SYLLABUS:

Computer Networks: Advantages of computer networks, LAN, WAN, MAN, internet, WiFi, sensor networks, 5G communication.

World Wide Web – Basics, role of HTML, CSS, XML, Tools for web designing, Social media, Online social networks.

Computer Networks:

Computer Network is a group of computers connected with each other through wires, optical fibers or optical links so that various devices can interact with each other through a network.The aim of the computer network is the sharing of resources among various devices. In the case of computer network technology, there are several types of networks that vary from simple to complex level.

Advantages of Computer Networks

1. **File sharing**

   The major advantage of a computer network is that it allows file sharing and remote file access. A person sitting at one workstation that is connected to a network can easily see files present on another workstation, provided he is authorized to do so.

2. **Resource sharing**

   All computers in the network can share resources such as printers, fax machines, modems, and scanners.

3. **Better connectivity and communications**

   It allows users to connect and communicate with each other easily. Various communication applications including e-mail and groupware are used. Through email, members of a network can send messages and ensure safe delivery of data to other members, even in their absence.

4. **Internet access**

   Computer networks provide internet service over the entire network. Every single computer attached to the network can experience the high speed internet.

5. **Entertainment**

   Many games and other means of entertainment are easily available on the internet. Furthermore, Local Area Networks (LANs) offer and facilitate other ways of enjoyment, such as many players are connected through LAN and play a particular game with each other from remote locations.

6. **Inexpensive system**

   Shared resources mean reduction in hardware costs. Shared files mean reduction in memory requirement, which indirectly means reduction in file storage expenses. A particular software can be installed only once on the server and made available across all connected computers at once. This saves the expense of buying and installing the same software as many times for as many

users.

7. **Flexible access**

A user can log on to a computer anywhere on the network and access his files. This offers flexibility to the user as to where he should be during the course of his routine.

8. **Instant and multiple access**

Computer networks are multiply processed .Many of users can access the same information at the same time. Immediate commands such as printing commands can be made with the help of computer networks.

Types of Computer Network

A computer network can be categorized by their size. A computer network is mainly of four types:
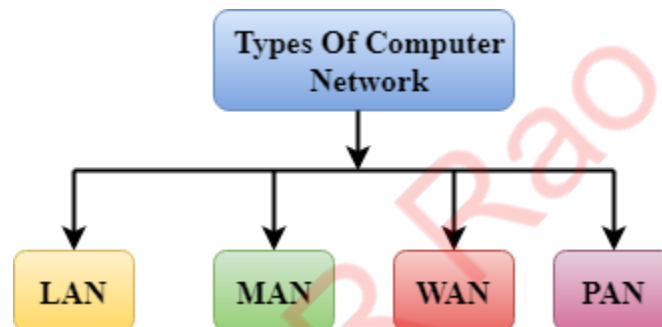
- LAN(Local Area Network)
- PAN(Personal Area Network)
- MAN(Metropolitan Area Network)
- WAN(Wide Area Network)

LAN(Local Area Network)

- Local Area Network is a group of computers connected to each other in a small area such as a building, office.
- LAN is used for connecting two or more personal computers through a communication medium such as twisted pair, coaxial cable, etc.
- It is less costly as it is built with inexpensive hardware such as hubs, network adapters, and ethernet cables.
- The data is transferred at an extremely faster rate in Local Area Network.
- Local Area Network provides higher security.

PAN(Personal Area Network)

- Personal Area Network is a network arranged within an individual person, typically within a range of 10 meters.
- Personal Area Network is used for connecting the computer devices of personal use is known as Personal Area Network.
- Thomas Zimmerman was the first research scientist to bring the idea of the Personal Area Network.
- Personal Area Network covers an area of 30 feet.
- Personal computer devices that are used to develop the personal area network are the laptop, mobile phones, media player and play stations.


