TWKSAA SKILLS CENTER

Foundation Day
30-09-2023

त्वक्सा कौशल केंद्र

TWKSAA COMPUTER NETWORK

Er. Rajesh Prasad

- आप एक सागर हो बहते नदी का जल नहीं आप एक बदलाव हो भटकाव की कोई राह नहीं
- उस रास्ते पर चलो जिस रास्ते पर भीड़ कम हो (हर काम हो कुछ अलग)
- देश की मिट्टी से करो आप इतना प्यार जहाँ जाओ वहाँ मिले खूब इज्जत और सम्मान
- छह दिन कीजिए अपना काम एक दिन कीजिए त्वक्सा को दान
- त्वक्सा एक चिंगारी हैं हर जगह जलना हम सब की जिमेवारी हैं
- **Motive: - New (RID PMS & TLR)**

"त्वक्सा कंप्यूटर नेटवर्क के इस पुस्तक में आप कंप्यूटर नेटवर्क के संबंध में सभी बुनियादी अवधारणाएँ सीखेंगे। मुझे आशा है कि इस पुस्तक को पढ़ने के बाद आपके ज्ञान में वृद्धि होगी और आपको कंप्यूटर विज्ञान के बारे में और अधिक जानने में रुचि होगी"

"In this TWKSAA Computer Network book you will learn all basic concept regarding computer network. I hope after reading this book your knowledge will be improve and you will get more interest to know more thing about computer Science".

"Skill कौशल एक व्यक्ति के पास उनके ज्ञान, अनुभव, तत्वशास्त्रीय योग्यता, और प्रैक्टिकल अभियांत्रिकी के साथ संचित नौकरी, व्यापार, या अन्य चुनौतीपूर्ण परिस्थितियों में सक्रिय रूप से काम करने की क्षमता को कहते हैं। यह व्यक्ति के द्वारा सीखी जाने वाली कौशलों की प्रतिभा, क्षमता और निपुणता को संक्षेप में व्यक्त करता है"।

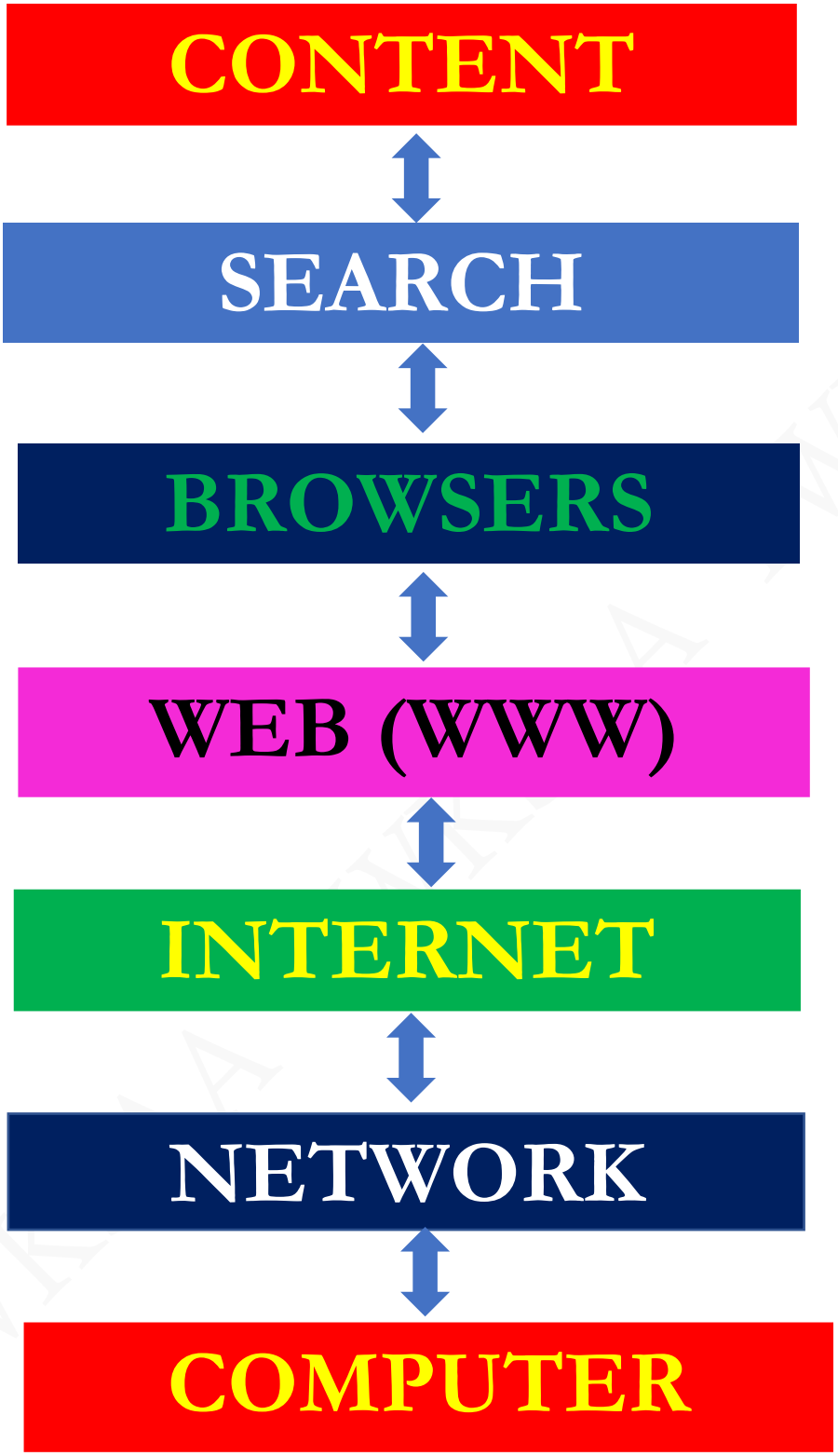
TWKSAA RID MISSION

(Research)	(Innovation)	(Discovery)
अनुसंधान करने के महत्वपूर्ण कारण:	**नवीनीकरण करने के महत्वपूर्ण कारण:**	**खोज करने के महत्वपूर्ण कारण:**
1. नई ज्ञान की प्राप्ति	1. प्रगति के लिए	1. नए ज्ञान की प्राप्ति
2. समस्याओं का समाधान	2. परिवर्तन के लिए	2. ज्ञान के विकास में योगदान
3. तकनीकी और व्यापार में उन्नति	3. उत्पादन में सुधार	3. अविष्कारों की खोज
4. विकास को बढ़ावा देना	4. प्रतिस्पर्धा में अग्रणी होने के लिए	4. समस्याओं का समाधान
5. सामाजिक प्रगति	5. समाज को लाभ	5. समाज के उन्नति का माध्यम
6. देश विज्ञान और प्रौद्योगिकी का विकास	6. देश विज्ञान और प्रौद्योगिकी के विकास।	6. देश विज्ञान और तकनीक के विकास

"TWKSAA Skills Center is Learning Earning and Development Based Skill Center."

त्वक्सा कौशल केंद्र सीखने कमाई और विकास आधारित कौशल केंद्र है।

Index


CONTENT
SEARCH
BROWSERS
WEB (WWW)
INTERNET
NETWORK
COMPUTER

Definition: - Network is a group of computers which are connected to each other.

Discover: - US DOD, ARPANET (advance Research projects agency networks)

Use: - sharing data from one device to another device. or one place to another place.

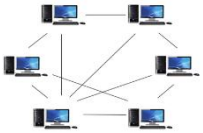
Types: - 1.PAN 2.LAN 3.MAN 4.WAN 5.GAN

Device: - Hardware devices are used to connect or make a network.

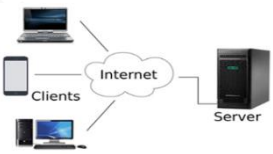
Architecture: - It is physical & logical design of the software, hardware, & protocols.

Types: - 1. Peer-To-Peer network 2. Client/Server network.

Peer-To-Peer network: - all the computers are linked together with equal privilege and responsibilities for processing the data.



Client/server network: - these types of networks are designed for end users called clients, to access the resources from a central computer known as Server.



Components: - NIC, switch, cable, hub, router, and modem.

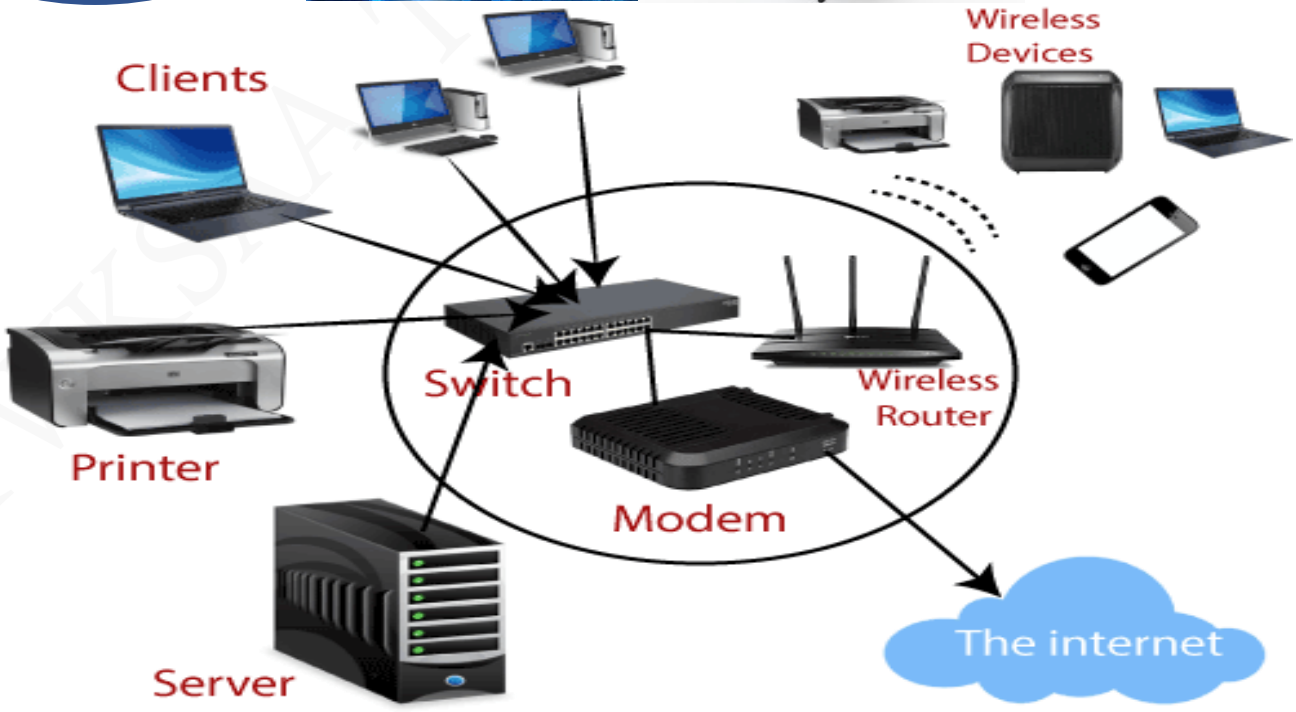
Features: - Data Sharing, Communication Speed, Backup, Scalability, Reliability, & Security

Internet: -it is network of network. Or global System of interconnected computer networks.

Server: - it is a main computer of computer network Or Centralised system, a piece of computer hardware or software program.

"NETWORK"

"TWKSAA"



TWKSAA SKILLS CENTER

Definition: - Network devices, or networking hardware, are physical devices

use: - Making a Network or it is used to connect to two or more computer.

Ex: - NIC, switch, cable, hub, router, Repeater, Bridge Gateway and modem.

Cable: - it is transmission media used for transmitting a signal.

Types: - 1. Twisted pair cable 2. Coaxial cable 3. Fibre-optic cable

Hub: -it is hardware device that divides network connection among multiple devices.

Types: 1. Active Hub (need Electricity) 2. Passive Hub (Not need electricity)

Features.: - LAN Device, less intelligence (Not Store MAC), Broadcast, port, single Collision Domain, Half-Duplex. Layer-1.

