points (where connections are joined). These provide easy access for service or reconfiguration of the network.

(ii) One Device Per Connection: Connection points in any network are inherently prone to failure. In the star topology, failure of a single connection typically involves disconnecting one node from an otherwise fully functional network.

(iii) Centralised Control/Problem Diagnosis: The fact that the central node is connected directly to every other node in the network, so any problem in one node will not disturb any other node in network.

Disadvantages of the Star Topology:

(i) Long Cable Length: Because each node is directly connected to the center, the star topology necessitates a large quantity of cable. Whilst the cost of cable is often small, congestion in cable ducts and maintenance and installation problems can increase cost considerably.

(ii) Difficult to Expand: The addition of a new node to a star network involves a connection all the way to the central node.

(iii) Central Node Dependency: If the central node in a star network fails, the entire network is rendered inoperable. This introduces heavy reliability and redundancy constraints on this node.

Q 10. How is a website different from a webportal?

Ans. In Website:

(i) Location on Internet and easily publicly accessible with a unique URL.

(ii) No any requirement of any login.

(iii) Anyone can visit and can see content of website.

While in Webportal:

(i) A private location on the Internet it can be accessible with unique URL and unique username and password.

(ii) Login required.

(iii) Only member of the webportal having access can see the content of webportal.

Q 11. Differentiate between Web browser and Web server. Write any two popular Web browsers.

[CBSE SQP 2020]

Ans. Web Browser: It refers to a program/software that is used for accessing documents such as web pages, etc. available on the World Wide Web (WWW). When a user requests a web page from a particular website, the web browser retrieves the necessary content from a web server and then display the desired page on the user's device.

Web Server: A web server refers to a computer running a server software to run websites. A web server stores websites and processes and delivers web pages as per user's request.

When a client computer requests a web page through a URL, web server delivers the asked web page using one or more protocols such as HTTP (Hypertext Transfer Protocol), etc.

Popular Web Browsers: Google Chrome, Mozilla Firefox, Bing, Internet Explorer, etc.

Q 12. Name some web server software prominently in use.

Ans. Some web server software prominently in use are:

(i) Apache web server
(ii) Apache Tomcat
(iii) Web server IIS
(iv) Light pad server
(v) Jigsaw web server
(vi) Sun Java system web server, etc.

Long Answer Type Questions

Q 1. What do you mean by network topology? What are the most popular topologies?

Ans. Topology refers to the way in which the workstations attached to the network are interconnected. The most popular topologies are:

(i) Bus or Linear Topology: In this topology, all devices on network are connected to a single continuous cable called a bus. Transmission from any station travels the length of the bus in both directions and can be received by all other stations. The destination device, on identifying the address on data packet copies the data onto its disk. When the data packet reaches at either end, the terminator on that end absorbs the signal, removing from the bus.

This topology can be used for smaller networks.

(ii) Ring Topology: A LAN using the ring topology is connected in the closed loop. The data packets transmitted, circulate along the ring. The destination station copies the packet content on recognising its address on the packet. After a packet travels a full circle, it is removed at the source station.

(iii) Star Topology: In this topology, each workstation is directly linked to a central node. Devices can be easily plugged or unplugged to the central node, as need dictates. Any communication between the stations must pass through the central node.

(iv) Tree Topology: In this topology, the network is shaped as an inverted tree with the central root branching and sub-branching to the extremities of the network. Transmission in this topology takes place in the same way as in bus topology.

Q 2. What are the components of a website?

Ans. Components of a Website:

(i) **Web-host:** Hosting is where a website is physically located. Group of linked web pages qualify to be called a website only when hosted on a web-server. On a web-server, somewhere, are a set of files that are transmitted to user computers when they specify the address of the website.

(ii) **Address:** This is the address of the website (also called URL of the site). When someone asks to see a website, (she needs to put this address into the web browser and the asked site is delivered by the web-server.

(iii) **Home page:** Every website has a home page. It is the first web page that appears when viewers go to a website. Home page of a website is very important as it sets the look and feel of the website and directs viewers to the rest of the pages in the website.

(iv) **Design:** It is the overall look and feel the website has as a result of proper use and integration elements like navigation menus, graphics, layout, etc.