MAN(Metropolitan Area Network)

- A metropolitan area network is a network that covers a larger geographic area by interconnecting a different LAN to form a larger network.
- Government agencies use MAN to connect to the citizens and private industries.
- In MAN, various LANs are connected to each other through a telephone exchange line.
- The most widely used protocols in MAN are RS-232, Frame Relay, ATM, ISDN, OC-3, ADSL, etc.
- It has a higher range than Local Area Network(LAN).
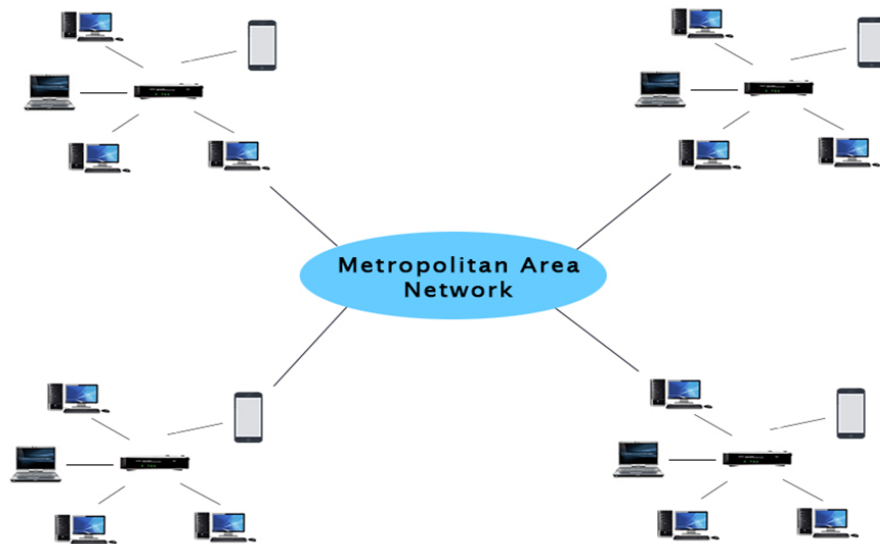
WAN(Wide Area Network)

- A Wide Area Network is a network that extends over a large geographical area such as states or countries.
- A Wide Area Network is quite bigger network than the LAN.
- A Wide Area Network is not limited to a single location, but it spans over a large geographical area through a telephone line, fibre optic cable or satellite links.
- The internet is one of the biggest WAN in the world.
- A Wide Area Network is widely used in the field of Business, government, and education.
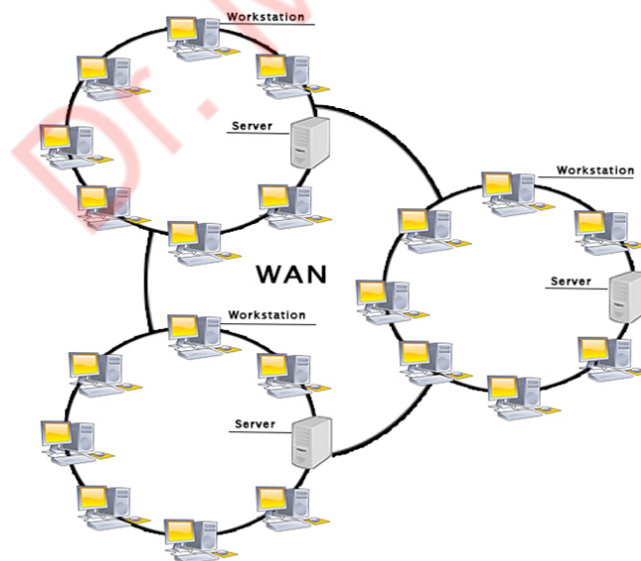
Internet

Internet is a global network that connects billions of computers across the world with each other and to the World Wide Web. It uses the standard internet protocol suite (TCP/IP) to connect billions of computer users worldwide. It is set up by using cables such as optical fibers and other wireless and networking technologies. At present, the

internet is the fastest means of sending or exchanging information and data between computers across the world.

Uses of the internet

In general, the Internet can be used to communicate across large or small distances, share information from any place in the world and access information or answers to almost any question in moments.

