Essential Internet Concepts: A Learning Document

# 1. How Does the Internet Work?

The internet is a global network of interconnected devices (computers, servers, routers) that communicate using standardized protocols.

## Key Process:

- Your device (e.g., laptop) sends a request (e.g., "Open google.com") as data packets.  
- Packets travel via routers and submarine cables/fiber optics to reach their destination.  
- The target server (e.g., Google’s server) processes the request and sends back packets.  
- Your device reassembles these packets into the final content (e.g., the Google homepage).

## Core Technologies:

- TCP/IP: Breaks data into packets, ensures reliable delivery.  
- Routers: Direct traffic between networks.

# 2. What is HTTP?

HTTP (HyperText Transfer Protocol) governs communication between web browsers and servers.

## Purpose:

Fetches resources (HTML pages, images).

## How It Works:

- Browser sends an HTTP request (e.g., GET /index.html).  
- Server responds with an HTTP response (e.g., 200 OK + the HTML file).  
- HTTPS: Secure version encrypts data using SSL/TLS to prevent eavesdropping.

# 3. What is a Domain Name?

A domain name is a human-readable address for websites (e.g., google.com).

## Purpose:

Translates user-friendly names into machine-readable IP addresses (e.g., 142.250.185.206).

## Structure:

- Top-Level Domain (TLD): .com, .org, .net.  
- Second-Level Domain (SLD): google in google.com.

# 4. What is Hosting?

Hosting provides storage and access for website files on a server.

## Types:

- Shared Hosting: Multiple sites share one server (cost-effective).  
- Dedicated Hosting: Entire server for one site (high performance).  
- Cloud Hosting: Resources spread across multiple servers (scalable).

## Role:

When you visit a site, the hosting server delivers its files (HTML, images) to your browser.

# 5. DNS and How It Works

DNS (Domain Name System) acts as the internet’s 'phonebook,' converting domain names → IP addresses.

## DNS Lookup Process:

- You type example.com → Browser checks its local cache.  
- If not found, queries a DNS resolver (usually your ISP).  
- Resolver asks root servers → directs to TLD servers (.com).  
- TLD servers point to the domain’s authoritative name server, which returns the IP.

## Caching:

Stores IPs temporarily to speed up future requests.

# 6. Browsers and How They Work

A browser (Chrome, Firefox) renders web content from servers.

## Workflow:

- Parsing: Converts HTML/CSS/JavaScript into a DOM (Document Object Model).  
- Rendering: Builds the page layout (render tree) and "paints" pixels on-screen.  
- Execution: Runs JavaScript to add interactivity.

## Key Components:

- Rendering Engine: Blink (Chrome), Gecko (Firefox).  
- JavaScript Engine: V8 (Chrome), SpiderMonkey (Firefox).