(v) **Content:** All the web pages contained in the website together make up the content of the website.

(vi) **Navigation Structure:** The navigation structure of a website is the order of the pages, the collection of what links to what. Usually, it is held together by at least one navigation menu.

Q 3. What are the components of a web page?

Ans. Components of a Web page Content Wise:

(i) **Hypertext:** Hypertext refers to a digital text, which is more than just text as it can include information in various media formats such as text, graphics, sound, images, video, hyperlinks.

(ii) **Hyperlink:** Hyperlink refers to a link from a hypertext file to another such file. A hyperlink can be in the form of a graphic or text, upon clicking where the linked document opens up.

Components of a Web page by Structure Wise:

(i) **Page Title:** This is a single line text which is displayed on the title bar of the browser displaying web page.

(ii) **Header:** This is generally a one or two line text (sometimes a graphics/image) defining the purpose of the web page. It is displayed at the top of the web page, below the address bar of the browser.

(iii) **Body of the Web page:** This is the section below the header of the web page and it contains the actual content of the web page.

(iv) **Navigational Links:** These are the hyperlinks placed on the web page using which you can move the linked web pages/documents.

(v) **Footer:** This is the bottom section of the web page. This is the section where usually the copyright notice, website contact information, etc. is put.

TiP

Write the components based on content as well as structure along with proper explanation.

Q 4. How can you send an e-mail?

Ans. The steps to send an e-mail, are as follows:

Step 1: Sign into the e-mail account.

Step 2: After signing in, on the top left of the browser window, select compose. This will open a new window wherein we can start writing the mail.

Step 3: The following columns need to be filled before we begin:

(i) **To:** Fill the e-mail address of the recipient.

(ii) **CC (Carbon Copy):** Type the e-mail address of the people we want to send a copy of our e-mail to. This feature is used to share a particular message with a large number of people.

(iii) **BCC (Blind Carbon Copy):** If we want to keep somebody invisible from all the other recipients of our message, then his or her e-mail address will be typed here.

(iv) **Subject:** The main idea or purpose behind the message is written here.

Step 4: After filling these fields, we can start typing our message in the blank area.

Step 5: After finishing, click on the send option to send the e-mail. A copy of each message we send is saved in the sent folder.

Q 5. 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 every 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:

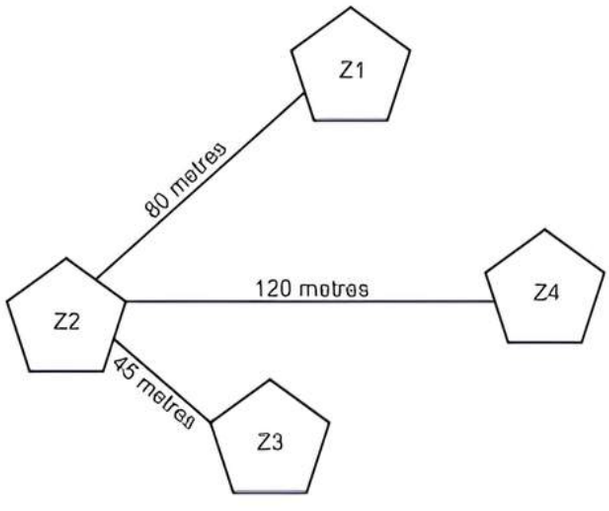
(a) Repeater (b) Hub/Switch

(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. *[CBSE SQP 2023-24]*

Ans. (i) Z2 will provide the best connectivity as it has maximum number of computers.

(ii) For very fast and efficient connections between various blocks within the campus, the suitable topology is Star Topology.



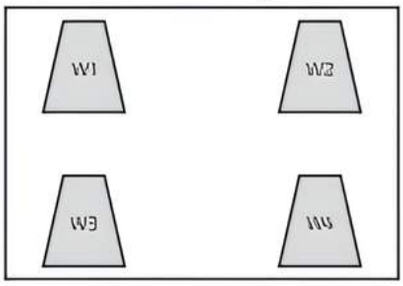
(iii) **Repeater:** To be placed between Block Z2 to Z4 as distance between them is more than 100 metres.

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 will be created as distance between Delhi and Mumbai is more than 40 kms.

