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EXPERT COMPUTER COURSE

NETWORKING & TROUBLESHOOTING

Topics Covered:

#	Topic
1	Basic Computer Networks — LAN, WAN, Wi-Fi, Broadband, Bluetooth
2	Internet — Concepts, Applications, WWW, TCP/IP, DNS
3	Key Web Browser Features, Switch, Router, Gateway
4	Internet Applications — Email, E-Commerce, Information Gathering
5	Methods of Connecting to Internet — Dial-up, ISDN, Broadband
6	Internet Protocols — TCP/IP, FTP, HTTP, HTTPS
7	ISP, URL, Hyperlink — Definitions and Concepts
8	Web Security — HTTPS, Secure Sites, Threats
9	Web Browser Features — Favorites, Bookmarks, Downloading, Printing
10	Web Forms and Search Engines
11	E-Commerce and Impact of Internet on Society
12	Instant Messaging, Social Networking, IPv4 & IPv6
13	Network Troubleshooting
14	Quick Revision + Important MCQ Questions

SECTION 1: BASIC COMPUTER NETWORKS

1.1 What is a Computer Network?

> *A computer network is a group of two or more computers and devices connected together to share resources (data, printers, internet) and communicate with each other.*

Network Type	Full Form	Coverage Area	Example
PAN	Personal Area Network	Few metres — personal space	Bluetooth earphones, phone to laptop transfer
LAN	Local Area Network	Building or campus	Office network, school computer lab, home Wi-Fi
MAN	Metropolitan Area Network	City or town	City-wide broadband, cable TV network
WAN	Wide Area Network	Country or worldwide	The Internet, corporate global networks (MPLS)
WLAN	Wireless LAN	Building — wireless	Wi-Fi network in office, café hotspot
VPN	Virtual Private Network	Internet (encrypted tunnel)	Remote employee securely accessing office network

1.2 LAN — Local Area Network

> *A LAN connects computers within a limited area such as a home, school, or office building. It is privately owned and provides high-speed, low-cost communication.*

Feature	Details
Coverage	Up to a few kilometres — typically one building or campus
Speed	10 Mbps (old) to 10 Gbps (modern Gigabit Ethernet)
Ownership	Privately owned by organisation or individual
Connection Medium	Ethernet cable (Cat5e/Cat6), Wi-Fi (wireless LAN)
Cost	Low setup cost; inexpensive maintenance
Examples	Home network, school computer lab, office network, college campus network

1.3 WAN — Wide Area Network

> *A WAN spans a large geographic area — a country, continent, or the entire globe. It connects multiple LANs together. The Internet is the world's largest WAN.*

Feature	Details
Coverage	Country-wide or worldwide
Speed	Varies widely — 1 Mbps to 100 Gbps on backbone links
Ownership	Usually owned by telecom companies (Airtel, BSNL, Jio)
Connection Medium	Leased telephone lines, fiber optic cables, satellite, submarine cables

Feature	Details
Cost	High — expensive infrastructure and maintenance
Examples	Internet, bank's ATM network across India, MNCs connecting offices worldwide

1.4 Wi-Fi — Wireless LAN

> *Wi-Fi (Wireless Fidelity) is a wireless networking technology that allows devices to connect to a LAN and the internet without physical cables, using radio waves.*

Wi-Fi Standard	Name	Frequency	Max Speed	Notes
802.11b	Wi-Fi 1	2.4 GHz	11 Mbps	Very old, obsolete
802.11g	Wi-Fi 3	2.4 GHz	54 Mbps	Common in early 2000s
802.11n	Wi-Fi 4	2.4 / 5 GHz	600 Mbps	Widely used in older devices
802.11ac	Wi-Fi 5	5 GHz	3.5 Gbps	Current standard in most devices
802.11ax	Wi-Fi 6	2.4 / 5 / 6 GHz	9.6 Gbps	Latest; handles crowded environments better
802.11ax (6E)	Wi-Fi 6E	6 GHz band added	9.6 Gbps	Newest — less congestion, higher speed

- SSID: Network name visible when searching for Wi-Fi (Service Set Identifier)
- WPA3: Latest Wi-Fi security protocol. WPA2 = older but still secure. WEP = old and insecure (avoid)
- 2.4 GHz band: longer range, more interference. 5 GHz band: shorter range, faster, less interference

1.5 Broadband

> *Broadband refers to high-speed internet connectivity that is always-on (no need to dial up) and provides significantly faster speeds than old dial-up connections.*

Broadband Type	Technology	Speed	Notes
DSL (ADSL/VDSL)	Over telephone copper wire	1-100 Mbps	Most common fixed broadband in India (BSNL, Airtel)
Cable Broadband	Via TV cable coaxial cable	10-1000 Mbps	Available through cable TV providers
Fiber Optic (FTTH)	Light through optical fiber	100 Mbps – 10 Gbps	Fastest; Jio Fiber, Airtel Xstream, BSNL Bharat Fiber
Mobile Broadband (4G/5G)	Cellular network	10-1000 Mbps	Jio, Airtel, Vi — portable, via SIM card
Satellite Broadband	Via satellite (e.g., Starlink)	25-300 Mbps	Remote areas; higher latency
WiMAX	Wireless broadband standard	1-70 Mbps	Like long-distance Wi-Fi — covers large areas

1.6 Bluetooth

> *Bluetooth is a short-range wireless technology for connecting devices over very short distances (up to 10-100 metres) using radio waves in the 2.4 GHz frequency band.*

Feature	Details
Range	Class 1: up to 100m | Class 2: up to 10m (most devices) | Class 3: up to 1m
Speed	Bluetooth 4.0: 25 Mbps | Bluetooth 5.0: 50 Mbps | Bluetooth 5.2: 50 Mbps
Frequency	2.4 GHz ISM band — same as Wi-Fi (but doesn't usually interfere)
Pairing	Devices must be paired before communication — press pair button, enter PIN if required
Use Cases	Wireless headphones, speakers, keyboard, mouse, file transfer phone-to-PC, smartwatch, car audio
Bluetooth Versions	5.0 and 5.2 = latest. Lower power (BLE = Bluetooth Low Energy) for IoT/fitness devices
Security	Uses frequency hopping and encryption — relatively secure for short range

> **Exam Tip:** LAN = local building. WAN = worldwide (Internet is biggest WAN). Wi-Fi = wireless LAN. Bluetooth = very short range (room-level). Broadband = high-speed always-on internet.