Some specific examples of how the Internet is used include:

- Social media and content sharing;

- E-mail and other forms of communication, such as Internet Relay Chat (IRC), Internet telephony, instant messaging, video conferencing

- education and self-improvement through access to online degree programs, courses and workshops and

- searching for jobs -- both the employer and applicant use the Internet to post open positions, apply for jobs and recruit individuals found on social networking sites like LinkedIn.

WIFI - Wireless Fidelity
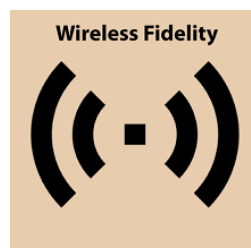
Wifi is also known as Wireless Fidelity. We are all familiar with Wi-Fi, which is available on our mobile phones, laptops, or wherever Wi-Fi is supported. Wi-Fi is a wireless networking technology that permits to connect wirelessly to a network or to other computers or mobile devices. A circular radio frequency range is used to transmit data in Wi-Fi. Wireless Fidelity (Wi-Fi) is a generic term for the wireless network in the communication norm. Wifi operates like a local area network without the use of a wire or cables.

Why is Wi-Fi used?

Without Wi-Fi, every network device would need to connect to the network with a network cable (e.g., Cat 5). Having a cable for every computer and network device makes installation and deployment difficult, especially for a home without the proper wiring. It also makes mobility (e.g., moving around the home or office) impossible. With Wi-Fi, any compatible device with the proper reception and access rights can connect to the network without having to drag a cable to that device.

Wireless Sensor Network (WSN)

Wireless Sensor Network (WSN) is an infrastructure-less wireless network that is deployed in a large number of wireless sensors in an ad-hoc manner that is used to monitor the system, physical or environmental conditions.

Sensor nodes are used in WSN with the onboard processor that manages and monitors the environment in a particular area. They are connected to the Base Station which acts as a processing unit in the WSN System.

Base Station in a WSN System is connected through the Internet to share data.
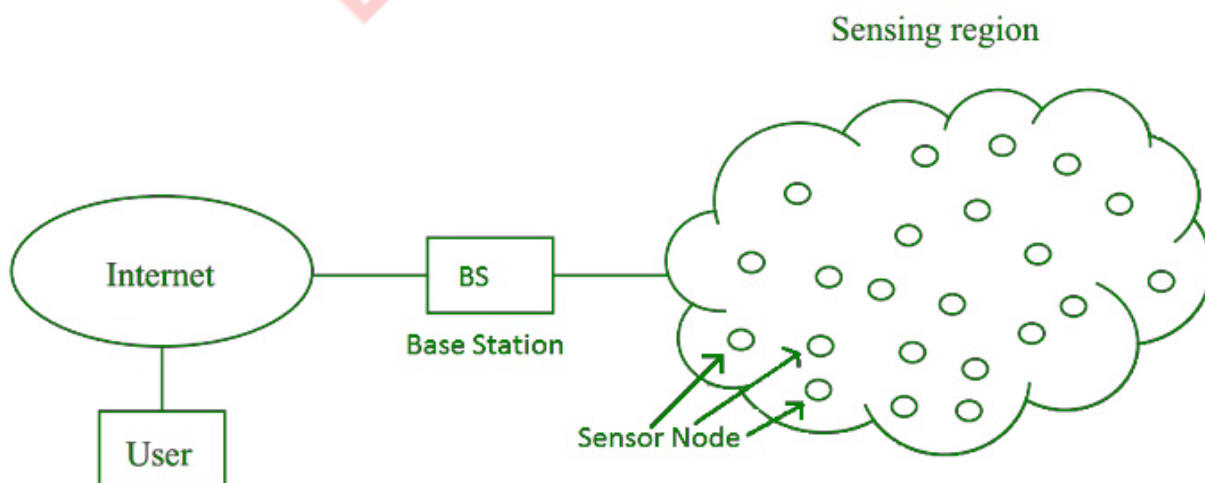
WSN can be used for processing, analysis, storage, and mining of the data.
Applications of WSN:

1. Internet of Things (IOT)
2. Surveillance and Monitoring for security, threat detection
3. Environmental temperature, humidity, and air pressure
4. Noise Level of the surrounding
5. Medical applications like patient monitoring
6. Agriculture
7. Landslide Detection

Architecture of 5G technology

Architecture of 5G is highly advanced, its network elements and various terminals are characteristically upgraded to afford a new situation. Likewise, service providers can implement the advanced technology to adopt the value-added services easily.