Q 6. 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.

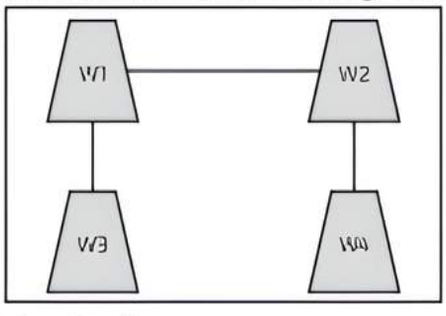
(iv) Suggest the placement of the following devices with justification if the company wants minimised network traffic:

(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.

[CBSE SQP 2020-21]

Ans. (i) Most suitable layout according to distance is:



(ii) Star Topology.

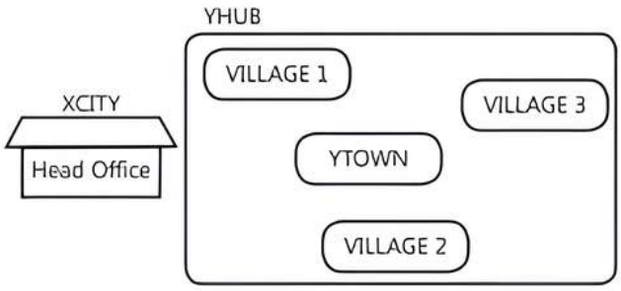
(iii) Broadband.

(iv) (a) Not required. Repeaters may be skipped as per above layout (because distance is less than 100 m).

(b) In every wing.

(v) RadioWaves.

Q 7. 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 centres 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 given.
As a network consultant, you have to suggest the best network related solution for their issues/ problems raised in (i) to (v) keeping in mind the distance between various locations and given parameters.



Shortest distance between various locations:

VILLAGE 1 TO YTOWN	2 km
VILLAGE 2 TO YTOWN	1.2 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 centres, in which one room has been given as training centre 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.

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

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

(iv) Which server/protocol will be most helpful to conduct live interaction of Experts from Head office and people at YHUB locations?

(v) Differentiate between Hub and Switch.

Ans. (i) Y TOWN

Justification:

(a) Since, it has the maximum number of computers.

(b) It is closet to all other locations.

(ii) Optical Fiber

(iii) Switch or Hub

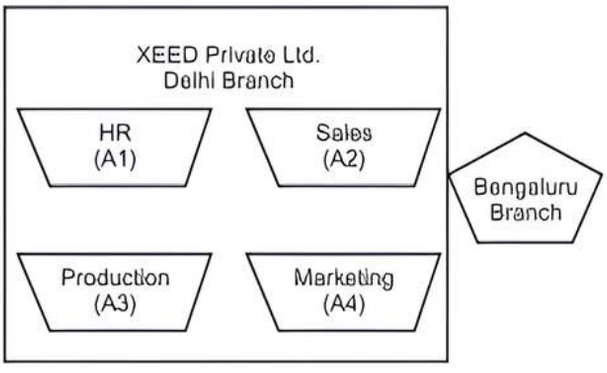
(iv) Video conferencing or VoIP or any other correct service/protocol.

(v) **Hub:** A hub is a simple and cheap networking device that works under the physical layer of the OSI model and connects a bunch of computers in a Local Area Network (LAN). It is considered less intelligent because it does not filter data and does not know where the data is to be sent.

Switch: A switch is a multicast networking device that works under the Datalink layer of the OSI model and connects a bunch of computers or devices in a network. It's mainly used to send a private message and it does not waste data.

Q 8. 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 Bengaluru. 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 Bengaluru Office	2154 km

Number of computers in each of the wing:

A1	50
A2	40
A3	110
A4	60

Based on the above specification, 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 Bengaluru 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.