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SECTION 2: INTERNET — CONCEPTS, APPLICATIONS, WWW, TCP/IP, DNS

2.1 What is the Internet?

> *The Internet is a global network of millions of interconnected computers and networks that communicate using the TCP/IP protocol. It is not owned by any single organisation — it is a network of networks.*

Term	Meaning
Internet	The physical global network infrastructure — cables, servers, routers connecting billions of devices
WWW (World Wide Web)	A service that runs ON the internet — collection of web pages linked by hyperlinks, accessed via browser
Intranet	Private internal network within an organisation using internet technologies — not accessible publicly
Extranet	Extended intranet — allows limited outside access to specific partners/suppliers
Cloud	Internet-based services for storage, software, and computing (Google Drive, AWS, Azure)

2.2 Applications of Internet

Application	Description	Examples
Communication	Email, instant messaging, video calls, VoIP	Gmail, WhatsApp, Zoom, Skype, Google Meet
Information Gathering	Search engines, online encyclopedias, news portals, research	Google, Wikipedia, BBC, Reuters, PubMed
E-Commerce	Online buying and selling of products and services	Amazon, Flipkart, Meesho, Myntra, Zomato
Online Banking	Access bank accounts, transfer money, pay bills	Net banking, UPI (PhonePe, GPay), NEFT, RTGS
Education	Online courses, tutorials, video lectures, e-books	YouTube, Coursera, Khan Academy, NPTEL
Entertainment	Streaming movies, music, gaming, social media	Netflix, Spotify, YouTube, Instagram, PUBG
Government Services	Applying for licenses, certificates, filing taxes online	DigiLocker, Income Tax portal, IRCTC
Healthcare	Telemedicine, online consultations, health information	Practo, Apollo 247, WHO website
Social Networking	Connecting with friends, sharing content, building communities	Facebook, Twitter/X, Instagram, LinkedIn
Cloud Storage	Store and access files from anywhere via internet	Google Drive, OneDrive, Dropbox, iCloud

2.3 WWW — World Wide Web

> *The World Wide Web (WWW) is a system of interlinked hypertext documents accessed via the Internet using a web browser. It was invented by Tim Berners-Lee in 1989 at CERN, Switzerland.*

- Web Page: A single document on the WWW, written in HTML, displayed in a browser
- Website: A collection of related web pages under one domain (e.g., google.com)
- Web Browser: Software to access and display web pages (Chrome, Firefox, Edge, Safari)
- Hyperlink: Clickable text or image that takes you to another web page or resource
- HTML: HyperText Markup Language — the language used to create web pages
- HTTP/HTTPS: Protocol used to transfer web pages from server to browser

2.4 TCP/IP — Transmission Control Protocol / Internet Protocol

> *TCP/IP is the foundational set of communication protocols used to connect devices on the Internet. It defines how data is broken into packets, addressed, transmitted, and reassembled.*

Component	Full Form	Function
IP	Internet Protocol	Handles addressing and routing — each device gets a unique IP address. Delivers packets to correct destination.
TCP	Transmission Control Protocol	Ensures reliable, ordered data delivery. Breaks data into packets, numbers them, reassembles at destination. Resends lost packets.
UDP	User Datagram Protocol	Faster but unreliable delivery — no resending lost packets. Used for video streaming, gaming, DNS.
IP Address	Internet Protocol Address	Unique numerical label for each device: 192.168.1.1 (IPv4) or 2001:db8::1 (IPv6)
Packet	—	Small chunk of data. Large files are split into many packets, sent independently, reassembled at destination.
Port	—	Number identifying specific application/service. HTTP=80, HTTPS=443, FTP=21, SMTP=25, DNS=53

2.5 DNS — Domain Name System

> *DNS (Domain Name System) is the Internet's phone book. It translates human-readable domain names (like google.com) into numerical IP addresses (like 142.250.190.46) that computers use to find each other.*

- Without DNS: You would need to remember IP addresses like 142.250.190.46 instead of google.com
- DNS Server: Special server that stores the database of domain names and their IP addresses
- DNS Lookup Process: You type google.com → browser asks DNS server → DNS returns 142.250.190.46 → browser connects
- Popular DNS Servers: Google (8.8.8.8 and 8.8.4.4), Cloudflare (1.1.1.1), BSNL/Airtel (ISP's DNS)
- DNS Cache: Browser and OS cache DNS results to speed up future visits to the same site

- DNS Poisoning: Attack where fake DNS entries redirect users to malicious websites

2.6 Search Engines

> *A search engine is a website that searches its index of billions of web pages and returns the most relevant results for a user's query. It uses web crawlers (bots) to continuously index new pages.*

Search Engine	Company	Market Share	Special Feature
Google	Alphabet (Google LLC)	~92% worldwide	Most accurate, AI-powered (Bard/Gemini), Maps, Images, News
Bing	Microsoft	~3% worldwide	Integrated with Microsoft Edge, Copilot AI, rewards program
Yahoo	Yahoo! / Verizon Media	~1.5%	One of the first search engines; also email and news portal
DuckDuckGo	DuckDuckGo Inc.	~0.5%	Privacy-focused — does NOT track search history
Baidu	Baidu Inc.	Dominant in China	Leading search engine in China
AltaVista	(Now defunct — absorbed by Yahoo)	Legacy	One of the first major search engines; now historical
Excite	Ask.com	Legacy	Early 2000s popular search engine; mostly historical now

- Search Tips: Use quotes for exact phrase ("computer science"). Use - to exclude (apple -fruit). Use site: to search specific website (site:wikipedia.org).

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SECTION 3: WEB BROWSERS, SWITCH, ROUTER, GATEWAY

3.1 Web Browser Features

> *A web browser is software used to access, retrieve, and display content from the World Wide Web. Popular browsers: Google Chrome, Mozilla Firefox, Microsoft Edge, Apple Safari.*

Browser Feature	Description	How to Use
Address Bar / URL Bar	Where you type a web address (URL) to navigate to a website	Click bar → type URL → press Enter
Back / Forward Buttons	Navigate to previously visited pages in current session	Click < (Back) or > (Forward) buttons
Refresh / Reload	Reloads the current page (fetches fresh copy from server)	Press F5 or click the circular arrow button
Stop Loading	Cancels page loading in progress	Press Escape key or click X button
Bookmarks/Favorites	Save links to websites for quick future access	Ctrl+D to bookmark | Bookmarks menu to access saved
Tabs	Open multiple websites in same browser window	Ctrl+T = new tab | Ctrl+W = close tab | Ctrl+Tab = switch tab
Incognito/Private Mode	Browse without saving history, cookies, or passwords	Ctrl+Shift+N (Chrome) | Ctrl+Shift+P (Firefox/Edge)
History	List of all previously visited websites	Ctrl+H to open history
Downloads	Manage downloaded files	Ctrl+J to open downloads list
Extensions/Add-ons	Install additional features in browser	Browser menu → Extensions → Add
Zoom	Increase or decrease web page text/content size	Ctrl+ = zoom in | Ctrl- = zoom out | Ctrl+0 = reset
Find on Page	Search for specific text on current web page	Ctrl+F → type search term
Home Page	Page that opens when browser starts or when Home button is clicked	Settings → On Startup → Set home page URL
Print	Print the current web page	Ctrl+P → choose printer → Print