Repeater: - It is a network device. used to Boost up the weak

Bridge: - It is a network device. used to separate LAN into number of sections. Or used to connect multiple LAN network

Features: LAN Device, Intelligent (check source & destination MAC Adress), Filter data Traffic, Reduce Traffic (by separate LAN), Port Number, Bridge Table (port & mac) 2 collision Domain, Half Duplex, First Broadcast then Multicast, Layer-2.

Switch (Multiport Bridge): - it is network device that connects multiple devices on a computer network.

Features: - LAN device, Full duplex mode, Intelligence (Using Port number (8/24/48), MAC address,), CAM Table (Content Accessible Memory), First Broadcast then unicast and multicast (Private Message), Multiple collision Domain, slow [10mbps (Wireless), 100mbps(wired)], Layer-2

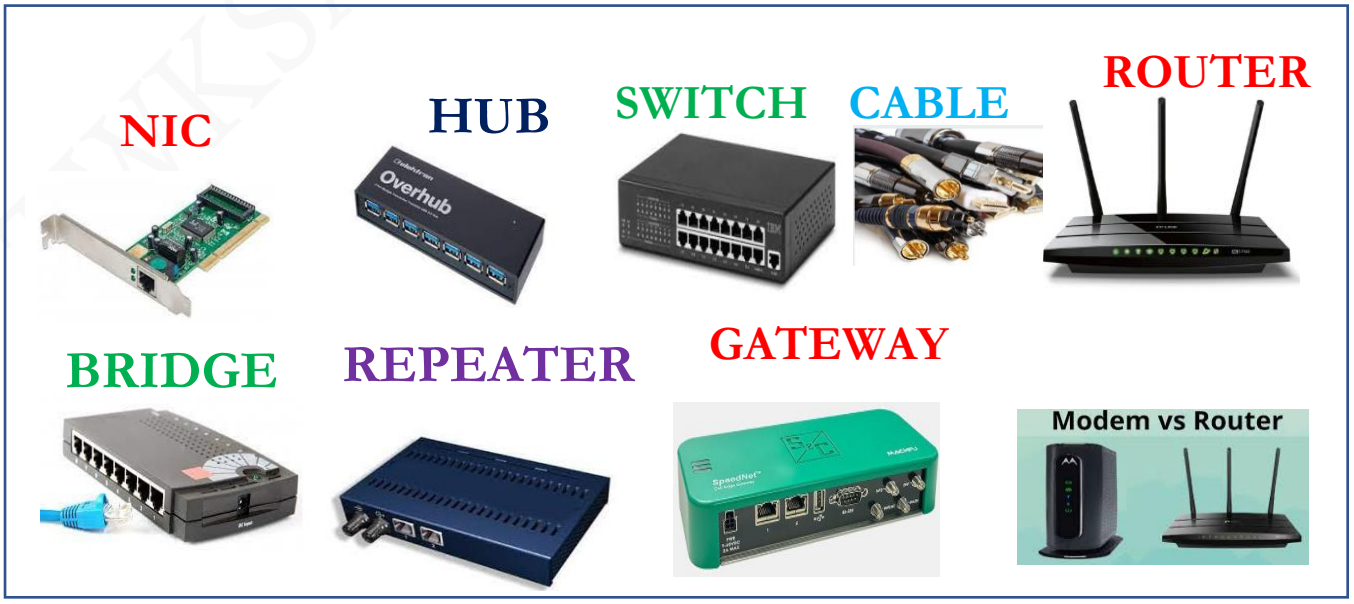
Router: - it is an internetworking device which is used to connect both LAN & WAN with an internet connection.

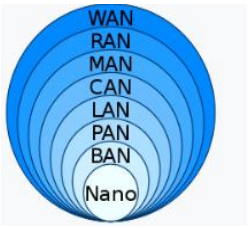
Features: - full-Duplex, No Broadcast, Highly Intelligence [Routing Table [Port Number (2/4/8) & Network ID {Use IP Address}], Works as a traffic Controller, choose congestion free path, connect two dis-similar networks, speed: - Fast 10mbps/100mbps/1gbps/100gbps, Layer-3

Gateway: - It is an interworking network device. used to connect two Dissimilar networks. (Enter Exit Point), Layer Application Layer (OSI Layer:4,5,6)

Modem: - It stands for Modulator/Demodulator. **Modulator**: - Convert Digital to Analog signal D**emodulator**: - Convert Analog to Digital signal

"NETWORK DEVICE"





Global Area Network

5.GAN (Global Area Network)

4.WAN (World Area Network)

3.MAN (Metropolitan Area Network)

2.LAN (Local Area Network)

1.PAN (Personal Area Network)

Type of NETWORK TWKSAA

Use: WW | Use: world | Use: Country | Use: Office | Use: Home | Range: 10m | Range: 150m | Range: 50km | Range: WW | Range: WW

Connected: With wire

Connected: With wire

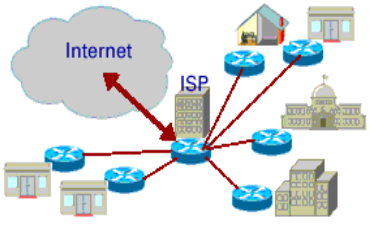
Connected: With Internet

Connected: With Internet

Connected: With Internet

Personal Area Network

Local Area Network



Metropolitan Area Network (MAN)

World Area Network

Definition: - it is layout of computer. it is show how device and cables are connected to each other.

Types: - 1. Bus 2. Ring 3. Star 4. Mesh 5. Hybrid 6. Tree

1. Bus Topology: - All Nodes/Computer are connected to a single cable.

2. Ring Topology: - Nodes are connected to two or more nodes & thus forming a single continues path for the data transmission.

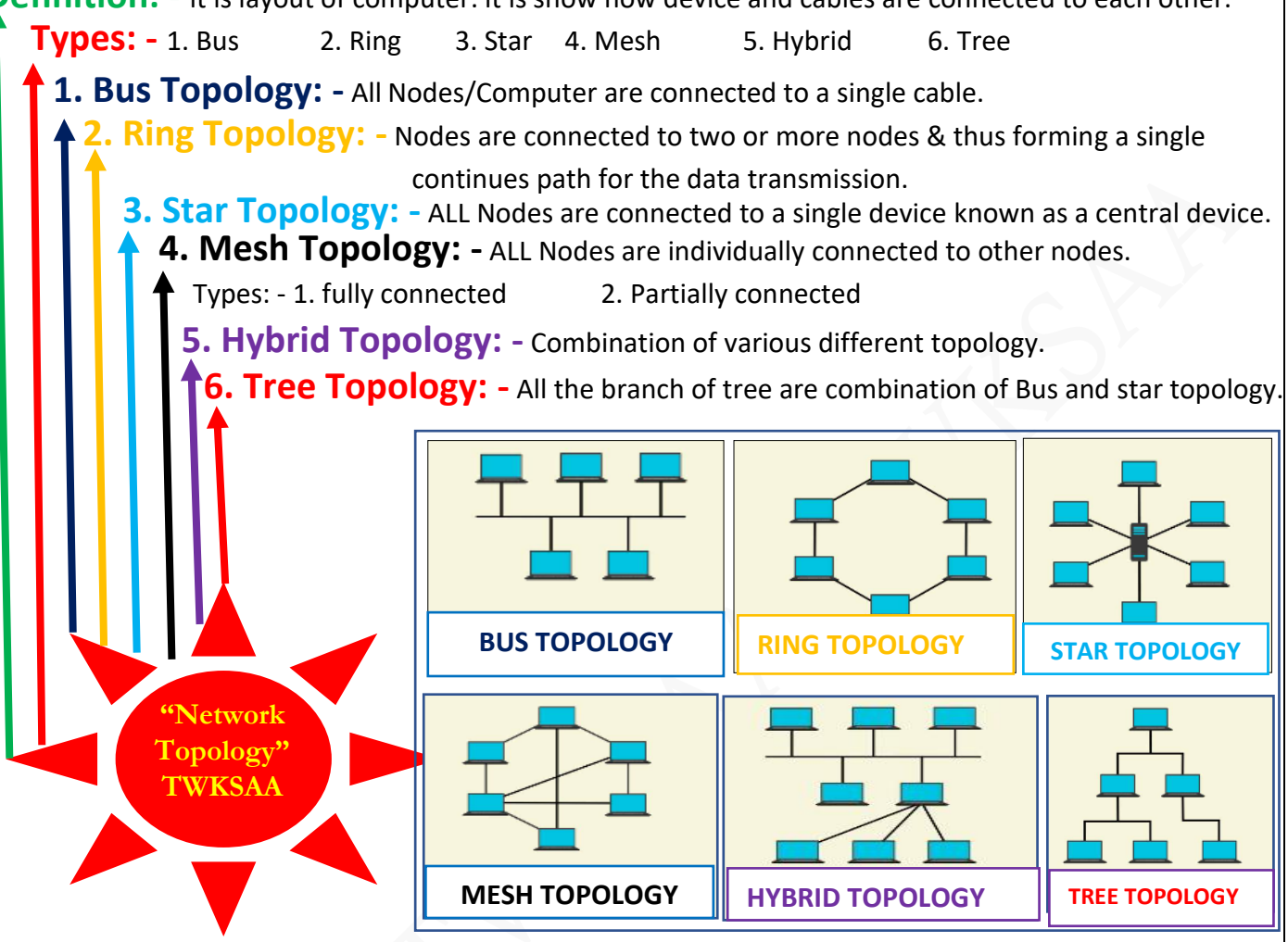
3. Star Topology: - ALL Nodes are connected to a single device known as a central device.

4. Mesh Topology: - ALL Nodes are individually connected to other nodes.

Types: - 1. fully connected 2. Partially connected

5. Hybrid Topology: - Combination of various different topology.

6. Tree Topology: - All the branch of tree are combination of Bus and star topology.



Definition: -it is a set of rules. use: - used for digital communication, formatting and processing the data

Type: -TCP, UDP, IP, HTTP, FTP, SMTP, DHCP, ICMP, POP, IMAP, ARP, RIP, NFS, FMTP, SNMP etc…

Application Layer Protocols: - HTTP: -- Hypertext Transfer Protocol**, DNS: -** Domain Name System, **FTP: -** File Transfer Protocol, **Telnet, SMTP: -** Simple Mail Transfer Protocol, **SNMP: -** Simple Network Time p.

Presentation Layer Protocols: - SSL, HTTP/ HTML (agent), FTP AppleTalk Filing Protocol, Telnet

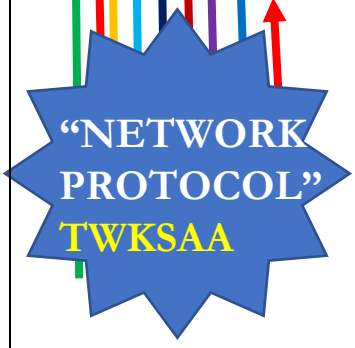
Session Layer Protocols: - RPC: - Remote Procedure Calls **PPTP: -** Point-to-Point Tunnelling P **SCP:-** Secure Copy Protocol. **SDP:-** Session Description Protocol etc..

Transport Layer Protocols: - TCP: - Transmission Control Protocol **UDP: -** User Datagram Protocol

Network Layer Protocols: - IP: -Internet protocol, **ICMP: -**Internet Control Message Protocol **ARP: -**Address Resolution Protocol

Data Link Layer Protocols: - SDLC: - Synchronous Data Link Protocol, **PPP: -** Point to Point Protocol **LCP: -** Link Control Protocol **LAP: -** Link Access Procedure **SLIP: -** Serial Line Interface Protocol

Physical Layer Protocols: - Physical layer provides an electrical, mechanical, and procedural interface to the transmission medium.



Application Layer Protocols: - HTTP :-- Hypertext Transfer Protocol**, HTTPS:- Hypertext Transfer Protocol secure DNS:-** Domain Name System, **FTP:-** File Transfer Protocol , **Telnet, SMTP:-** Simple Mail Transfer Protocol , **SNMP:-** Simple Network Time protocol DHCP:- Dynamic host configuration Protocol LDAP:-Lightweight Directory Access Protocol MGCP:- Media Gateway control protocol MQTT:- Lightweight protocol OSPF:- open shortest path first IMAP:- internet message access protocol BGP:-BORDER Gateway Protocol IRC:- Internet relay chat pop:- post office protocol PTP:- Precision Time protocol NTP:- Network time protocol; RTP:- Real time transport RIP:- routing information protocol SIP :- Session initiation protocol SSH:- Secure shell Protocol SSL:- Secure Socket Layer RTSP:- real time streaming protocol ONC/RPC:- open network computing
RPC: - remote procedure call.