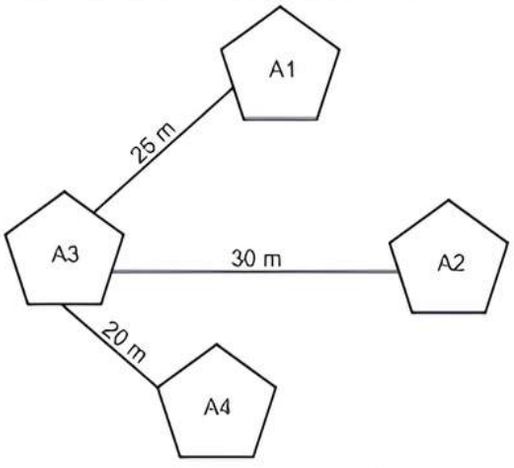
(v) Many employees were finding it difficult to cope up with work pressure and hence were showing stress related symptoms. In order to improve the mental health of its employees, HR planned to conduct an online session with a mental health expert from Mumbai. Out of the options given below, suggest the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

(a) FTP (b) SMTP

(c) VOIP (d) POP

[CBSE 2023]

Ans. (i) The suitable topology is star topology and the most suitable cable layout for connecting all the divisions of Delhi branch is as shown:



(ii) MAN network is required for connecting production (A3) with the Bengaluru branch because there is a medium distance of <50 kms between the divisions of the company.

(iii) Router can be used to connect the network of Delhi branch to the Internet.

(iv) Hub/switch should be placed in each division as each one has many computers that needs to be included to form a network.

(v) VoIP (Voice over Internet Protocol) will help to send the voice signals over internet to conduct the session successfully.

Q 9. Indian School, in Mumbai is starting up the network between its different wings. There are four buildings named as SENIOR, JUNIOR, ADMIN and HOSTEL as shown below:

SENIOR
JUNIOR
ADMIN
HOSTEL

The distance between various buildings is as follows:

ADMIN TO SENIOR	200 m
ADMIN TO JUNIOR	150 m
ADMIN TO HOSTEL	50 m
SENIOR TO JUNIOR	250 m
SENIOR TO HOSTEL	350 m
JUNIOR TO HOSTEL	350 m

Number of Computers in Each Building:

SENIOR	130
JUNIOR	80
ADMIN	160
HOSTEL	50

(i) Suggest the cable layout of connections between the buildings.

(ii) Suggest the most suitable place (*i.e.*, building) to house the server of this school, provide a suitable reason.

(iii) Suggest the placement of the following devices with justification.

- Repeater
- Hub/Switch

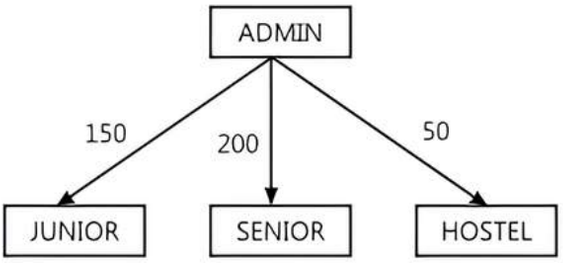
(iv) The organisation also has inquiry office in another city about 50-60 km away in hilly region. Suggest the suitable transmission media to interconnect to school and inquiry office out of the following:

- **Fiber optic cable**
- **Microwave**
- **Radiowave**

(v) Categories the following under client side and Server Side script category?

- **JSP**
- **ASP**
- **VB Script**
- **Java Script**

Ans. (i)



(ii) Server can be placed in the ADMIN building as it has the maximum number of computer.

(iii) Repeater can be placed between ADMIN and SENIOR building as the distance is more than 110 m.

(iv) Radiowaves can be used in hilly regions as they can travel through obstacles.

(v) **Client Side Script**

(a) JSP

(b) Java Script

Server Side Scripts

(a) ASP

(b) VB Script

Q 10. (i) Which out of three type of networks LAN, MAN and WAN, is to be used when an institute connects computers of two adjacent computer laboratories?

(ii) What is the difference between HTTP and FTP?

(iii) What is the major difference between message switching and packet switching in networking?

(iv) What is the basic difference between DNS and URL?

(v) Give two applications of web 2.0.

Ans. (i) LAN (The range is up to 1 km).

(ii)

HTTP	FTP
Stands for Hyper Text Transfer protocol.	It stands for file transfer protocol.
It is used to transfor web pages on www.	It is used to write data over server.

(iii)

Message Switching	Packet Switching
It communicate among two process.	It share the data in many computers.
Physical links are allocated dynamically.	Virtual links are made simultaneously.