3.2 Switch

> *A Network Switch is a hardware device that connects multiple computers in a LAN and intelligently forwards data ONLY to the specific destination device using its MAC address.*

Feature	Details
OSI Layer	Operates at Layer 2 (Data Link Layer)
Addressing	Uses MAC (Media Access Control) addresses to forward data
Intelligence	Maintains MAC address table — learns which device is on which port

Feature	Details
Efficiency	Sends data only to intended recipient — no unnecessary broadcasting (unlike Hub)
Types	Unmanaged (plug-and-play), Managed (configurable via admin interface), PoE (powers IP phones/cameras)
Ports	Typically 4, 8, 16, 24, or 48 ports for connecting devices via Ethernet cables

3.3 Router

> *A Router is a hardware device that connects two or more different networks and routes data packets between them using IP addresses. It is the device that connects your home/office LAN to the Internet (WAN).*

Feature	Details
OSI Layer	Operates at Layer 3 (Network Layer)
Addressing	Uses IP addresses (not MAC) to route packets between different networks
Main Function	Determines best path for data packets to travel from source to destination network
Home Router	Combines router + switch + Wi-Fi access point + firewall in one device
NAT	Network Address Translation — allows multiple devices to share one public IP address
DHCP	Most routers act as DHCP server — automatically assign IP addresses to devices on LAN
Default Gateway	Router's IP address is used as 'Default Gateway' — all internet traffic sent here first

3.4 Gateway

> *A Gateway is a network node that acts as an entry/exit point between two networks that use different protocols or architectures. It translates data between incompatible systems.*

- Most commonly, your home router IS your default gateway — it connects your LAN to the Internet
- Default Gateway: The IP address of the router that a device sends traffic to when the destination is outside the LAN
- Protocol Translation: Enterprise gateways can translate between e.g. IPv4 and IPv6, or TCP/IP and other protocols
- Example: 192.168.1.1 is typically the default gateway (router's IP address) in home networks

> **Switch vs Router vs Hub:** Hub = broadcasts to ALL (dumb). Switch = sends to specific device via MAC (smart Layer 2). Router = connects different networks via IP (Layer 3). Gateway = entry/exit point, translates protocols.

SECTION 4: APPLICATIONS OF INTERNET

4.1 Email (Electronic Mail)

> *Email is the exchange of digital messages over the Internet. It is one of the most widely used internet applications. Email messages can include attachments (files, images, documents).*

Email Component	Description
Email Address	Unique address format: username@domain.com (e.g., ajay@gmail.com)
Inbox	Folder where received emails appear
Outbox	Temporary folder for emails being sent
Sent Items	Folder containing copies of emails you have sent
Draft	Saved but not yet sent emails
Spam/Junk	Folder for suspicious or unwanted emails automatically filtered by email provider
Attachment	File(s) attached to an email — document, image, spreadsheet, etc. (usually max 25 MB)
CC (Carbon Copy)	Send a copy of email to additional recipients — all recipients can see CC list
BCC (Blind Carbon Copy)	Send copy to additional recipients — BCC recipients are hidden from other recipients
Subject Line	Brief summary of email content — should be clear and descriptive

- Popular email providers: Gmail (Google), Outlook/Hotmail (Microsoft), Yahoo Mail, Rediffmail (India)
- Email protocols: SMTP (Send mail) | POP3 or IMAP (Receive mail)
- IMAP vs POP3: IMAP keeps mail on server (sync across devices). POP3 downloads and deletes from server.

4.2 E-Commerce (Electronic Commerce)

> *E-Commerce refers to buying and selling of products and services over the Internet. India's e-commerce market is one of the fastest growing in the world.*

E-Commerce Type	Full Form	Description	Example
B2C	Business to Consumer	Companies sell directly to individual customers online	Amazon, Flipkart, Myntra, Nykaa
B2B	Business to Business	Companies sell to other companies online	Alibaba, IndiaMART, TradeIndia
C2C	Consumer to Consumer	Individuals sell to other individuals via platform	OLX, Quikr, eBay
B2G	Business to Government	Companies sell to government entities	Government e-procurement portals
G2C	Government to Consumer	Government provides services to citizens online	DigiLocker, IRCTC, Income Tax e-filing

E-Commerce Type	Full Form	Description	Example
D2C	Direct to Consumer	Brands sell directly without middlemen	Boat, Mamaearth — their own websites

- Payment methods: Credit/Debit card, Net banking, UPI (GPay, PhonePe, Paytm), EMI, Cash on Delivery
- Benefits: 24/7 availability, wide product range, price comparison, home delivery, customer reviews

4.3 Information Gathering and Retailing

- Information Gathering: Google, Bing, Wikipedia, news sites, academic databases (JSTOR, PubMed)
- Online Retailing: Amazon, Flipkart, Meesho, BigBasket (groceries), Swiggy/Zomato (food)
- Government Information: Official sites (.gov.in) for news, schemes, applications
- Research: IEEE, ResearchGate, Google Scholar for academic papers

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SECTION 5: METHODS OF CONNECTING TO THE INTERNET

5.1 Dial-up Connection

> *Dial-up was the first method of Internet access for homes. It uses a regular telephone line and a modem to establish a connection by literally 'dialing' a phone number.*

Feature	Details
Speed	Very slow — maximum 56 Kbps (kilobits per second)
Technology	Uses PSTN (Public Switched Telephone Network) — regular phone line + modem
Always-On?	No — must dial to connect; disconnects when done. Cannot use phone and internet simultaneously.
Cost	Pay-per-minute call charges to ISP number
Status	Obsolete — no longer used for home internet. Historical only.
Modem Type	56K dial-up modem (connected to phone line and PC)

5.2 ISDN — Integrated Services Digital Network

> *ISDN is a digital telephone network standard that provided faster internet than dial-up by converting phone lines to carry digital signals. Now largely obsolete, replaced by DSL/fiber.*

Feature	Details
Speed	BRI (Basic Rate Interface): 128 Kbps | PRI (Primary Rate Interface): 1.5-2 Mbps
Technology	Digital transmission over regular copper telephone lines
Advantage over Dial-up	Faster, can use voice and data simultaneously on same line
Status	Mostly obsolete — replaced by ADSL, fiber, and mobile broadband
Usage	Was used in small businesses and SOHO setups in 1990s-early 2000s

5.3 Broadband Connections

Type	Technology	Speed	Notes
ADSL (Asymmetric DSL)	Copper phone line + DSL modem	1-24 Mbps download / 256Kbps-1Mbps upload	Most common; download faster than upload
VDSL (Very High DSL)	Copper or fiber + DSL	10-100 Mbps	Faster DSL; needs short copper distance to exchange
Cable Broadband	Coaxial TV cable + cable modem	10-1000 Mbps	Shared with neighbours; speed can vary at peak times
FTTH/FTTP	Pure fiber optic to home	100 Mbps - 10 Gbps	Fastest; Jio Fiber, Airtel Xstream Fiber, BSNL Bharat Fiber
4G LTE	Cellular mobile network	10-150 Mbps	Portable; via router/dongle or phone hotspot