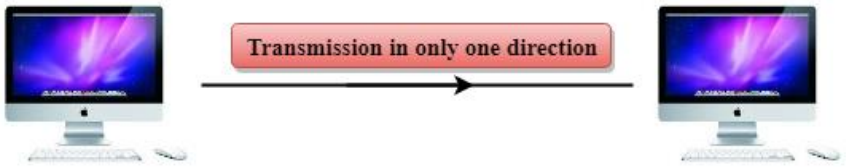
Transport Layer Protocols: - TCP: - Transmission Control Protocol **UDP: -** User Datagram Protocol
DCCP: - Datagram congestion control Protocol SCTP: -Stream Control Transmission Protocol

Network/ Internet Layer Protocols or: - IP: -Internet protocol, **ICMP: -**Internet Control Message Protocol **ARP: -**Address Resolution Protocol IGMP: - Internet group management Protocol ECN: - Explicit Congestion Notification NDP: - Neighbour Discovery Protocol

Definition: - The way in which data is transmitted from one device to another device is known as transmission mode. It is also known as Communication Mode

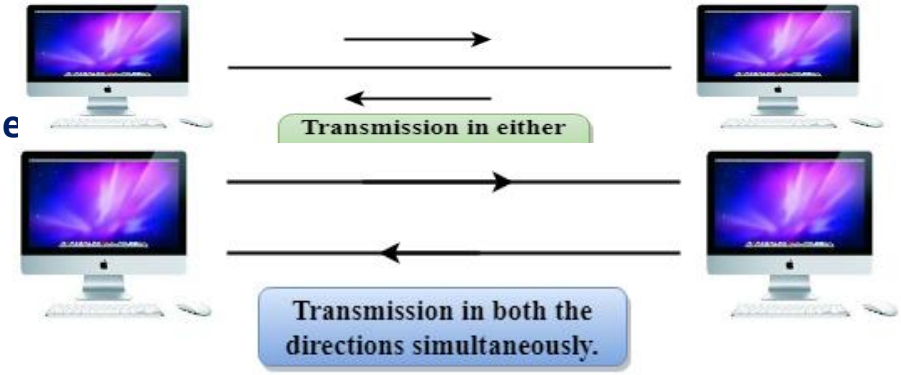
Type: - 1. Simplex mode 2. Half-duplex mode 3. Full-duplex mode

Simplex mode: -



Half-Duplex Mode: - Messages flow in both the directions, but not at the same time.

Full-Duplex Mode



Transmission modes TWKSAA

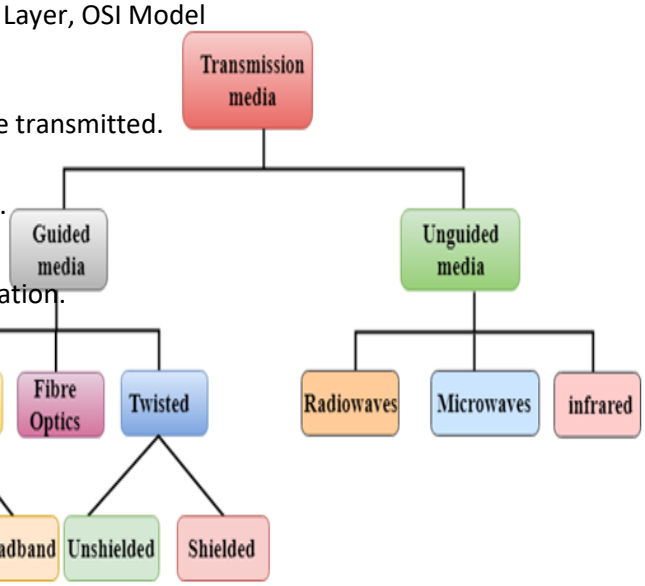
"Digital Transmission"

Definition: - Conversation of Data from Analog to Digital is known as Digital Transmission.

Transmission Media: - communication channel that carries information from sender to receiver.

Why Need: - Because Computer store data in Digital Form.

- carry the information in the form of bits. It's support Physical Layer, OSI Model
- Data is transmitted through the electromagnetic
- It is a physical path between transmitter and receiver.



❖ Guided Media is physical medium through which the signals are transmitted.

- Coaxial cable is TV wire it contains two conductors parallel.

1.Baseband: - process of transmitting a single signal at high speed.

2.Broadband: - Transmitting multiple signals simultaneously.

- Fibre optic is a cable that uses electrical signals for communication.
- Twisted pair is physical media made up of a pair of cables

1. unshielded is widely used in telecommunication.
2. shielded is a cable that contains mesh surrounding wire that allows higher transmission rate.

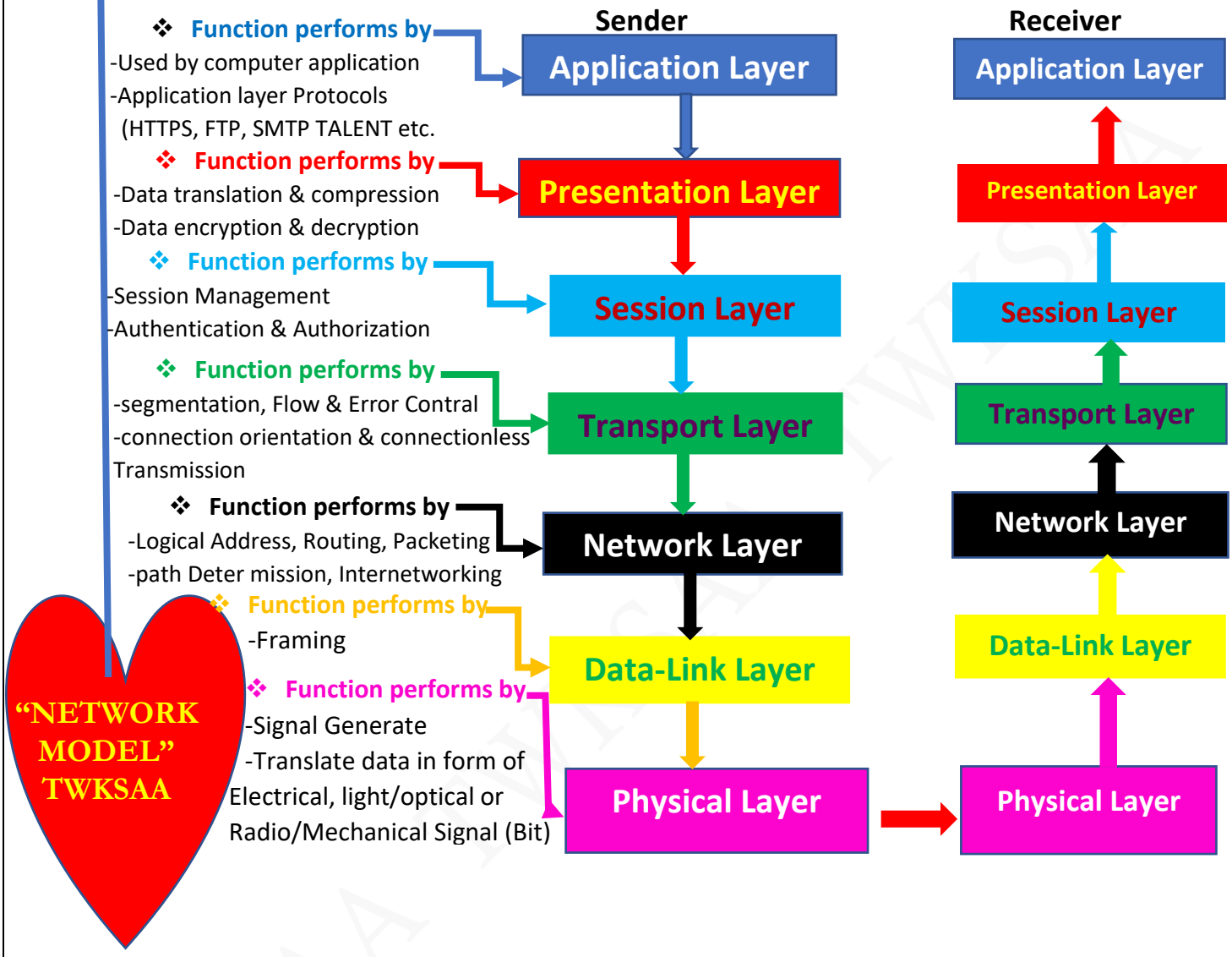
❖ unguided Media transmits electromagnetic waves without using any physical medium. (wireless)

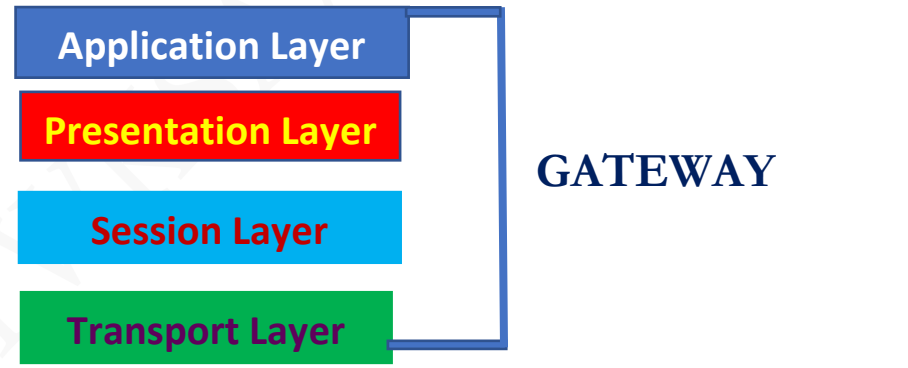
- Radio waves are the electromagnetic waves that are transmitted in all the directions of free space.
- Microwaves are of two types:

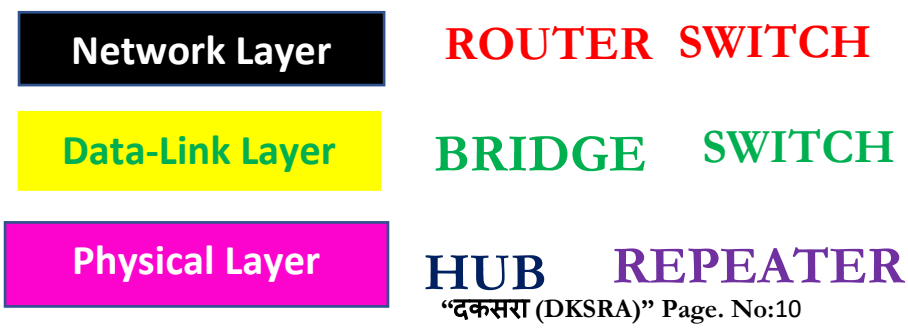
1. Terrestrial Microwave transmission is a technology that transmits the focused beam of a radio signal from one ground-based microwave transmission antenna to another.
2. satellite is a physical object that revolves around the earth at a known height.

OSI Model: - Open System Interconnection Model. OSI model was developed by the International Organization for Standardization (ISO) in 1984, it is a reference model.

- infrared transmission is a wireless technology used for communication over short ranges.