(iv)

DNS	URL
It stands for domain Name Server.	It stands for Universal Resource locator.
It is the Avitar or webId for any person website over Internet.	It is the unique IP address provided to any group, person or company.

(v) Application of web 2.0

(a) web hosting

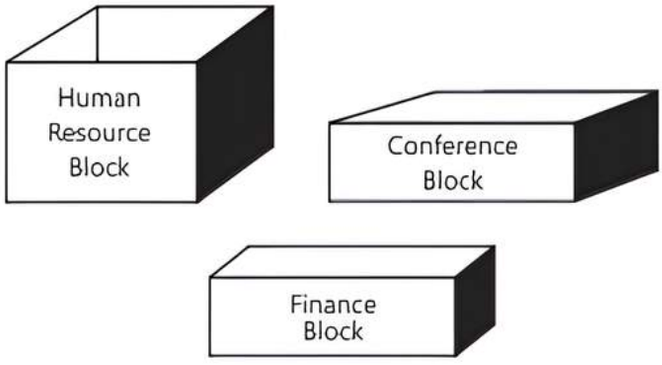
(b) web browsing

(c) web Indexing

(d) web searching

Q 11. Trine Tech Corporation (TTC) 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 blocked of TTC



Block-to-Block distances (in Mtrs.)

Block (From)	Block (To)	Distance
Human Resource	Conference	110
Human Resource	Finance	40
Conference	Finance	80

Expected number of computers to be installed in each block.

Block	Computer
Human Resource	25
Finance	120
Conference	90

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

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

(iii) What will be the best possible connectivity out of the following, you will suggest to connect the new setup of offices in Bengaluru with its London based office?

Satellite Link

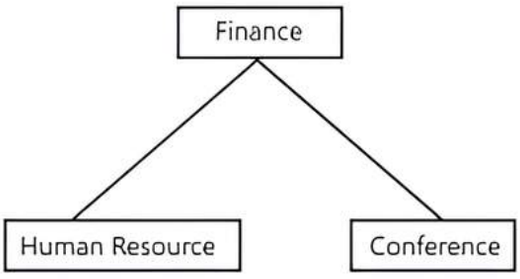
- Infrared
- Ethernet Cable

(iv) Which of the following device will be suggested by you to connect each computer in each of the buildings?
- Switch
- Modem
- Gateway

(v) Who is a hacker?

Ans. (i) Finance block because it has maximum number of computers.

(ii)



(iii) Satellite link

(iv) Switch

(v) A computer enthuslast, who uses his computer programming skill to intentionally access a computer without authorisation is known as hacker. A hacker accesses the computer without the intention of destroying data or maliciously harming the computer.

Q 12. "Anutulya Creation" A startup 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.

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

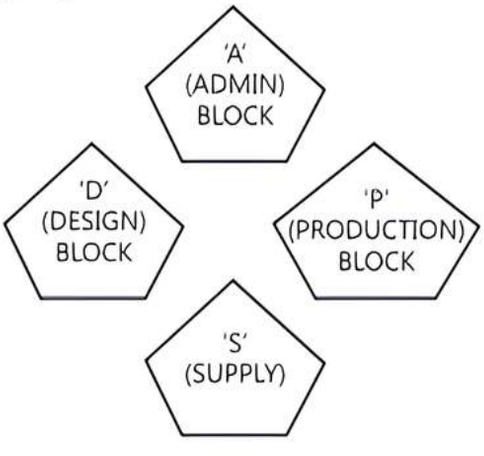
Numbers of computers in each block

Block A – 20

Block D – 80

Block P – 15

Block S – 8



Based on the above specifications, answer the following questions:

(i) Out of LAN, WAN and MAN, what type of network will be formed if we interconnect different computers of the campus? Justify.

(ii) 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.

(iii) Suggest the placement of the following device with justification:

(i) Repeater

(ii) Hub/Switch

(iv) 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.