Type	Technology	Speed	Notes
5G	Next-gen cellular	100 Mbps - 10 Gbps	Ultra-fast, low latency; rolling out in India
Satellite	Satellite in orbit	25-300 Mbps	Remote areas; Starlink, VSAT — higher latency

5.4 Connecting a Computer to the Internet — Steps

- Wired (LAN): Connect Ethernet cable from router/switch to PC's LAN port → Windows detects and connects automatically
- Wi-Fi: Click Wi-Fi icon in taskbar → select your network (SSID) → enter password → Connect
- Mobile Broadband/Dongle: Insert USB dongle → install software → connect through provided app
- Mobile Hotspot: Enable hotspot on phone → on PC, find the network, enter password → connect

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SECTION 6: INTERNET PROTOCOLS — TCP/IP, FTP, HTTP, HTTPS

6.1 Internet Protocols Overview

> *An Internet Protocol is a set of rules that defines how data is formatted, addressed, transmitted, and received over a network. Different protocols handle different types of communication.*

Protocol	Full Form	Port	Purpose
HTTP	HyperText Transfer Protocol	80	Transfers web pages from server to browser. Not encrypted — data visible to hackers.
HTTPS	HyperText Transfer Protocol Secure	443	Same as HTTP but encrypted using SSL/TLS. Used for secure websites (banking, login pages).
FTP	File Transfer Protocol	20/21	Transfers files between computers. Used to upload website files to web server.
SFTP	Secure FTP	22	FTP with SSH encryption — secure file transfer.
SMTP	Simple Mail Transfer Protocol	25/587	Sends outgoing email from email client to server.
POP3	Post Office Protocol v3	110	Downloads email from server to local device. Deletes from server after download.
IMAP	Internet Message Access Protocol	143	Reads email stored on server. Keeps email on server — syncs across devices.
DNS	Domain Name System	53	Translates domain names to IP addresses.
DHCP	Dynamic Host Configuration Protocol	67/68	Automatically assigns IP addresses to devices on network.
SSH	Secure Shell	22	Encrypted remote access to server command line — secure alternative to Telnet.
Telnet	Telnet	23	Unencrypted remote access to server CLI. Obsolete — use SSH instead.
IP	Internet Protocol	—	Routes data packets between networks using IP addresses.
TCP	Transmission Control Protocol	—	Reliable ordered delivery of data packets. Connection-oriented.
UDP	User Datagram Protocol	—	Fast but unreliable delivery. Connectionless. Used for video/gaming/DNS.

> **Exam Tip:** HTTP port=80 (not secure). HTTPS port=443 (secure, encrypted). FTP port=21 (file transfer). SMTP port=25 (send email). POP3 port=110 (receive email). DNS port=53.

SECTION 7: ISP, URL, HYPERLINK — DEFINITIONS

7.1 ISP — Internet Service Provider

> *An ISP (Internet Service Provider) is a company that provides access to the Internet to individuals and organisations for a fee. The ISP connects you to the Internet backbone.*

ISP	Type	Services Offered
Jio (Reliance)	Mobile + Fiber	4G/5G, JioFiber broadband, JioMeet, JioTV
Airtel	Mobile + Fiber + DSL	4G/5G, Airtel Xstream Fiber, broadband, DTH
BSNL	Government ISP	DSL broadband, Bharat Fiber (FTTH), mobile internet
Vi (Vodafone Idea)	Mobile	4G mobile internet
ACT Fibernet	Fiber (urban)	Fiber broadband in Hyderabad, Bangalore, Delhi, Chennai
Hathway	Cable/Fiber	Cable broadband and fiber in major cities

7.2 URL — Uniform Resource Locator

> *A URL (Uniform Resource Locator) is the complete address of a specific resource (web page, image, file, video) on the Internet. It tells the browser exactly what to retrieve and from where.*

URL Structure Example: https://www.zedking.in/courses/digital-marketing

Part of URL	Example	Meaning
Protocol	https://	How to access the resource (secure HTTP)
Subdomain	www.	World Wide Web subdomain (optional — many sites use it)
Domain Name	zedking	The website's name — registered with domain registrar
.in / .com / .org	in	Top Level Domain (TLD): .in=India, .com=commercial, .org=organisation, .edu=education, .gov=government
Path	/courses/digital-marketing	Specific location/page on the website after the domain
Query String	?id=101&city=kaithal	Additional parameters sent to the server (seen in search URLs)
Fragment	#section2	Jumps to a specific section on the page (anchor)

7.3 Hyperlink

> *A hyperlink (or simply 'link') is a clickable element on a web page that takes you to another page, website, file, or location when clicked. It is the fundamental navigation mechanism of the WWW.*

Hyperlink Type	Description	HTML Example
Text Link	Clickable text, usually underlined and blue by default	Click here
Image Link	Clickable image that navigates to a URL	<img src='image.jpg'>
Internal Link	Links to another page on the SAME website	About Us
External Link	Links to a page on a DIFFERENT website	Google
Email Link	Opens email client with pre-filled address	Email Us
Anchor Link	Jumps to a specific section on same page	Contact

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SECTION 8: WEB SECURITY — HTTPS, SECURE SITES, THREATS

8.1 Identifying a Secure Website

Security Indicator	What to Look For	Meaning
HTTPS in URL	URL begins with https:// (not http://)	Traffic between browser and server is encrypted using SSL/TLS
Padlock Icon	Small lock icon in address bar (left side)	Connection is secure and encrypted — certificate is valid
Green Address Bar	Some banking sites show green extended validation bar	Extended Validation (EV) SSL certificate — highest assurance
Certificate Details	Click padlock → Certificate → View Details	Shows who owns the certificate, expiry date, issuing authority
No Warning	Browser doesn't show 'Not Secure' warning	Page is served over HTTPS properly
Valid SSL Certificate	Certificate issued by trusted Certificate Authority (CA)	Issued by DigiCert, Let's Encrypt, Comodo, etc.