TCP/IP Model

Transmission Control Internet Protocol

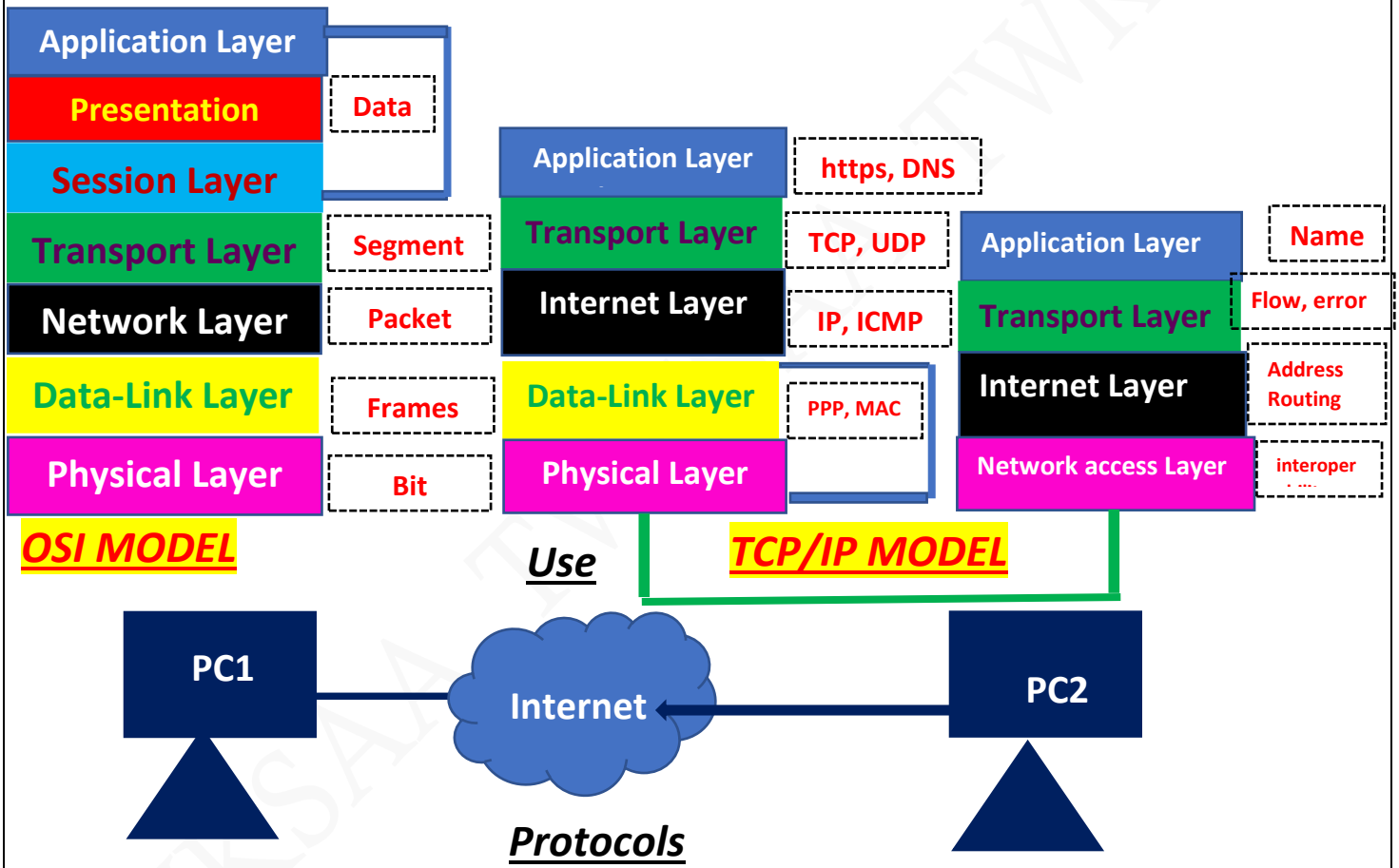
- TCP/IP model developed by American DOD (Defence of Department) in flag day 1-jan-1983. It is practical Model.

❖ what was Problem?

1. How data transmitted across a network. &
2. How data should be formatted so other network system can understand.

❖ **TCP/IP Model Features: -** 1. End Node Verification & 2. Dynamic Routing

TCP/IP Model Layers



1. Application Layer (Protocols): - HTTP/HTTPS: - Hypertext Transfer Protocol, **DNS: -** Domain Name System, **FTP: -** File Transfer Protocol HTTPS, DNS, FTP, DHCP, IMCP, IRC, NTP, POP, RTP, SSL, SSH, SMTP etc.

2. Transport Layer (Protocols): - TCP: - Transmission Control Protocol **UDP: -** User Datagram Protocol - TCP, UDP, DCCP, SCTP, RSVP, QUIC etc.

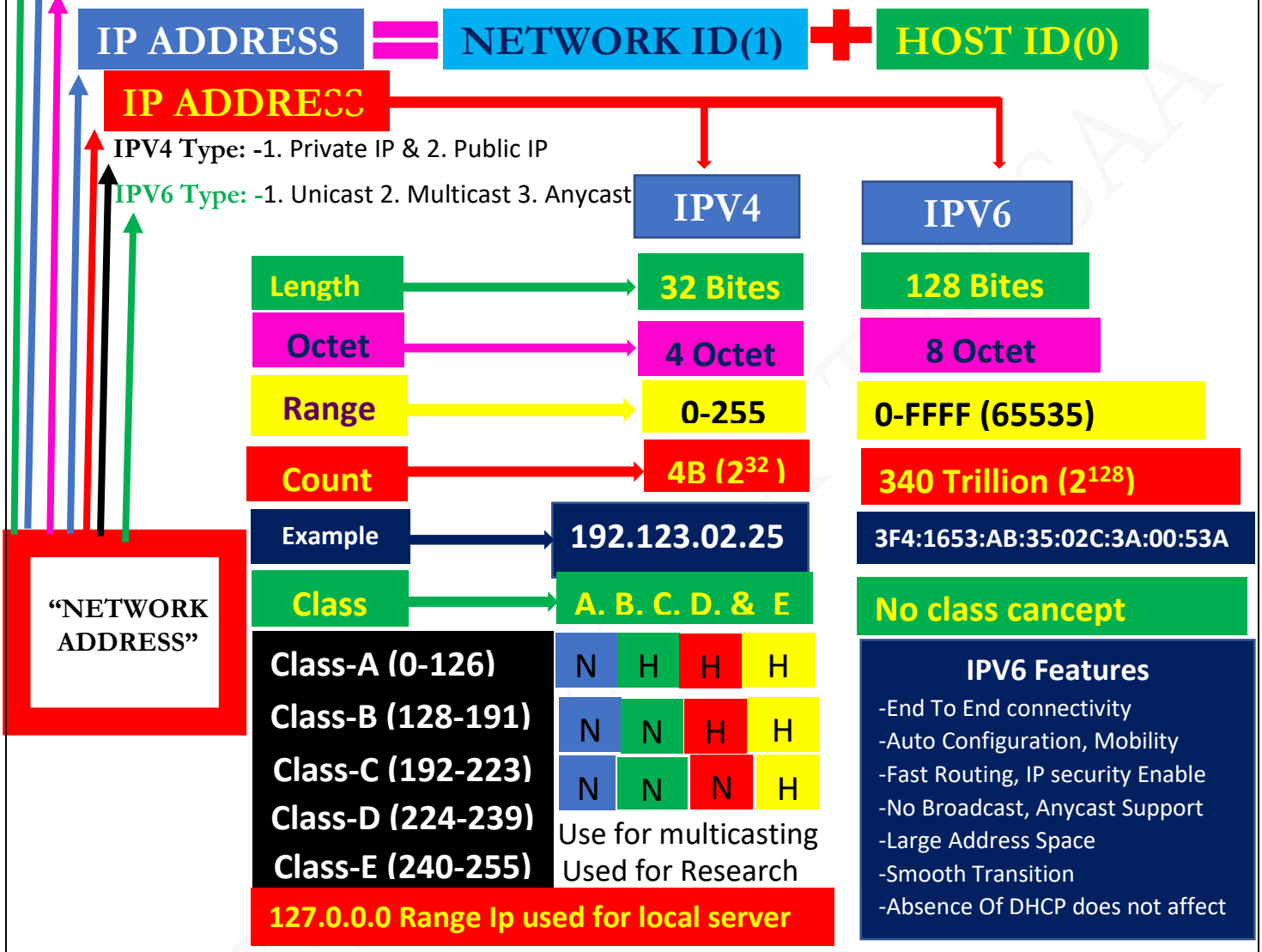
3. Internet Layer (Protocols): - IP: -Internet protocol, **ICMP: -**Internet Control Message Protocol **ARP: -**Address Resolution P IP, ICMP, NDP, ECN, IGMP, IPSEC etc.

4. Data Link Layer (Protocols): - SDLC: - Synchronous Data Link Protocol, **PPP: -** Point to Point Protocol **LCP, LAP SLIP NCP,MAC** etc.

Definition: - it is a unique physical or logical address that identifies a network node or device over a computer or telecommunications

Type: - 1. IP Address or Logical Address 2.MAC Address or Physical Address.

IP Address: Internet Protocol is a unique address that is used to identify computers on the internet.



MAC Address

Media Access Contral address

Definition: - **it is a Globally unique physical and Permanent address that identifies device over a Network.**

- **MAC address also known as Physical address or Hardware Address or BIA(Burnt-in) address.**

Length=48 Bits

48bits = 24bits + 24bits

MAC address= Organization + Device

MAC address= OUI + Vendor Specific

- OUI provided by IANA (Internet Assigned Number Authority) Organization.

MAC Address Representation: **it is represented as hexadecimal format**

- 12 Hexadecimal (0-9, A, B, C, D, E, F)

Format

mm: mm: mm: ss: ss: ss

mm-mm-mm-ss-ss-ss

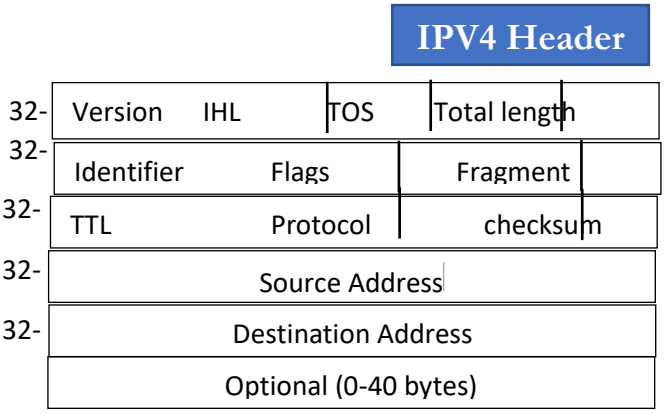
mmm. mmm. sss. sss

- MM=Organisation (OUI {organization unique identifier})
- Ss=device Model

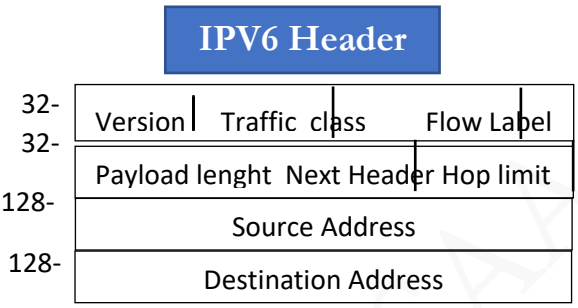
Ex: - Dell=AE: 40: FF: 00: 00: 01

aB-df-2b-33-39-3a

a4c.def.34a.bc6



-IPV4 header is 20 bytes long
Version: - represent version of IP
IHL: - Internet Header Length
TOS: -Types of Service
Total Length: - Length of entire packet
TTL:- Time to live



-IPV6 header is 40 bytes long
Version: - represent version of IP
Traffic Class: -classified the Priority
Flow Label: - set of Packets in same
Payload Length: -used to tell Routers
Next Header: - Protocol used by packet
Hop Limit: - Avoid the looping

Subnet:- it is a technique to use for save IP address.

Subnetting: - network within network or logically division of IP address

Why need Subnetting: - for save Ip address and dividing a network into two or more network.