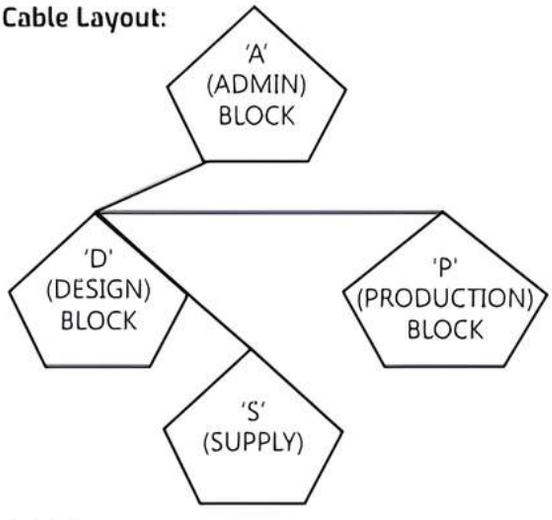
[CBSE SQP 2022 Term-2]

Ans. (i) LAN

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

(ii) Star topology

Cable Layout:



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

(b) Hub/Switch should be placed in each building to connect various computers together.

(iv) Video-conferencing software: Teams, Zoom, Skype, etc.

Protocol of video-conferencing software: VoIP

COMMON ERROR

In appropriate knowledge of various topologies may lead to wrong answers.

Chapter Test

Multiple Choice Questions

Q 1. Online textual talk is called .....

a. video-conferencing b. telephony
c. text phone d. chat

Q 2. Electronic mail cannot be used for:

a. sending documents
b. sending bulk data (say over 2GB)
c. sending attachments
d. sending messages

Q 3. Which of the following is not a unit for data transfer rate?

a. baps b. abps c. gbps d. kbps

Q 4. A computer network:

a. is a collection of hardware components and computers
b. is interconnected by communication channels
c. allows sharing of resources and information
d. All of the above

Q 5. What is a firewall in computer network?

a. The physical boundary of network
b. An operating system of computer network
c. A system designed to prevent unauthorised access
d. A web browsing software

Fill in the Blanks

Q 6. The ..... is a network device that can connect the network segments based on the same protocol.

Q 7. The ..... is a network device that navigates the data packets over large networks through the most efficient route.

Q 8. The ..... is a network device that connects dissimilar networks.

Assertion & Reason Type Questions

Directions (Q. Nos. 9-11): *In the questions given below, there are two statements marked as Assertion (A) and Reason (R). Read the statements and choose the correct option.*

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.

Q 9. Assertion (A): When you send some files from your computer to a remote server, it is considered as uploading.
Reason (R): ZIP is a common file format used to compress and combine files to make them download more quickly.

Q 10. Assertion (A): Uploading is the process of copying a file from one computer to another across the Internet.
Reason (R): IP or Internet Protocol address is the unique identifier for each connected device on a network.

Q 11. Assertion (A): SFTP stands for Secure File Transfer Protocol. It is a secure version of File Transfer Protocol (FTP), which facilitates data access and data transfer over a Secure Shell (SSH) data stream.
Reason (R): Lynx web browser is especially meant for the CUI-based (Character User Interface) operating system such as Unix. It contains features to access web pages.

Case Study Based Questions

Q 12. Samarth is the hardware 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 maximize speed and make each computer independent of network breakdowns.

a. Bus topology b. Star topology
c. Ring topology d. Mesh topology

(ii) 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

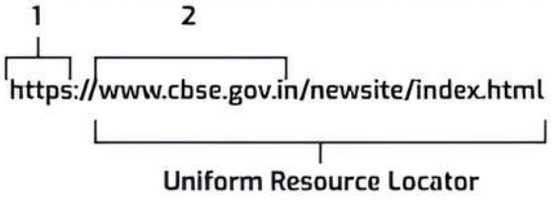
(iii) After setting up the lab and Internet in the lab, Samarth is now required to enable videos and animations to be played on the web browser for students of multimedia class. Which browser tool/service can be used for the same?

a. Plug-Ins
b. Addons
c. Control Panel
d. Download settings

(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. e-mail messaging
c. VoIP
d. WWW

(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

Q 13. TCP/IP, or the Transmission Control Protocol/ Internet Protocol, is a suite of communication protocols used to interconnect network devices on the internet. TCP/IP can also be used as a communications protocol in a private computer network (an intranet or an extranet).

TCP defines how application can create channels of communication across a network. It also manages how a message is assembled into smaller packets before they are then transmitted over the internet and reassembled in the right order at the destination address.