- ALWAYS check for https:// and padlock before entering passwords or credit card details
- HTTP sites send data as plain text — anyone intercepting the connection can read your data
- 'Not Secure' warning in Chrome/Edge means site uses HTTP — do not enter sensitive info

8.2 Security Threats from Websites

Threat	Description	How to Protect
Virus from Website	Malicious code embedded in web pages — auto-downloads and runs when you visit	Keep antivirus updated; avoid suspicious sites; use safe browser
Drive-by Download	Malware automatically downloads without your knowledge when visiting infected page	Keep browser and plugins updated; use NoScript extension
Phishing	Fake website designed to look like real bank/social media to steal login details	Always check URL carefully; look for HTTPS; don't click links in emails
Malvertising	Malicious ads on legitimate websites that download malware	Use ad blocker; keep browser updated
Worms from Web	Self-replicating malware that spreads via web vulnerabilities	Use firewall; update OS and browser
Trojan from Downloads	Legitimate-looking software downloads that contain malware	Only download from official trusted sources
Spyware	Secretly installed software that monitors your activity and sends data to attacker	Run anti-spyware scans; avoid free software from unknown sources
Cross-Site Scripting (XSS)	Attacker injects malicious script into a trusted website	Ensure web applications sanitize input; use updated browser

Threat	Description	How to Protect
Man-in-the-Middle	Attacker intercepts communication between browser and server	Only use HTTPS; avoid public Wi-Fi for sensitive tasks; use VPN

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SECTION 9: WEB BROWSER FEATURES — FAVORITES, BOOKMARKS, DOWNLOAD, PRINT

9.1 Using Favorites / Bookmarks

> *Bookmarks (called Favorites in Edge/Internet Explorer) save links to websites so you can return to them quickly without typing the URL again.*

Action	Chrome	Microsoft Edge
Add Bookmark	Ctrl+D OR click star in address bar → Save	Ctrl+D OR click star icon → Add
Access Bookmarks	Ctrl+Shift+B (toggle bookmarks bar) | Bookmarks menu	Ctrl+Shift+B | Favorites menu (Ctrl+Shift+O)
Organize Bookmarks	Ctrl+Shift+O → drag to folders, rename, delete	Ctrl+Shift+O → manage favorites
Delete Bookmark	Ctrl+Shift+O → right-click → Delete OR click star again → Remove	Ctrl+Shift+O → right-click → Delete
Import Bookmarks	Settings → Import bookmarks and settings	Settings → Import browser data
Sync Bookmarks	Sign in to Chrome account → syncs across devices	Sign in to Microsoft account → syncs across devices

9.2 Downloading Web Pages and Files

- Download File: Right-click any link/image → 'Save link as' OR click download button → choose save location
- Download Location: Default is 'Downloads' folder (C:\Users\Username\Downloads). Change in: Settings → Downloads → Change location
- Save Full Web Page: Ctrl+S → choose location → saves as HTML file with a folder for images
- Save as PDF: Ctrl+P → Destination = 'Save as PDF' → Save → creates PDF of the page
- Download Manager: Ctrl+J (Chrome) — shows all downloads, resume paused, open file location
- IDM (Internet Download Manager): Popular third-party tool for faster, resumable downloads

9.3 Printing Web Pages

- Print: Ctrl+P OR right-click page → Print → choose printer, number of copies, pages → Print
- Print Preview: Automatically shown in print dialog — see how page will look on paper before printing
- Background Graphics: In print settings, enable/disable printing of background colors and images
- Page Range: Print all pages, specific pages (e.g., 2-4), or current page only
- Save as PDF: Set Destination to 'Save as PDF' instead of a printer — creates digital printout
- Simplified View: Some browsers offer 'Reader Mode' before printing for cleaner output

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9.4 Setting the Browser Home Page

- Chrome: Settings (⋮) → On startup → Open a specific page → Add new page → enter URL → Save
- Edge: Settings → Start, home, and new tabs → Home button → set URL → Save
- Firefox: Options → Home → Homepage and new windows → enter URL
- The home page opens when you click the Home button or when browser starts

9.5 Publishing on the Web

> *Publishing on the web means making your content (website, blog, images, videos) available on the Internet for others to access.*

- Domain Registration: Register a domain name (e.g., yourname.com) at GoDaddy, BigRock, Google Domains
- Web Hosting: Rent server space to store website files — Hostinger, Bluehost, GoDaddy, AWS
- Upload Files: Use FTP software (FileZilla) to upload HTML/CSS/JS files to web server
- CMS (Content Management System): Build without coding — WordPress, Wix, Squarespace
- Blog Platforms: Blogger (Google), WordPress.com — free blog publishing
- Social Publishing: Post on Facebook, Instagram, YouTube — immediate publication to followers

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SECTION 10: WEB FORMS AND SEARCH ENGINES

10.1 Completing a Web-Based Form

> *Web forms allow users to enter and submit data to a website — for registration, login, orders, surveys, feedback, etc. Forms contain various input controls.*

Form Control	Description	Example on Web
Text Box	Single-line field for typing short text	Name, email address, phone number, username
Password Field	Text box that hides characters with dots/asterisks	Password entry fields
Text Area	Multi-line field for longer text entry	Comments section, message in contact form
Drop-Down Menu (Select)	Click to open list, select one option from the list	Select State, Select Year, Select Country
List Box	Scrollable list — can show multiple options; may allow multi-select	Select your preferred courses
Check Box	Square box — tick it to select. Multiple checkboxes can be selected simultaneously.	Select interests: □Music □Sports □Reading
Radio Button	Round button — select ONLY ONE from a group. Selecting one deselects others.	Gender: ○Male ○Female ○Other
File Upload Button	Browse and attach a file to upload with the form	Upload resume, Upload photo
Submit Button	Click to send form data to the server for processing	'Submit', 'Register', 'Send', 'Place Order' buttons
Reset Button	Clears all form fields back to empty/default values	'Clear', 'Reset' button
CAPTCHA	Challenge to prove you are human, not a bot	'I am not a robot' checkbox, image recognition puzzle

> **Exam Tip:** Radio Button = select ONLY ONE (like gender). Checkbox = select MULTIPLE (like interests/hobbies). Dropdown = one from list. Text Box = free text entry.

10.2 Search Engines — Benefits and Popular Engines

> *A search engine is a web service that searches billions of indexed web pages and returns the most relevant results for your query. It uses algorithms, web crawlers, and AI to rank results.*

Benefit of Search Engines	Description
Instant Information Access	Find answers to any question within seconds from billions of sources
Research Assistance	Access academic papers, news, government data, statistics instantly
Product Price Comparison	Compare prices across multiple e-commerce sites

Benefit of Search Engines	Description
Location Discovery	Find businesses, restaurants, hospitals, ATMs near you (Google Maps integration)
News & Current Events	Real-time news from thousands of sources indexed and ranked
Multilingual Support	Search in Hindi, Punjabi, Tamil, and dozens of other languages
Image & Video Search	Find images and videos related to your search term
Personalisation	Learns your preferences and improves results over time

10.3 Advanced Search Techniques

Operator	Example	What It Does
Exact Phrase (" ")	"computer science notes"	Returns pages with this exact phrase
Exclude Term (-)	laptop -Apple	Excludes Apple brand results
Site Search	site:wikipedia.org computer	Searches only within Wikipedia
File Type	filetype:pdf computer notes	Finds PDF files only
OR Operator	cat OR dog	Either term in results
Related Sites	related:flipkart.com	Finds sites similar to Flipkart
Word Definition	define:algorithm	Shows dictionary definition
Calculator	2500 * 18/100	Performs calculation in search bar
Time in City	time in Tokyo	Shows current time in Tokyo
Weather	weather Kaithal	Shows current weather and forecast