Class-A IPV4 (0-126) CIDR=8 Network=NNNH Subnet Mask= 225.225.255.255(H)
Example: - 12.0.0.0
Subnet Mask= 255.0.0.0
Subnet id=12.0.0.0/12

Class-B IPV4 (128-191) CIDR=16 Network=NNHH Subnet Mask= 225.225.255(H).255(H)
Example: - 190.201.0.0
Subnet Mask= 255.255.0.0
Subnet id=190.201.0.0/16

Class-c IPV4 (192-223) CIDR=24 Network=NHHH Subnet Mask= 225(N).225.255.255
Example: - 197.10.10.0
Subnet Mask= 255.255.255.0
Subnet id=197.10.10.0/24

Subnet

CIDR: - Classless inter domain Routing it is a method for allocating IP address and for IP Routing

History: - IETF (International Engineering task force) introduce in 1993

Purpose: - For replace the previous classful network address sting architecture on the internet CIDR is Based on Variable length subnet masking (VLSM)

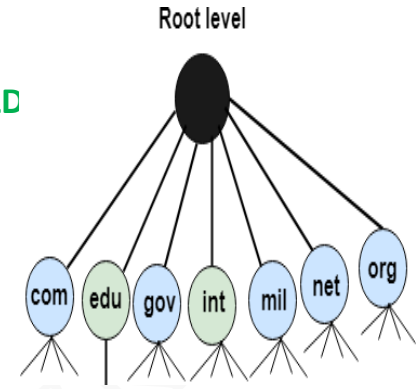
CIDR Notation: - it is a compact representation of an Ip address and its associated network mask
This notation was invented by "pill kam" in 1980

Example: - 198.36.100.0/24 Subnet mask=255.255.255.0

CIDR

address of website; it is a string & Unique name in the world.

ntify services provided the internet such as website, email. Networking Contexts, application addressing purpose identify domain or Ip resources.



Types: -1. Top-level Domain **(TLD)** 2. Second & low-level Domain (SLD)

TLD: - It is two types 1. Generic TLD**(GTLD)** 2. Country Code TLD **(CCTLD**

GTLD: - .com, .net, .org, .edu, .mil, .int, .biz, & .gov,

CCTLD: - .IN, .US, .CN, .PK, etc.

SLD: - ex:- www.twksaa.ra.org where .ra is SLD

Fully Qualified Domain Name: - www.twksaa.org.in.

Partially Qualified Domain Name: - www.twksaa.org.in

1st Domain Name: - Symolics.com in 15.03.1985

1st Edu Domain Name: - Berkeley.edu in 24.04.1985

DNS: - Domain Name System is a host name (Domain name) Ip address translation service.

Use: - it is used to Translate Domain name to Ip address vice-versa. DNS was introduced on ARPANET in1983 and Published by Internet Engineering Task Force (IETF). Managed BY ICANN (Internet Corporation for Assigned Names and Numbers)

Name Space: - 1). Flat Name Space 2). Hierarchy Name Space

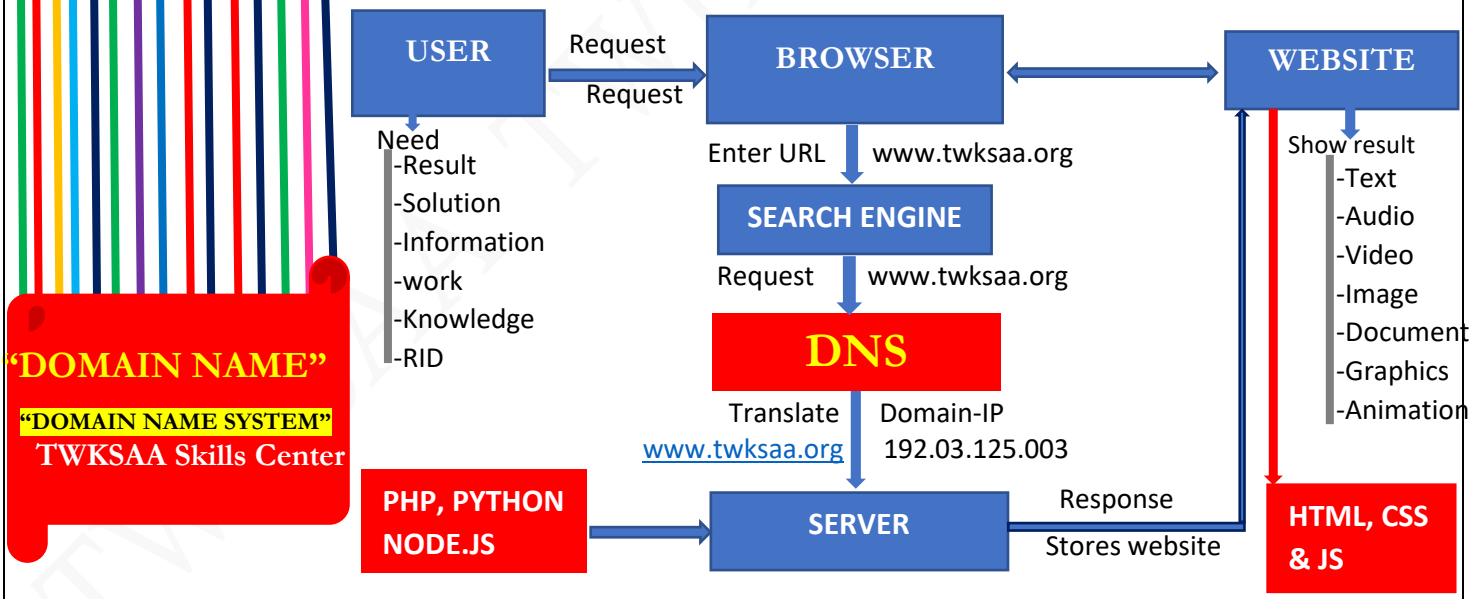
Flat DNS Name Space: - Name is assigned Sequence of character without any Structure.

Hierarchy DNS Name Space: - Name Space can be decentralised Hierarchy of Name Servers a).Root name server b).Top-level Server c).Authoritative Name Server.

DNS Resolver Method: - 1) Iterative Method 2). Recursive Method

Iterative Method: -Root name server involved at a single time.

Recursive Method: - Root name server involved from starting to end (Request-Response)



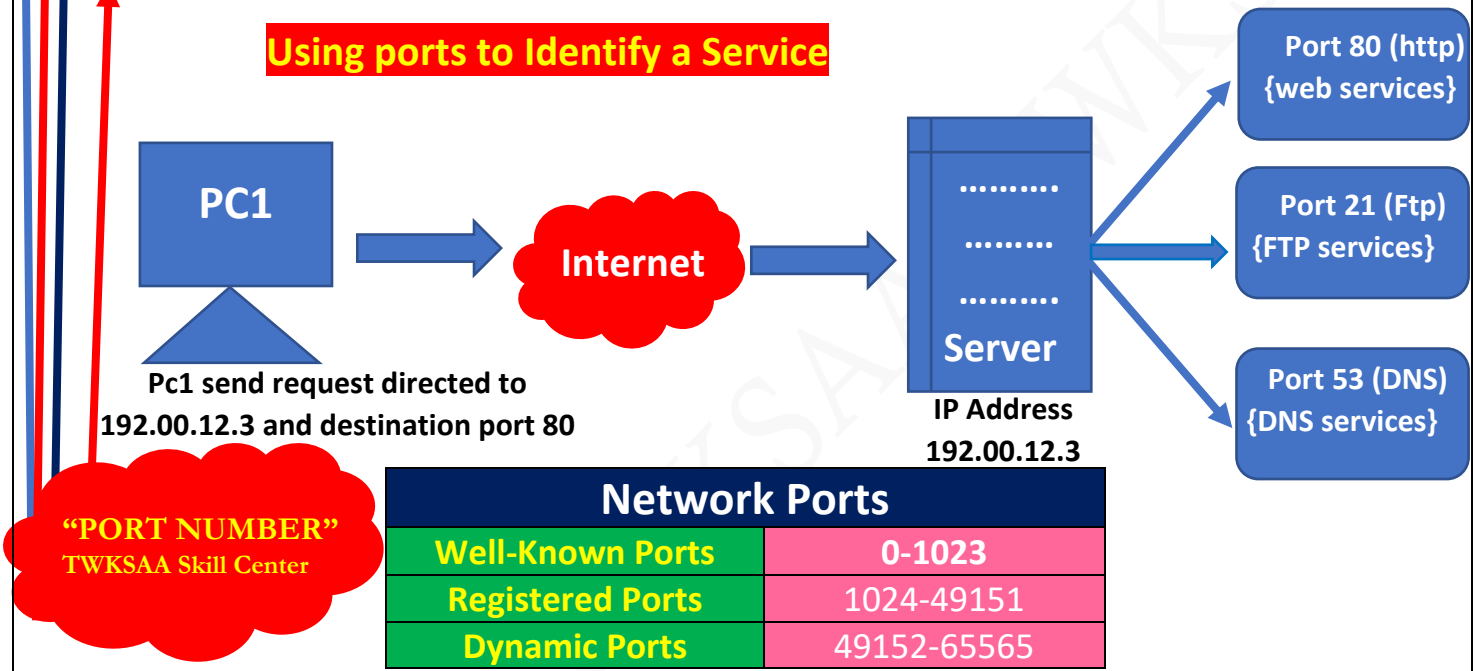
Definition: - Port Number is assigned to uniquely identify a connection endpoint and to direct data Specific Service. it is logical Number that identifies a specific process or a type of network service. Manged by (IANA)

Port Number is a 16-Bits, Port is connection on computer to peripheral Devices.

Range: - (0-65535) 1). Well-Know Ports (System Port) {0-1023} 2). Registered Ports {1024-49151} 3). Dynamic or Private Ports (49152-65535)

Service	DNS	HTTP	HTTPS	FTP	SSH	TALNET	SMTP	DHCP	POP3
Port Number	53	80	443	20 &21	22	23	25	67 & 68	110

Types: - 1). Serial Port: - Interface to connect using serial port 2). Parallel Port: - Used Parallel Port



Network Ports	
Well-Known Ports	0-1023
Registered Ports	1024-49151
Dynamic Ports	49152-65565

Definition: - it is network of network. Or the global System of interconnected computer networks

use: - it is used to communicate between network & device by using the suite of network Protocols.

Discover: - US DOD, ARPA (advance Research projects agency) in 1969 1st Internet ARPANE

How it's Work: - 1. Packets & 2. Protocols

ICANN: - Internet Corporation for Assigned Names and Numbers "Organisation" responsibl (Domain names, IP addresses, application port numbers & other parameters.

ISP: Internet service Provider, it's provide internet **1). Tier-1** {Globally} **2).Tier-2** {Countries wise} **3).Tier-3** {Local}

IPS: - Internet Protocals Suite **1). TCP/IP** Model **2). OSI** (opent System Interconection) Model

RIR: - Regional Internet registries established five regions of the world for assign IP address & other Internet parameters. **1. AfriNIC:**-African Network Information Center **for Africa**, **2.ARIN:**-American Registry Internet Numbers **for North America 3.APNIC:**-Asia-Pacific NIC **for Asia 4. LACNIC:**for Latin America &**5. RIPE NCC:**-Réseaux IP Européens – Network Coordination Centre **for Europe**

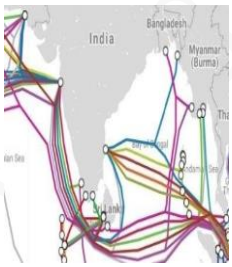
Parameter's: 1). Network 2).IP Address 3). Protocols 4).Domain Name 5).Port Number & 6).ISP

Access: 1).Cellular telephone (3G,4G, 5G, …) 2).Wi-fi 3).Satellite 4).Fibber Optics 5).Coaxial cable 6).Copper wire 7).DSL(Digital Subscriber Line) 8). BPL (Broadband over powerless 9).DLL

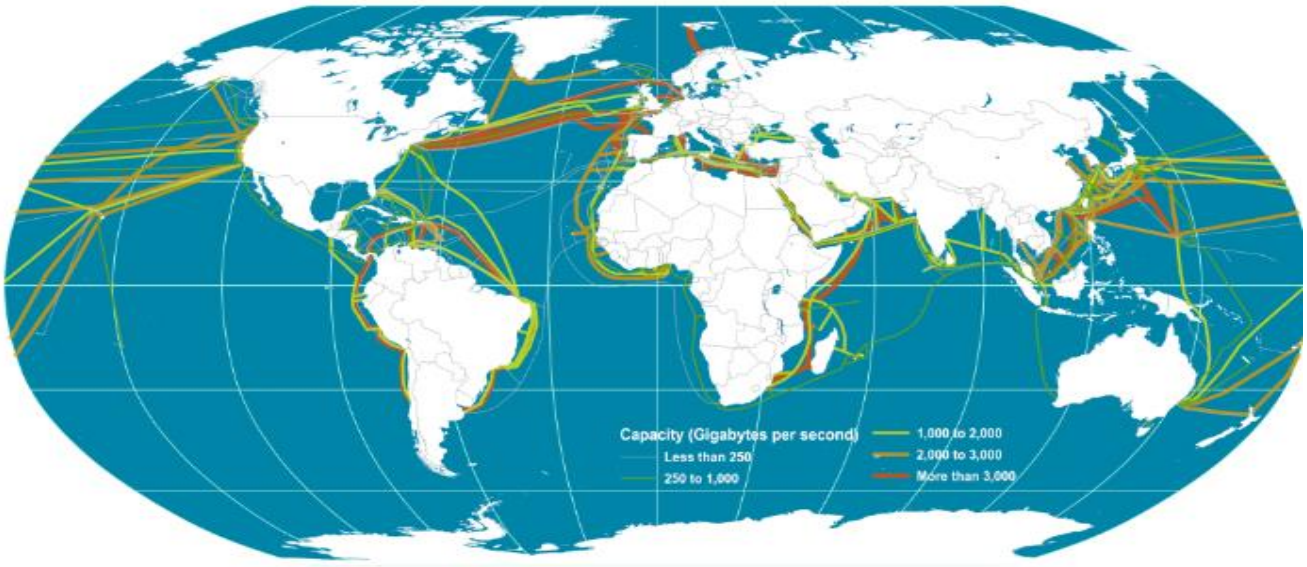
Application: - www, Social Media, Mobile Application, mail, File Transfer, Online work etc…

Internetworking Device: - Router, Switch, Internet Gateway etc..