However, upgradeability is based upon cognitive radio technology that includes various significant features such as the ability of devices to identify their geographical location as well as weather, temperature, etc. Cognitive radio technology acts as a transceiver (beam) that perceptively can catch and respond to radio signals in its operating environment. Further, it promptly distinguishes the changes in its environment and hence responds accordingly to provide uninterrupted quality service.
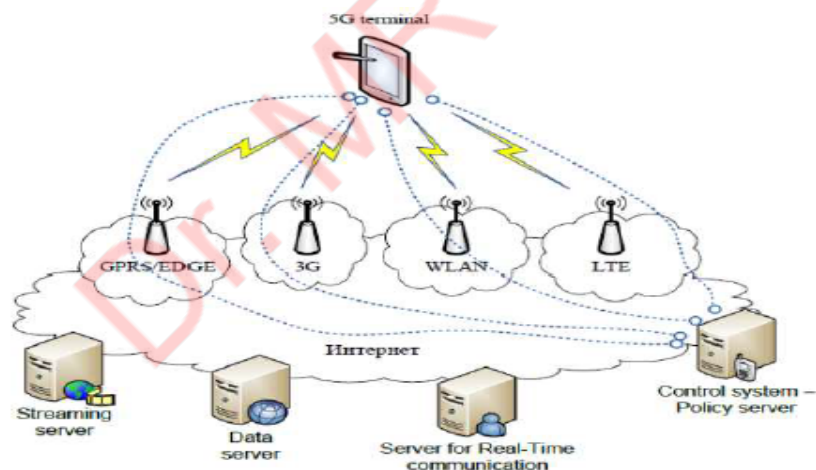
World Wide Web:

World Wide Web, which is also known as a Web, is a collection of websites or web pages stored in web servers and connected to local computers through the internet. These websites contain text pages, digital images, audios, videos, etc. Users can access the content of these sites from any part of the world over the internet using their devices such as computers, laptops, cell phones, etc.

HTML

- HTML stands for Hyper Text Markup Language

- HTML is the standard markup language for creating Web pages
- HTML describes the structure of a Web page
- HTML consists of a series of elements
- HTML elements tell the browser how to display the content
- HTML elements label pieces of content such as "this is a heading", "this is a paragraph", "this is a link", etc.

HTML Element

An HTML element is defined by a start tag, some content, and an end tag:

<tagname> Content goes here... </tagname>

The HTML element is everything from the start tag to the end tag:

<h1>My First Heading</h1>

<p>My first paragraph.</p>

HTML DOCUMENT Structure

DOCUMENT DECLARATION TAG

<html>

<head>

DOCUMENT HEADER RELATED TAGS

</head>

<body>

DOCUMENT BODY RELATED TAGS

</body>

</html>

EXAMPLE OF HTML DOCUMENT:

<!DOCTYPE html>

<html>

<head>

<title>Page title</title>

</head>

<body>

<h1>This is a heading</h1>

<p>This is a paragraph.</p>

<p>This is another paragraph.</p>

</body>

</html>

CSS

CSS stands for Cascading Style Sheets.

CSS saves a lot of work. It can control the layout of multiple web pages all at

once.With CSS, you can control the color, font, the size of text, the spacing between elements, how elements are positioned and laid out, what background images or background colors are to be used, different displays for different devices and screen sizes, and much more!