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SECTION 11: E-COMMERCE AND IMPACT OF INTERNET ON SOCIETY

11.1 Commerce on the Internet

Aspect	Description
Online Shopping	Buy products from anywhere; 24/7; delivery to door; easy return policies
Online Payments	UPI, credit/debit card, net banking, digital wallets (Paytm, PhonePe, GPay)
Digital Advertising	Businesses reach customers through Google Ads, Facebook Ads, Instagram ads
Online Banking	View balance, transfer money, pay bills — without visiting bank branch
Investment Platforms	Buy/sell stocks, mutual funds online (Zerodha, Groww, Upstox)
Online Auctions	eBay-style bidding for products; government procurement auctions
Cryptocurrency	Bitcoin, Ethereum — digital currencies using blockchain technology
Subscription Services	Netflix, Spotify, Hotstar, Adobe CC — monthly paid access to digital content

11.2 Impact of Internet on Society

Area	Positive Impact	Negative Impact / Challenge
Education	Free access to world-class knowledge; e-learning platforms; digital classrooms	Digital divide — rural areas lack access; screen addiction in students
Communication	Instant global communication; video calls; social connections across distance	Cyber-bullying; fake news spreading faster than ever; privacy concerns
Economy	New industries (IT, e-commerce); global job opportunities; remote work	Job displacement due to automation; gig economy insecurity
Healthcare	Telemedicine; health apps; faster medical research collaboration	Misinformation about health treatments spreading virally
Government	E-governance; transparent public services; digital records; RTI	Cybersecurity threats to critical infrastructure; surveillance concerns
Environment	Paperless processes; reduced travel through video conferencing	Energy consumption of data centers; e-waste from devices
Culture	Cultural exchange; global awareness; sharing of art and creativity	Cultural homogenisation; addiction to social media; loss of privacy

SECTION 12: INSTANT MESSAGING, SOCIAL NETWORKING, IPV4 & IPV6

12.1 Instant Messaging (IM)

> *Instant Messaging allows real-time text, audio, video, and file communication between users over the internet. Unlike email, messages are delivered and displayed instantly.*

IM Platform	Description	Key Features
WhatsApp	Most popular in India; owned by Meta	End-to-end encrypted, group chats, voice/video calls, status, business accounts
Telegram	Privacy-focused; cloud-based	Channels, large groups (200,000 members), bots, file sharing up to 2GB, self-destruct messages
Google Chat	Integrated with Gmail/Workspace	Part of Google Workspace; rooms, direct messages
Microsoft Teams	For businesses/education	Video meetings, file sharing, Office 365 integration, Teams channels
Slack	For professional teams	Channels by topic, integrations with hundreds of apps, search history
Signal	Most secure IM app	End-to-end encrypted everything; open source; no ads; no data collection
Discord	Gaming and communities	Voice channels, screen share, communities (servers), screen streaming

12.2 Social Networking Sites

> *Social Networking Sites (SNS) are online platforms where users create profiles, share content, and connect with friends, family, and professionals.*

Platform	Launched	Focus / Use	Active Users (approx)
Facebook	2004	Social connections, groups, events, marketplace	3 Billion+
Instagram	2010 (Meta)	Photo/video sharing, reels, stories, influencers	2 Billion+
Twitter / X	2006	Short posts (280 chars), news, trending topics, discussions	550 Million+
LinkedIn	2003	Professional networking, job search, career	1 Billion+
YouTube	2005 (Google)	Video sharing and streaming platform	2.7 Billion+
Snapchat	2011	Disappearing photos/videos; stories; AR filters	750 Million+
Pinterest	2010	Image bookmarking; DIY, fashion, recipes inspiration	450 Million+
Koo	2020 (India)	Indian Twitter alternative; supports multiple Indian languages	~10 Million

- Responsible use: Check privacy settings; don't share personal info (phone, address, Aadhaar) publicly
- Cyber safety: Report cyberbullying; don't accept requests from unknown people; be aware of fake accounts

12.3 IPv4 — Internet Protocol Version 4

> *IPv4 is the fourth version of the Internet Protocol. It uses 32-bit addresses written as four decimal numbers separated by dots. IPv4 has been the backbone of the Internet since 1983.*

Feature	Details
Address Size	32-bit address = 4 bytes
Format	4 groups of decimal numbers (0-255) separated by dots: 192.168.1.1
Total Addresses	2^32 = approximately 4.3 billion addresses (EXHAUSTED — all assigned by 2019)
Address Classes	Class A (0-127.*.*.*), Class B (128-191.*.*.*), Class C (192-223.*.*.*)
Private Ranges	10.0.0.0/8, 172.16.0.0/12, 192.168.0.0/16 — used inside LANs, not on internet
Loopback	127.0.0.1 — refers to your own computer (localhost)
Subnet Mask	255.255.255.0 (/24) — defines network vs host portion of IP
Example	192.168.1.100 — typical home network device IP

12.4 IPv6 — Internet Protocol Version 6

> *IPv6 is the latest version of Internet Protocol, designed to replace IPv4 due to address exhaustion. It uses 128-bit addresses providing an astronomically larger address space.*

Feature	Details
Address Size	128-bit address = 16 bytes
Format	8 groups of 4 hexadecimal digits separated by colons: 2001:0db8:85a3:0000:0000:8a2e:0370:7334
Short Form	Consecutive zeros can be shortened: 2001:db8::8a2e:370:7334
Total Addresses	2^128 = 340 undecillion addresses — virtually unlimited (enough for every atom on Earth)
Loopback	::1 — equivalent to IPv4's 127.0.0.1
No NAT Needed	Every device can have a unique global IP — no need for address sharing via NAT
Auto-configuration	Devices can configure themselves automatically (SLAAC — Stateless Address Autoconfiguration)
Built-in Security	IPsec encryption support built into the protocol

IPv4 vs IPv6 Comparison

Feature	IPv4	IPv6
Address Length	32-bit	128-bit
Address Format	Dotted decimal (192.168.1.1)	Hexadecimal with colons (2001:db8::1)
Total Addresses	~4.3 billion	~340 undecillion (3.4 × 10^38)
Address Exhaustion	Exhausted — all allocated	Will never run out
Header Size	20 bytes (variable)	40 bytes (fixed — simpler processing)
NAT Required?	Yes — to handle address shortage	No — every device has unique IP
Security	IPsec optional	IPsec built-in
Broadcast	Uses broadcast	Uses multicast (more efficient)
Configuration	Manual or DHCP	Auto-configuration (SLAAC) + DHCPv6

> **Exam Tip:** IPv4 = 32-bit, ~4.3 billion addresses, 192.168.1.1 format. IPv6 = 128-bit, unlimited addresses, 2001:db8::1 format. IPv4 addresses exhausted in 2019 — IPv6 is the future.