"INTERNET"



Global Submarine Cable Network



TWKSAA SKILLS CENTER

Definition: - www is a global collection of documents and other resources linked by hyperlink and URLs.it is known as web, it is an information system technology enabling.

History: - computer scientist "Tim Berners Lee" at CERN {(European Organization for nuclear Research) it is a Intergovernmental org. established in 1954)} invented in1989.1st proposal was written & working system implemented by end of 1990 including www Browser & http server.

Function: - 1).HTML 2). Linking 3). www prefix 4). Scheme specifiers 5). Web Page 6). Website 7). Browser 8). Search Engine 9). Server 10). Cookie 11). Deep web 12). Caching 13). Security 14). Privacy 15). Standards

HTML: - Hypertext Markup Language it used for Creating Web page & Web Application.

Linking: - it is interconnecting the web page via Hyperlinks.

www prefix: -it is like .com, .org, .net etc. **Scheme specifiers: -** http:// or https://

Browser: - it is a software responsible for open the website

Web Page: - A webpage is an HTML document on the WWW. **Website: -** it is a collection of web page.

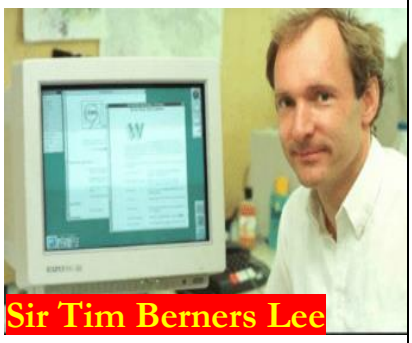
Search Engine: - it is a software program/system Software Desigen to carry out the web search.

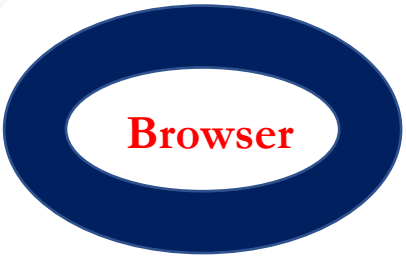
Server: - it is a software or hardware device that accept & respond to request made over a network.

Cookie: - it is a small piece of data sent from the website and stored on the user's computer by the web browser while user is browsing. It is stateful

Deep web: - it is an invisible web or hidden web are parts of www whose contents are not indexed by standard web search engine. Computer scientist "Michael K. Bergman" is credited with deep web in 2001

Caching: - A web cache is a server computer located on the public internet. It is stores recently accessed web page to improve response time for user's


Sir Tim Berners Lee



Definition: - Browser is an application software or a software Program.

Use: - Browser is used for accessing websites fetch content from the www or from local storage and display on the user's Device

History: - www was the 1st Browser created in 1990 by sir Tim Berner Lee Mosaic-1993 Netscape-1994 Internet Explorer-1995 Opera-1995 Mozilla Firefox-2004 Safari-2003 Chrome-20008 Edge-

Features: - Automatically log user's Browsing history, set Book Marks, Customize Browser with Extensions, User password, Sync Service, Web Accessibility, open Multiple Pages, Back & forward Bottoms, Refresh, Reload Stop, Home bottom, Address Bar to IP URLs and Security etc.

TWKSAA SKILLS CENTER

Definition: - A search engine is a software system designed to carry out web searches. Or it is set of Program.

use: - it is used to search www in a systematic way for particular information specified in a textual web search query.

History: - 10 sept 1990 is D.O.B of 1st Search Engine "Archie" by Alan Emtage (note: - note index Concept)
1st Popular Search Engine was Yahoo! (Founded by Yang and David Filo in 1994) Google Search Engine (Founded by Lary Page & Sergey Brin in 1998) used Page Rank Algorithm, Indexing & Hyperlinks

Example: - Google, Bing, Yahoo, Baidu, DuckDuckGo, Yandex, Ask.com, AOL Search, Ecosia, Qwant etc.

Types: - 1. Conventional 2. Text-Based 3. Voice-Based 4. Multimedia Search 5. Q/A 6. Clustering 7. Research System

Conventional (Library CatLog): - Search by keyword title, Author etc.

Text-based & Voice-based: - Google, Bing & Yahoo! Search by keyword

Multimedia Search: - (QBIC, Web seek, safe) Search by visual Appearance (Shapes, colours)

Q/A: - Stack Exchange, NSIR search in (Restricted) Natural Language.

Clustering: - Vivisimq, clustery **Research System: -** Lemur, Nutch

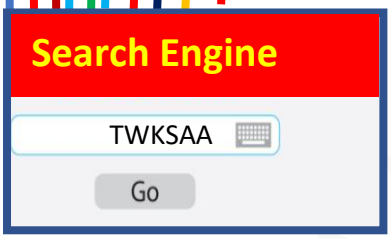
How Search Engine work

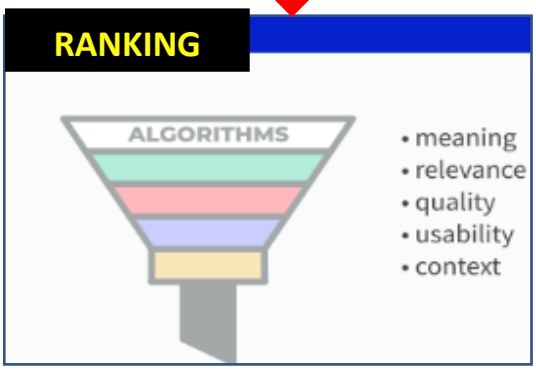
Crawling: - also known as Spider or Spider Bot it is internet bot that systematically browses the www and that is typically operated by search engine for the purpose of web indexing.

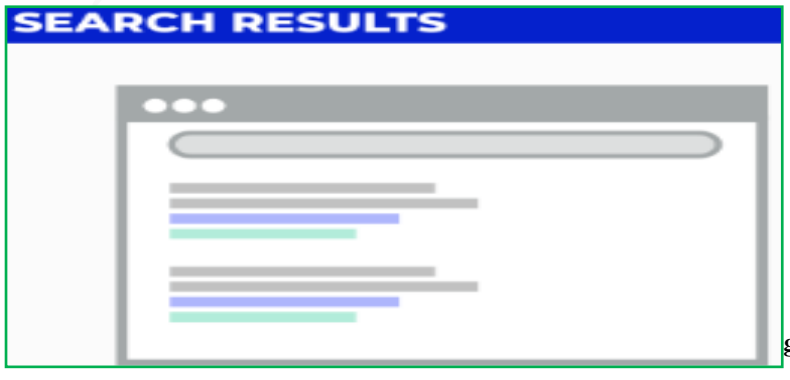
Indexing: - Collecting, Parsing and Storing of Data

Ranking: - position a website or webpage holds within a specific search engine results page.

Search Results: - it is a query that a user enters into a "web search engine "to satisfy the information needs







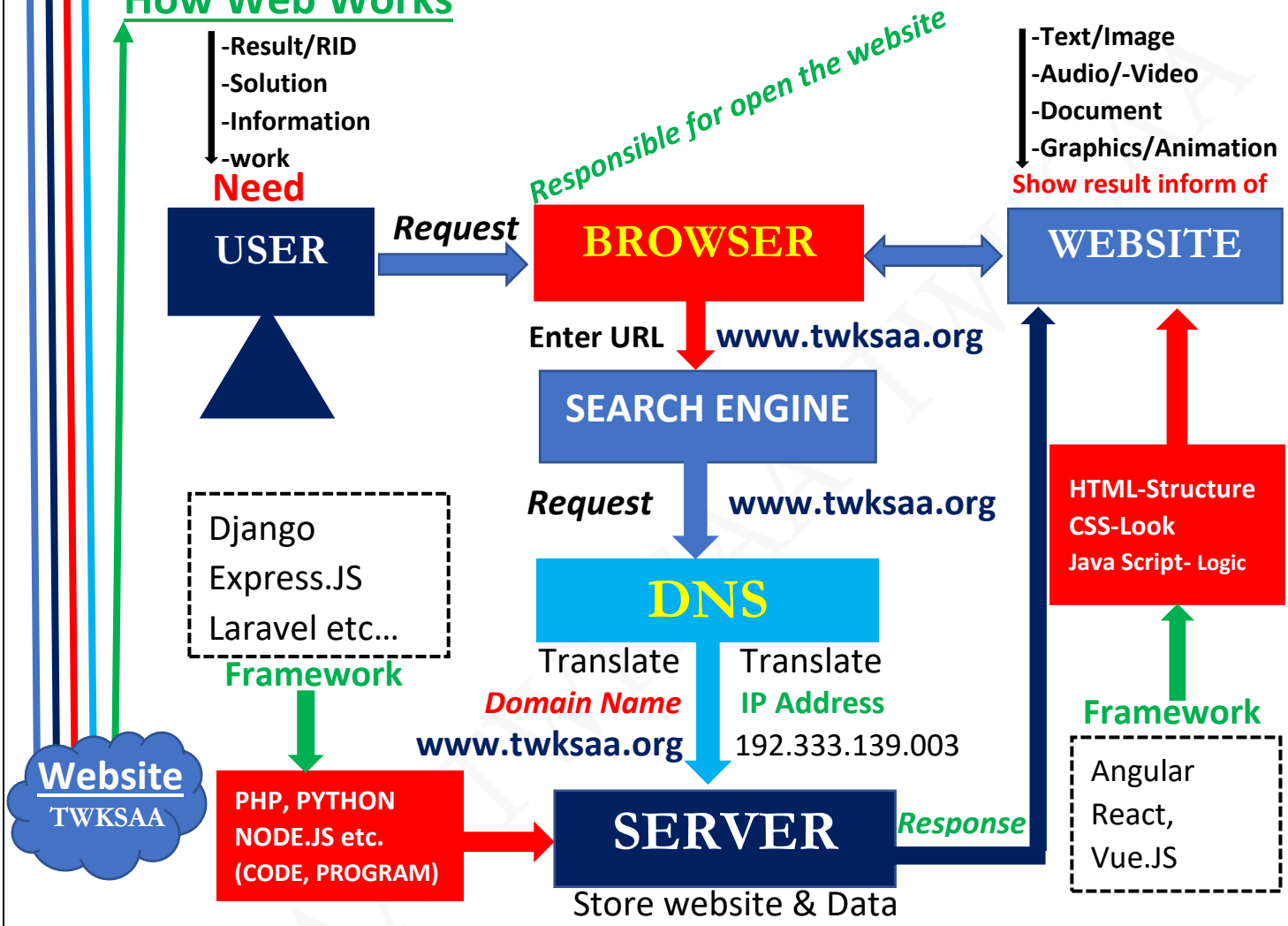
Definition: - website is collection of web page and related content that is identified by a common "Domain name"

Types: - 1). Static Website 2). Dynamic Website

Static Website: - consists of a series of HTML files, each one representing a physical page of a website.