IP defines how to address and route each packet to make sure it reaches the right destination. Each gateway computer on the network checks this IP address to determine where to forward the message. TCP/IP uses the client-server model of communication in which a user or machine (a client) is provided a service (like sending a web page) by another computer (a server) in the network. Collectively, the TCP/IP suite of protocols is classified as stateless, which means each client request is considered new because it is unrelated to previous requests. Being stateless frees up network paths so they can be used continuously.

(i) How do Internet help us?
(ii) What is the significance of HTTP?
(iii) How do you differentiate between a web address and an e-mail address?
(iv) What is MODEM?
(v) Explain number addressing systems and Web addressing schemes.

Very Short Answer Type Questions

Q 14. Identify the Domain name and URL from the following:

http://www.income.in/home.aboutus.html

Q 15. What is web hosting?

Q 16. Write two characteristics of WiFi.

Short Answer Type-I Questions

Q 17. Write advantages and disadvantages of mesh topology.

Q 18. What is the role of modem in electronic communications?

Q 19. Define gateway.

Short Answer Type-II Questions

Q 20. Explain the structure of an e-mail message. Also differentiate between CC: and Bcc: fields.

Q 21. What is VoIP? How does it work?

Long Answer Type Questions

Q 22. G.R.K. International Inc. is planning to connect its Bengaluru Office Setup with its Head Office in Delhi. The Bengaluru Office G.R.K. International Inc. is spread across and area of approx. 1 square kilometre, consisting of 3 blocks—Human Resources, Academics and Administration.

You as a network expert have to suggest answers to all the queries raised by them.

Notes: *Keep the distance between blocks and number of computers in each block in mind, while providing them the solutions.*

Shortest distances between various blocks:

Human Resources to Administration	100 m
Human Resources to Academics	65 m
Academics to Administration	110 m
Delhi Head Office to Bengaluru Office Setup	2350 km

Number of computers installed at various blocks are as follows:

BLOCK	No. of Computers
Human Resources	155
Administration	20
Academics	100
Delhi Head Office	20

(i) Suggest the most suitable block in the Bengaluru Office Setup, to host the server. Give a suitable reason with your suggestion.
(ii) Suggest the cable layout among the various blocks within the Bengaluru Office Setup for connecting the Blocks.

(iii) Suggest a suitable networking device to be installed in each of the blocks essentially required for connecting computers inside the blocks with fast and efficient connectivity.

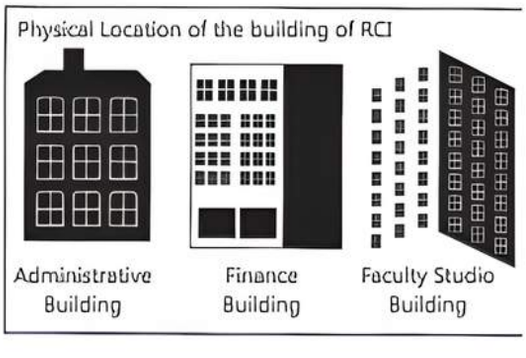
(iv) Suggest the most suitable media to provide secure, fast and reliable data connectivity between Delhi Head Office and the Bengaluru Office Setup.

(v) 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.

Q 23. Rovenza Communications 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, provide the best possible answers for the queries raised by them.



Block-to-Block Distances (in Mtrs.)

From	To	Distance
Administrative Building	Finance Building	60
Administrative Building	Faculty Studio Building	120
Finance Building	Faculty Studio Building	70

Expected computers to be installed in each block.

Buildings	Computers
Administrative Building	20
Finance Building	40
Faculty Studio Building	120

(i) Suggest the most appropriate block, where RCI should plan to install the server.

(ii) Suggest the most appropriate block-to-block cable layout to connect all three blocks for efficient communication.

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

(a) Infrared (b) Microwave (c) Satellite

(iv) Write two advantages of using open source software over proprietary software.

(v) Which of the following crime(s) does not come under cybercrime?

(a) Copying some important data from a computer without taking permission from the owner of the data.

(b) Stealing keyboard and mouse from a shop.

(c) Getting into unknown person's social networking account and start messaging on his behalf.