CSS can be added to HTML documents in 3 ways:

- Inline - by using the style attribute inside HTML elements
- Internal - by using a <style> element in the <head> section
- External - by using a <link> element to link to an external CSS file

Ex:

<h1 style="color:blue;">A Blue Heading</h1>

<p style="color:red;">A red paragraph.</p>

<mark>XML</mark>

- XML stands for eXtensible Markup Language
- XML is a markup language much like HTML
- XML was designed to store and transport data
- XML was designed to be self-descriptive

Example:

<note>
 <to>Tove</to>
 <from>Jani</from>
 <heading>Reminder</heading>
 <body>Don't forget me this weekend!</body>
</note>

The XML above is quite self-descriptive:

- It has sender information
- It has receiver information
- It has a heading
- It has a message body

<mark>Tools for Web Designing</mark>

Wix:

Wix is a website-building tool that does not require coding to build websites. If you want to build a website but do not have a lot of experience in it, Wix could be one of the best options

Some features of the Wix Platform include:

- It enables you to incorporate site elements using the drag-and-drop feature to create your desired website layout.
- Track the performance of the website using in-house tools and analytics. It offers the possibility of adding tools like Google Analytics, Google Ads, Facebook Pixel, etc.
- You can create an online community that can interact with each other via likes,

follows, comments, etc. This is similar to other popular social media platforms.

Squarespace:

Squarespace is another website-building tool that offers more than 100 website templates to start with

Some features of Squarespace are as follows:

- It provides various functionalities for online shopping centers, such as customer account functionality, inventory management, abandoned card recovery, and discount codes.
- You can duplicate pages or other content to expedite the website building process.
- You can provide fine-grain access to your project collaborators. The various access levels are Administrator, Store Manager, Comment Moderator, Viewer, etc.
-

WordPress

WordPress is the most known Content Management System (CMS) that can help you build a website quickly. Some features of WordPress are as follows:

- You can embed any type of media file on the page's content area. There is also no limit on the number of pages, posts, etc.
- It is an open-source platform where you can find lots of free plugins that can improve the functionality of your website.
- Working with WordPress doesn't require any prior experience in coding, and this platform is mainly used for creating blogging websites for individuals or organizations.

Google Web Designer

Google Web Designer is a website designing platform that helps build interactive and appealing webpage designs based on HTML 5. The tool also ensures that the webpage designs and motion graphics are running as expected and can be viewed on various digital devices like computers and smartphones. Some features of this tool are as follows:

- This tool helps in editing JavaScrip, CSS, and HTML.
- It offers tools that enable you to make your web layout responsive across a wide range of screen sizes.
- You can use Google Drive to publish your designs with Google Web Designer.

Canva

Canva is the most popular design platform. This tool can help you to create visuals for your website. Some features of Canva are as follows:

- You can combine multiple images and build creative montages

- Various customizable templates can be used for the creation of designs.
- This tool also uses a drag-and-drop feature to add elements to a design draft.

Social media:

Social media is an internet-based form of communication. Social media platforms allow users to have conversations, share information and create web content. There are many forms of social media, including blogs, micro-blogs, wikis, social networking sites, photo-sharing sites, instant messaging, video-sharing sites, podcasts, widgets, virtual worlds, and more.

What are the benefits of using social media?

Billions of people around the world use social media to share information and make connections. On a personal level, social media allows you to communicate with friends and family, learn new things, develop your interests, and be entertained. On a professional level, you can use social media to broaden your knowledge in a particular field and build your professional network by connecting with other professionals in your industry. At the company level, social media allows you to have a conversation with your audience, gain customer feedback, and elevate your brand.

Online social networks

This is the creation of both business and personal relationships and maintaining an interactive environment, with an aim of building a network. In social networking, profiles are built with personal details, and the content based on people's interactions. The use of social networking is advantageous in that;
- It is possible to get meaningful feedback
- Meaningful relationships are made
- The content received is in line with the interactions

Social Media
VS
Social Networking
Comparison Table

Characteristics	Social Media	Social Networking
Definition	Is the use of web-based technology as an interactive means, usually with a broad audience	It is the creation of both business and personal relationships and maintaining an interactive environment, with an aim of building a network
Target crowd	May not have a specific target crowd	Is very specific on the target crowd.
Goals	The goal is interaction through creating buzz	Build a network and also nurture created relationships.
Communication style	Is basically a message delivering channel to the users	Involves two-way communication hence developing relationships.
Timely responses	May not have timely responses as it is not fully interactive	Fosters timely responses as it involves direct communication among the parties involved