Dynamic Website: -change or customizes itself frequently and automatically.

How Web Works



Web: The web is a global system of interconnected computer networks that use the Internet protocol suite to access and share information. It allows users to access and share information over the Internet. Or Web is virtual directory on web server. Or Web [Portion of Internet]

Site:

- Site [Location] A site refers to a location or a collection of web pages hosted on a web server and accessible through a specific domain or URL.
- A site refers to a specific location on the internet identified by a unique domain name and accessible via a web browser.

Page:

- A page refers to a single, individual document or resource on the web.
- It is a single document or resource that is part of a website and can be accessed through a specific URL?

Web Page:

- A web page is a single hypertext document available on World Wide Web (WWW).

- Hyper Text document that contains information beyond what is displaying.

Definition: - it is a software or hardware device that accepts and responds to requests made over a network.

The term "Hyper" is derived from a Greek term, which means "beyond"

use: - it is used for store, send, & receive data. Responsible for Client/user, Http/Https Request & Response.

Types: - web server, application server, mail server, FTP server, real-time communication server, & virtual server.

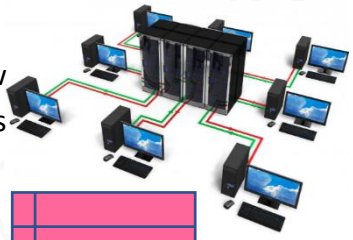
World 1st web server CERN httpd (later renamed to W3C httpd) was invented in 1989 by Tim Berners-Lee.

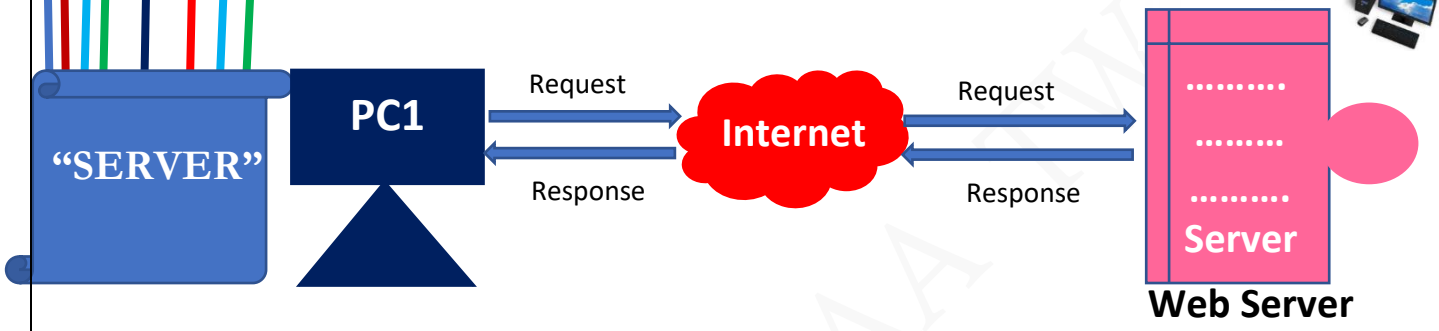
Parameter's: - Network, Internet, Data Centre, Host, Port, Protocol, Hardware, O.S, &Power.

Hardware: - RAID (Redundant array of independent) Disk, ECC (Error Correction Code) Memory,

OS: - Like Linux, Unix, Window Server (2016), MacOS Server etc…

Features: - Availability, Reliability, Durability, Fault Tolerant, Low Failure Rates, Uptime, Uninterruptible, H/w Redundancy, Clutter's or Server Form, Dual Power Supply, & Energy consumption





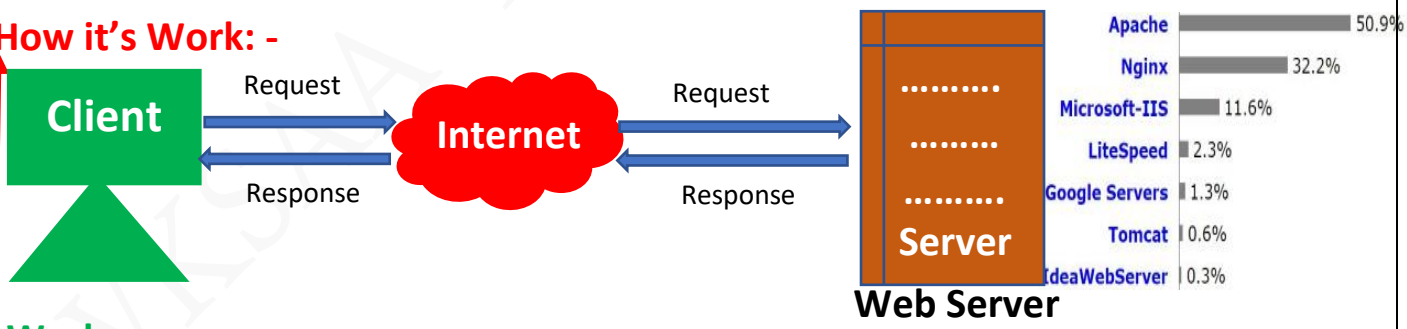
WEB SERVER

Definition: - web server is computer software and hardware that accepts requests via HTTPS (IP created to distribute web content). A web server is a dedicated computer responsible for running websites

use: - it is used to process and manage HTTP/HTTPS requests and responses from the client system. A web server Store and protect website data.

Example: - Apache (Http server project), Microsoft IIS, Nginx, Apache Tomcat etc.

How it's Work: -



Work: - **1. Receive Client Request/Response** (Read & Verify, URL-Normalization, URL Mapping, URL Path Redirections) **2. Executes or refuse HTTP Request Method** (URL Authorization, URL Redirection, Directory Index File Regular Files) **3. Response/Replies** (HTTP Response, Logs)

"WEB SERVER"

Features: - 1. Static Content serving 2. HTTP/HTTPS 3. Logging 4. Dynamic Content Serving 5. Virtual Hosting 6. Authorization 7. Content Cache 8. Large file Support 9. Bandwidth throttling 10. Rewrite Engine 11. Custom Error Page 12. Security

HTTP/HTTPS

Hypertext Transfer Protocol Secure

HTTPS: -. HTTP is a client-server Protocol. it is State less but not session less.

Use: - information of particular website is exchanged between web server & web Browser.

Components: -

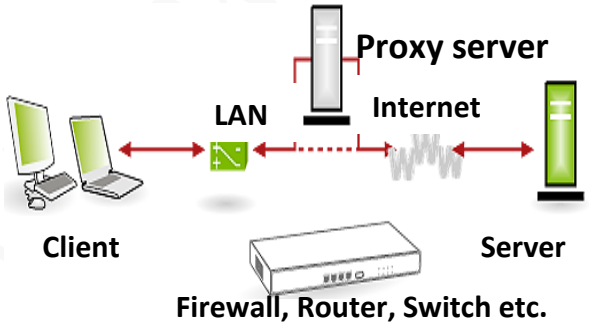
Client: - user agent is any tool that acts a behalf of the user Browser is always entity initiating request.

Proxy: - Between web Browser and the server numbers computers and machines relay the HTTP Message those operating at the application are called Proxies.

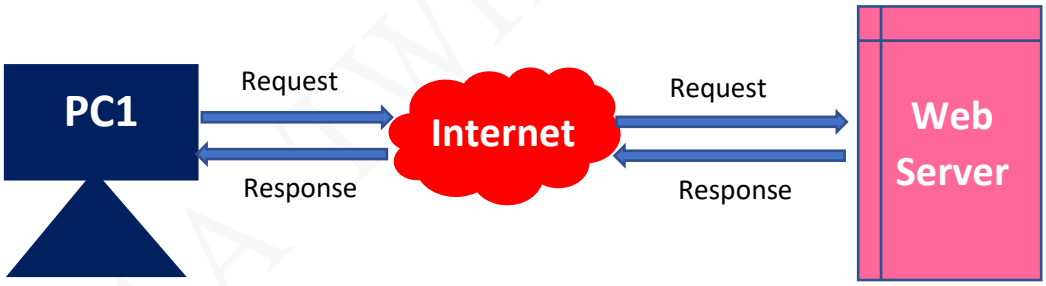
Example: -Firewall, Gateway, Router, Switch etc.

-Proxies perform following functions: -

1.caching: - like the history and Browser cache
2.Filtering: - like an antivirus scan
3. Load Balance: - to allow multiple servers to sever Load.
4.Authentication: - to control access to different resource.
5.Logging: - allowing the storage of historical information



Server: - it is a software or h/w device that accepts and responds to requests made over a network.



Difference Between HTTP AND HTTPS :-

Http: -

-http URL begins with htttp://
-http Works at application level
-http is not encrypted (because send in plain text)
-http not required any certification
-Http use port no 80

Https: -

-https URL begins with htttps://
-https Works at Transport level
-https is encrypted
-http required SSL certification
-Http use port no 443

URL

Uniform Resource Locator

Definition: - URL is a web address or location that pointing to a specific website.

Use: it is used to describe the identify of resource on internet. URL is a type of URI (Uniform Resource Identifier. It is used only for locating web pages.)

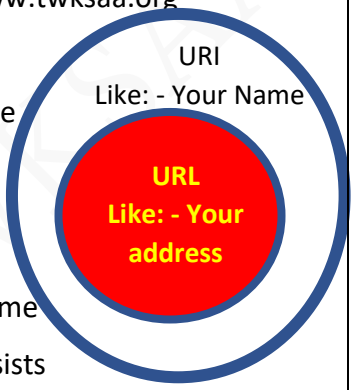
History: - URL introduced by time Berners lee in 1985 **Example: -** https://www.twksaa.org

Component's: - path, domain, hash, string query & protocols

URL Contains: - 1. Port Number 2. Protocols 3. address 4. Location of service 5. Fragment 6. Directory Structure of server

URL Located: - Address bar or search bar at the top of the Browser

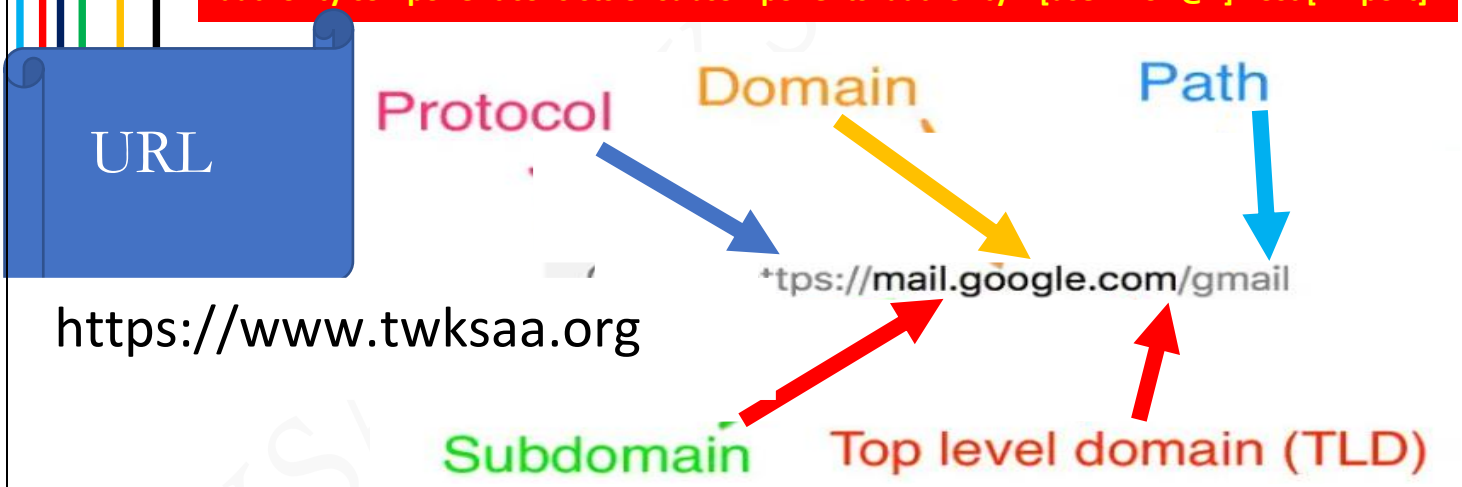
Format: - Combines the pre-existing system of domain name with file path. syntax //: - Slashes are used to separate directory and filename