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SECTION 13: NETWORK TROUBLESHOOTING

13.1 Common Network Problems and Solutions

Problem	Likely Cause	Solution Steps
No Internet at all	Router off, ISP outage, cable disconnected, Wi-Fi off	1) Check router power LEDs 2) Restart router/modem 3) Check all cables 4) Check if Wi-Fi is enabled on PC 5) Call ISP if still no connectivity
Wi-Fi shows but won't connect	Wrong password, IP conflict, router issue	1) Forget network → reconnect with correct password 2) Restart router 3) Check if other devices can connect
Slow internet	ISP problem, too many devices, background downloads, far from router	1) Speedtest.net to measure actual speed 2) Restart router 3) Move closer to router 4) Check for background downloads
Can ping IP but can't browse	DNS problem	1) Try browsing using IP directly 2) Change DNS to 8.8.8.8 (Google) in network settings 3) Flush DNS: ipconfig /flushdns in CMD
Limited/No connectivity	IP address not assigned (DHCP problem)	1) ipconfig to check IP 2) If 169.254.x.x, DHCP failed 3) ipconfig /release then /renew 4) Restart router
Cannot access specific website	Site blocked, DNS issue, site is down	1) Try different browser 2) Flush DNS cache 3) Check if site is down (downdetector.com) 4) Try VPN
Network icon shows disconnected (wired)	Cable unplugged, faulty cable, bad port	1) Check cable at both ends 2) Try different cable 3) Try different port on switch/router
High latency / lag in games	Far server, network congestion, Wi-Fi interference	1) Use wired Ethernet instead of Wi-Fi 2) Connect to closer game server 3) QoS settings on router

13.2 Key Network Troubleshooting Commands

Command	How to Use	What It Does
ipconfig	CMD → ipconfig	Shows IP address, subnet mask, and default gateway for all network adapters
ipconfig /all	CMD → ipconfig /all	Full details: IP, MAC address, DHCP server, DNS servers, lease info
ipconfig /release	CMD → ipconfig /release	Releases current IP address from DHCP server
ipconfig /renew	CMD → ipconfig /renew	Requests new IP address from DHCP server
ipconfig /flushdns	CMD → ipconfig /flushdns	Clears the DNS cache — forces fresh DNS lookups for all websites
ping	CMD → ping google.com	Tests connectivity to a host. Shows if reachable and response time in ms.
ping 127.0.0.1	CMD → ping 127.0.0.1	Pings localhost — tests that TCP/IP is working on this computer

Command	How to Use	What It Does
ping 8.8.8.8	CMD → ping 8.8.8.8	Pings Google's DNS — tests internet connectivity (bypasses DNS)
tracert	CMD → tracert google.com	Traces the route (hops) packets take from your PC to destination — finds where connection fails
nslookup	CMD → nslookup google.com	Queries DNS to find IP address of a domain name
netstat	CMD → netstat -an	Shows all active network connections, ports in use, and connection states
netstat -b	CMD → netstat -b (Admin)	Shows which program is using each network connection
net view	CMD → net view	Shows all computers visible on the local network

13.3 Windows Network Troubleshooting Tools

- Network Troubleshooter: Settings → System → Troubleshoot → Other troubleshooters → Internet Connections → Run
- Network Reset: Settings → Network & internet → Advanced network settings → Network reset (use as last resort — removes all network adapters)
- Device Manager: Right-click Start → Device Manager → Network Adapters → check for yellow warning signs → update or rollback driver
- Network and Sharing Center: Control Panel → Network and Sharing Center → see active networks, diagnose problems
- Event Viewer: Search 'Event Viewer' → Windows Logs → System → look for Network-related errors
- Resource Monitor: Task Manager → Performance → Open Resource Monitor → Network tab — see which process is using most bandwidth

13.4 Troubleshooting Wi-Fi Specifically

- Step 1 — Check Wi-Fi Switch: Ensure Wi-Fi is ON (Fn+F2 or F5 on laptops; Windows taskbar Wi-Fi toggle)
- Step 2 — Restart Router: Unplug power → wait 30 seconds → plug back in → wait 2 minutes for full restart
- Step 3 — Forget & Reconnect: Click Wi-Fi network → Forget → reconnect with correct password
- Step 4 — Run Troubleshooter: Right-click Wi-Fi icon in taskbar → Troubleshoot problems
- Step 5 — Check Driver: Device Manager → Network Adapters → Wi-Fi adapter → Update driver
- Step 6 — Reinstall Driver: If update doesn't help, uninstall driver → restart → Windows reinstalls automatically
- Step 7 — Check Encryption: If still failing, router may need WPA2 instead of WPA3 for older devices

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SECTION 14: QUICK REVISION POINTS

Key Points for Exam

Networks

- LAN = local building | WAN = worldwide | Internet = biggest WAN | Wi-Fi = wireless LAN | Bluetooth = < 10 metres
- Switch = MAC address, Layer 2. Router = IP address, Layer 3. Hub = broadcasts to all (dumb). Gateway = connects different protocol networks
- IPv4 = 32-bit, 4.3 billion addresses (exhausted). IPv6 = 128-bit, unlimited

Internet & Protocols

- TCP = reliable (resends lost packets). UDP = fast but unreliable (video, gaming). IP = routing
- HTTP port 80 (unsecure). HTTPS port 443 (secure). FTP port 21. SMTP=25. POP3=110. DNS=53
- DNS = translates domain name to IP. DHCP = auto-assigns IP addresses
- URL structure: protocol://subdomain.domain.TLD/path?query#fragment

Web & Security

- HTTPS + padlock = secure site. HTTP = not secure. Never enter password on HTTP site.
- Phishing = fake website. Ransomware = encrypts files. Spyware = monitors activity. Worm = self-replicates
- Radio button = select ONE. Checkbox = select MANY. Dropdown = pick from list.
- Ctrl+D = bookmark. Ctrl+P = print. Ctrl+H = history. Ctrl+J = downloads. Ctrl+T = new tab

Troubleshooting Commands

- ipconfig = see IP. ipconfig /flushdns = clear DNS cache. ping 8.8.8.8 = test internet
- tracert = trace route. nslookup = DNS lookup. netstat = active connections
- First step always: RESTART router and computer

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SECTION 15: IMPORTANT MCQ QUESTIONS

Multiple Choice Questions (MCQs)

> *20 important exam questions. Correct answer marked with ✓ and explanation provided.*

Q1. LAN stands for:

(a) Large Area Network
(b) Local Area Network ✓
(c) Linked Area Network
(d) Linear Access Network

Explanation: *LAN = Local Area Network. It connects computers in a limited area like one building or campus. It is privately owned and provides high-speed communication. WAN = Wide Area Network (worldwide).*

Q2. The Internet is the world's largest example of which type of network?