HTTP URL conforms to syntax of a generic URI. URI generic syntax consists of five components organized hierarchically in order of decreasing significance from left to right

URI = scheme ":" ["//" authority] path ["?" query] ["#" fragment]

authority component consists of subcomponents: authority = [userinfo "@"] host [":" port]



DHCP

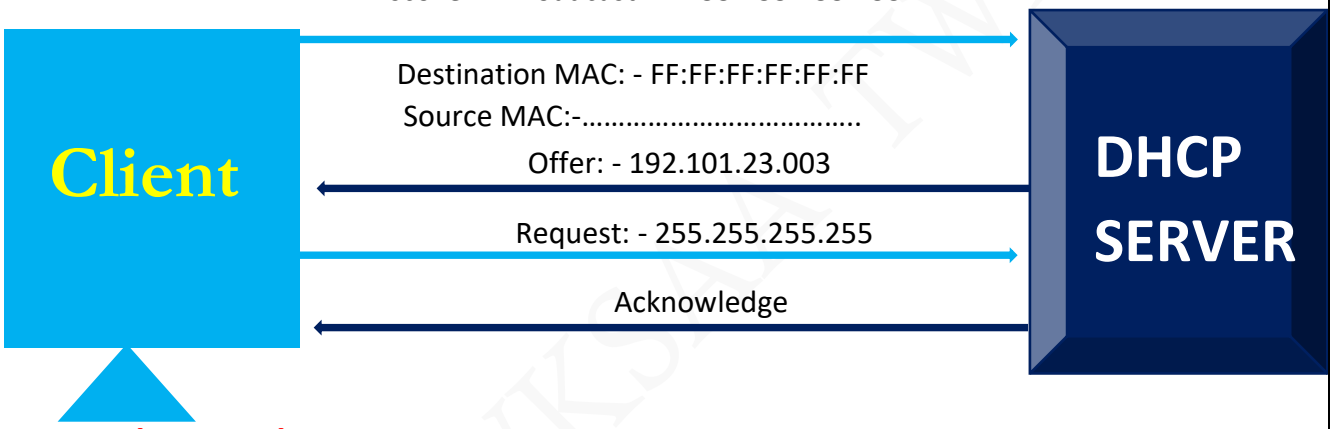
Dynamic Host Configuration Protocol

Definition: - DHCP is an automatically assign IP address to client. It is client server-based model. It's works on application layer, IP address assigned is known as dynamic IP address. DHCP IP address range is called scope.

BOOTP: - It is another method to allocate dynamic Ip address but MAC address must be entered manual. DHCP is advance version of BOOTP.

DHCP Provide: - 1. IP address 2. Subnet mask 3. Domain Name 4. Default Gateway 5. DNS Server address 6.Wins server Address.

DORA Process: - DHCP automatically assign IP address dynamically by DORA Process.



-Discover(port-68): - UDP Broadcast from DHCP client to locate available server Layer2 Broadcast FF: FF: FF: FF: FF: FF Layer3 Broadcast: - 255.255.255.255

-Offer(port-67): - DHCP server to client in Response to DHCP discover with offer of configuration parameter (DHCP server offer IP, MAC add of client, subnet mask, Lease Length)

-Request(port-68): - then client Broadcast to DHCP server request for offered IP Address.

-Acknowledge(port-67): - server to client with configuration parameters including network address.

DHCP
T3 SKILL CENTER

Definition: - SMTP (simple mail transfer Protocol) is an application layer protocol.it is Push based Protocol.

Use: - it used for send mail and it is used by the client send mail to the server it's used TCP port-25 because TCP is connection oriented. SMTP requires each message in 7-bit ASCII Format.

SMTP Commands: - 1.HELO & EHLO:- initiate a new protocol session between client & server.
2.MAIL FROM:- to initiate sending an email message or to identify sender.
3.DATA:- indicating the start of transmission of email message . last message is "."
4.RSET:-Reset connection if it encounter or error.
5.QUIT:- Terminates the protocol session

"SMTP"
TWKSAA

"Difference Between POP3 and IMAP" it is pull based Protocol.

POP3(Post-office protocol version 3) and IMAP (Internet mail access Protocol) are used for Receive mail.

POP3: -

-only allows downloading message
-it is used port 110 and with SSL port 995
-access from a single device at a time
-Read the mail after downloading
-does not allow user to organize mails & folder
-user can not search message before downloading
-no backup messages

IMAP: -

-Allow see in the folder without download
-it is used port 43 & with SSL port 993
-access from multiple devices
-can be read partially before download
-can organize email directly in sever
-user can create, delete & rename email on the mail server
-Backup is possible.

Definition: - FTP (file transfer Protocol) it is an application layer protocol.

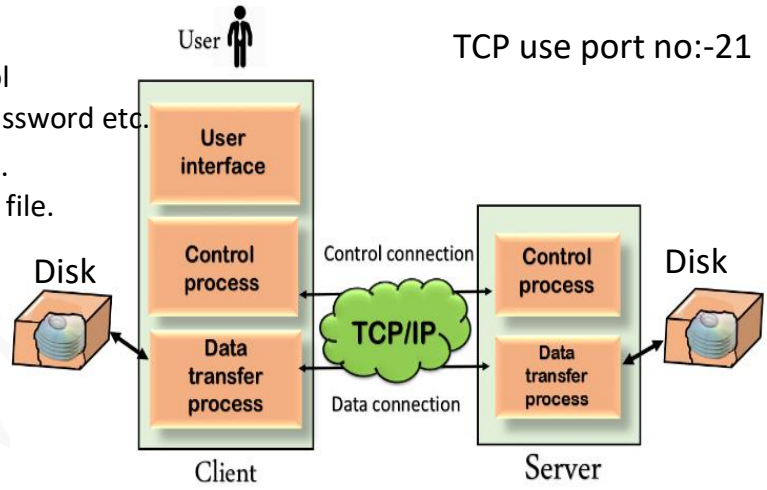
Use: - To transfer a file 2 TCP connection are used by FTP in parallel control connection & data connection.

TCP Work Flow

TCP use port no:-21

-Contral connection: - for sending control information like user identification password etc.

-Data connection: - for sending actual file. It is also used for downloading the file.



FTP Data Structure: -

-1. File Structure: - in file structure there is no internal structure and the file is considered to be continuous sequence of data a byte.

-2. Record Structure: - in record structure file is made up of sequential records.

-3. Page Structure: - in page structure the file is made up of independent indexed pages

Transmission mode of FTP: -

-1. Stream Mode: - Data transmission in continuous stream of bytes

-2. Block Mode: - Data transmission in Blocks.

-3. Compressed Mode: -Data is compressed then send generally used for sending large files.

FTP is not secure, it is plan text files transfer, data is not encrypted.

SFTP: - Secure Transfer Protocol

Data is encrypted SFTP use SSH|SSL|TLS For security. It is use port no-22 SFTP was designed by IETF as an extended version of SSH2.0, Allowing file transfer over SSH and use with transport layer.

TFTP: - Trivial file transfer protocol

-it is used for transforming files within a local area network, it uses UDP therefore unreliable it is used port no-69 it is not used to transfer files over the internet, Fast

FTP, SFTP & TFTP

❖ Research(अनुसंधान):

- अनुसंधान (Research) एक प्रणालीकरण कार्य होता है जिसमें विशेष विषय या विषय की नई ज्ञान एवं समझ को प्राप्त करने के लिए सिद्धांतिक जांच और अध्ययन किया जाता है। इसकी प्रक्रिया में डेटा का संग्रह और विश्लेषण, निष्कर्ष निकालना और विशेष क्षेत्र में मौजूदा ज्ञान में योगदान किया जाता है। अनुसंधान के माध्यम से विज्ञान, प्रोधोगिकी, चिकित्सा, सामाजिक विज्ञान, मानविकी, और अन्य क्षेत्रों में विकास किया जाता है। अनुसंधान की प्रक्रिया में अनुसंधान प्रश्न या कल्पनाएँ तैयार की जाती हैं, एक अनुसंधान योजना डिज़ाइन की जाती है, डेटा का संग्रह किया जाता है, विश्लेषण किया जाता है, निष्कर्ष निकाला जाता है और परिणामों को उचित दर्शाने के लिए समाप्ति तक पहुंचाया जाता है।

❖ Innovation(नवीनीकरण):

- Innovation (इनोवेशन) एक विशेषता या नई विचारधारा की उत्पत्ति या नवीनीकरण है। यह नए और आधुनिक विचारों, तकनीकों, उत्पादों, प्रक्रियाओं, सेवाओं या संगठनात्मक ढंगों का सृजन करने की प्रक्रिया है जिससे समस्याओं का समाधान, प्रतिस्पर्धा में अग्रणी होने, और उपयोगकर्ताओं के अनुकूलता में सुधार किया जा सकता है।

❖ Discovery (आविष्कार):

- Discovery का अर्थ होता है "खोज" या "आविष्कार"। यह एक विशेषता है जो किसी नए ज्ञान, अविष्कार, या तत्व की खोज करने की प्रक्रिया को संदर्भित करता है। खोज विज्ञान, इतिहास, भूगोल, तकनीक, या किसी अन्य क्षेत्र में हो सकती है। इस प्रक्रिया में, व्यक्ति या समूह नए और अज्ञात ज्ञान को खोजकर समझने का प्रयास करते हैं और इससे मानव सिविलाइजेशन और विज्ञान-तकनीकी के विकास में योगदान देते हैं।

Note: अनुसंधान विशेषता या विषय पर नई ज्ञान के प्राप्ति के लिए सिस्टमैटिक अध्ययन है, जबकि आविष्कार नए और अज्ञात ज्ञान की खोज है।

TWKSAA RID MISSION

(Research)	(Innovation)	(Discovery)
अनुसंधान करने के महत्वपूर्ण कारण:	**नवीनीकरण करने के महत्वपूर्ण कारण:**	**खोज करने के महत्वपूर्ण कारण:**
1. नई ज्ञान की प्राप्ति	1. प्रगति के लिए	1. नए ज्ञान की प्राप्ति
2. समस्याओं का समाधान	2. परिवर्तन के लिए	2. ज्ञान के विकास में योगदान
3. तकनीकी और व्यापार में उन्नति	3. उत्पादन में सुधार	3. अविष्कारों की खोज
4. विकास को बढ़ावा देना	4. प्रतिस्पर्धा में अग्रणी होने के लिए	4. समस्याओं का समाधान
5. सामाजिक प्रगति	5. समाज को लाभ	5. समाज के उन्नति का माध्यम
6. देश विज्ञान और प्रौद्योगिकी का विकास	6. देश विज्ञान और प्रौद्योगिकी के विकास।	6. देश विज्ञान और तकनीक के विकास

➢ जो लोग रिसर्च, इनोवेशन और डिस्कवरी करते हैं उन लोगों को ही हमें अपना नायक, प्रतीक एवं आदर्श मानना चाहिए क्योंकि यें लोग हमारे समाज, देश एवं विज्ञान के क्षेत्र में प्रगति, विकास और समस्याओं के समाधान में महत्वपूर्ण भूमिका निभाते हैं।

मैं राजेश प्रसाद एक वीणा उठाया हूँ Research, Innovation and Discovery का जिसका मुख्य उदेश्य हैं आने वाले समय में सबसे पहले New(RID, PMS & TLR) की खोज, प्रकाशन एवं उपयोग भारत की इस पावन धरती से ही हो |

"अगर आप भी Research, Innovation and Discovery के क्षेत्र में रूचि रखतें हैं एवं अपनी प्रतिभा से दुनियां को कुछ नया देना चाहतें तो हमारे इस त्वक्सा रीड मिशन (TWKSAA RID MISSION) से जरुर जुड़ें" |

- **राजेश प्रसाद**