(a) LAN
(b) MAN
(c) WAN ✓
(d) PAN

Explanation: *The Internet is the world's largest WAN (Wide Area Network) — it connects millions of LANs and individual devices globally. It spans countries and continents.*

Q3. DNS stands for and its function is:

(a) Data Network Service — stores data
(b) Domain Name System — translates domain names to IP addresses ✓
(c) Digital Network Security — protects networks
(d) Dynamic Node Service — assigns IP addresses

Explanation: *DNS = Domain Name System. It translates human-readable domain names (google.com) to numerical IP addresses (142.250.x.x) that computers use to locate each other on the internet.*

Q4. Which protocol is used to securely transfer web pages with encryption?

(a) HTTP (port 80)
(b) FTP (port 21)
(c) HTTPS (port 443) ✓
(d) SMTP (port 25)

Explanation: *HTTPS = HyperText Transfer Protocol Secure (port 443). It encrypts data between browser and server using SSL/TLS. HTTP (port 80) is unencrypted. Always use HTTPS for banking and login pages.*

Q5. Which of the following indicates a SECURE website?

(a) http:// in the URL
(b) A warning message in the browser
(c) https:// and a padlock icon in the address bar ✓
(d) A green background on the page

Explanation: *HTTPS + padlock icon = secure connection (encrypted with SSL/TLS). HTTP = not secure. Never enter passwords or payment info on plain HTTP sites. The padlock confirms the certificate is valid.*

Q6. What does URL stand for?

(a) Universal Resource Link
(b) Uniform Resource Locator ✓

(c) Unique Reference Label
(d) Universal Retrieval Language

Explanation: *URL = Uniform Resource Locator. It is the complete web address of a specific resource. Example: https://www.google.com/search?q=AI — includes protocol, domain, path, and query parameters.*

Q7. ISP stands for:

(a) Internet Service Platform
(b) Internal Software Protocol
(c) Internet Service Provider ✓
(d) Internet Security Protocol

Explanation: *ISP = Internet Service Provider — a company that provides internet access. Examples in India: Jio, Airtel, BSNL, Vi, ACT Fibernet. You pay the ISP for your internet connection.*

Q8. Which network device operates at Layer 2 and uses MAC addresses to forward data?

(a) Router
(b) Hub
(c) Switch ✓
(d) Modem

Explanation: *A Switch operates at OSI Layer 2 (Data Link Layer) and uses MAC addresses to send data only to the intended device — unlike a Hub which broadcasts to all. Router uses IP addresses at Layer 3.*

Q9. Which connection method is always-on and much faster than dial-up?

(a) Dial-up
(b) ISDN
(c) Broadband ✓
(d) Telephone modem

Explanation: *Broadband provides always-on, high-speed internet without needing to dial. Speeds range from 1 Mbps (ADSL) to 10 Gbps (fiber). Dial-up is obsolete at max 56 Kbps and not always-on.*

Q10. BCC in email means:

(a) Basic Copy Carbon
(b) Blind Carbon Copy ✓
(c) Backup Copy Correspondence
(d) Browser Cache Control

Explanation: *BCC = Blind Carbon Copy. Email is sent to BCC recipients but their addresses are hidden from other recipients. CC (Carbon Copy) shows all addresses to everyone. Use BCC for mass emails to protect privacy.*

Q11. The IPv4 address 127.0.0.1 refers to:

(a) Your router's IP address
(b) Google's DNS server
(c) Your own computer (localhost / loopback) ✓
(d) Your ISP's gateway

Explanation: *127.0.0.1 is the loopback address (localhost) — it always refers to the computer itself. Used to test if TCP/IP is working locally. In IPv6, ::1 is the equivalent loopback address.*

Q12. Which form control allows selecting ONLY ONE option from a group?

(a) Checkbox
(b) Text Box
(c) Radio Button ✓

(d) List Box

Explanation: *Radio Buttons allow selecting ONLY ONE option from a group — selecting one automatically deselects the others. Checkboxes allow multiple selections. Example: Gender selection (Male/Female/Other).*

Q13. What does the command 'ipconfig /flushdns' do?

(a) Shows your IP address
(b) Releases your IP from DHCP
(c) Clears the DNS cache to force fresh lookups ✓
(d) Resets network settings completely

Explanation: *ipconfig /flushdns clears the local DNS cache. Useful when websites don't load despite working internet — old cached DNS entries may point to wrong IP. Forces fresh DNS resolution.*

Q14. IPv6 addresses are how many bits long?

(a) 32 bits
(b) 64 bits
(c) 128 bits ✓
(d) 256 bits

Explanation: *IPv6 uses 128-bit addresses — providing 2^128 ≈ 340 undecillion unique addresses. IPv4 used 32-bit addresses (only 4.3 billion), which ran out by 2019. IPv6 ensures enough addresses for billions of IoT devices.*

Q15. Which of the following is a privacy-focused search engine that does NOT track users?

(a) Google
(b) Bing
(c) DuckDuckGo ✓
(d) Yahoo

Explanation: *DuckDuckGo is a search engine that does not track your searches, store personal data, or build an advertising profile. Google, Bing, and Yahoo track and use search data for targeted advertising.*

Q16. FTP is primarily used for:

(a) Sending emails
(b) Browsing web pages
(c) Transferring files between computers ✓
(d) Making video calls

Explanation: *FTP = File Transfer Protocol (port 21). Used for uploading and downloading files between computers — particularly for uploading website files to a web hosting server. SFTP adds SSH encryption.*

Q17. What is a Hyperlink?

(a) A high-speed internet connection
(b) A secure password format
(c) A clickable element that takes you to another webpage or resource ✓
(d) A type of email attachment

Explanation: *A hyperlink is a clickable text or image on a web page that navigates to another page, website, file, email, or section of the same page when clicked. It is the fundamental navigation mechanism of the WWW.*

Q18. Wi-Fi 6 is based on which IEEE standard?

(a) 802.11n
(b) 802.11ac
(c) 802.11ax ✓

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(d) 802.11g

Explanation: *Wi-Fi 6 = 802.11ax. Wi-Fi 5 = 802.11ac. Wi-Fi 4 = 802.11n. Wi-Fi 6 operates on 2.4/5/6 GHz bands, supports up to 9.6 Gbps, and handles crowded environments (stadiums, offices) better.*

Q19. Which command traces the route that packets take from your computer to a destination?

(a) ping
(b) ipconfig
(c) tracert ✓
(d) netstat

Explanation: *tracert (Trace Route) shows each 'hop' (router) that a packet passes through from your PC to the destination. Useful for identifying exactly where in the network a connection is failing or slow.*

Q20. WWW was invented by:

(a) Bill Gates
(b) Tim Berners-Lee ✓
(c) Steve Jobs
(d) Vint Cerf

Explanation: *Tim Berners-Lee invented the World Wide Web in 1989 at CERN, Switzerland. He created the first web browser, web server, and wrote HTTP and HTML. Note: Vint Cerf co-invented the Internet (TCP/IP protocol).*

Best of Luck for Your Exam!

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