Theory Assignment

Q1: Explain the process of establishing an HTTP request. Describe the various Header Fields used in HTTP.

Ans:- HTTP Request Process:

1. The client (browser) enters a URL.
2. DNS resolves the domain name to an IP address.
3. A TCP connection is established with the server.
4. The client sends an HTTP request message.
5. The server processes the request and sends an HTTP response.
6. The connection is closed or kept alive.

HTTP Header Fields:

- Host - Specifies the server domain.
- User-Agent - Browser and OS details.
- Accept - Type of response expected.
- content-Type - Type of data sent.
- content-length - Size of request body.
- Authorization - Credentials for authentication.
- Cookie - Sends stored cookies to server.

Q2: What is meant by Status Code? Define HTTP status codes 200 and 400.

Ans: Status code defines an HTTP code is 3-digit number sent by the server to indicate the result of a client request.

HTTP Status Codes:

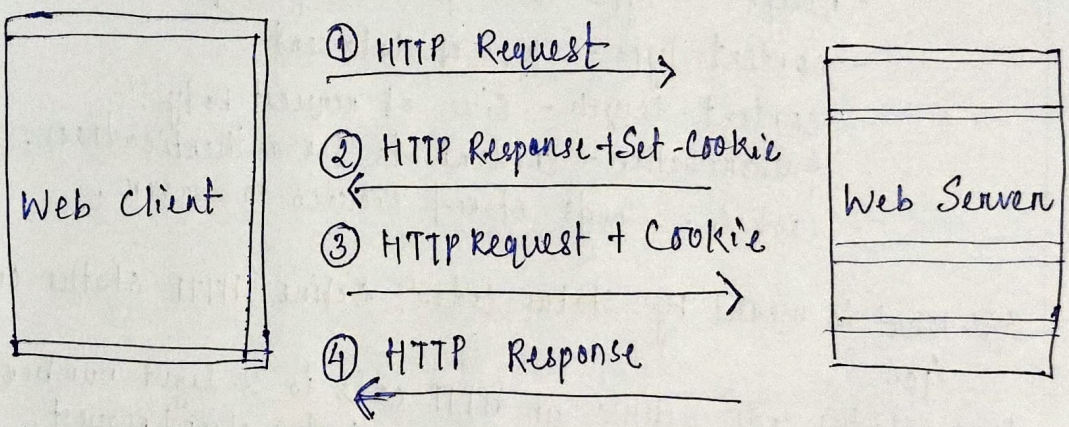
- 200 OK → Defines, Request was successful.
  → Server returned the requested data.
- 400 Bad Request → Request is invalid or malformed.
  → Server cannot process it due to client error.

Q3: What are Cookies in the context of HTTP? Explain their purpose and functioning, using a diagram for illustration.

Ans: Cookies are small pieces of data stored on the client's browser by the server.

Purpose:
- → Session management
- → User authentication
- → Storing preferences
- → Tracking user activity.

Functioning
- → Server sends cookie using Set-cookie header.
- → Browser stores the cookie.
- → Cookie is sent back with every request.
- → Server identifies the user using the cookie.



Q4: Explain the differences between WebSocket and Long Polling.

Ans:

	WebSocket	Long Polling
connection →	Persistent	Repeated HTTP
communication →	Full-duplex	One-way
Latency →	very Low	High
Efficiency →	High	Low
Use case →	Real-time apps	chat, notifications.

Q5: Describe XML DTD, including its key features, advantages, and disadv. Write DTD for the given XML document.

Ans: XML DTD defines the structure and rules of an XML document.

Key features →

→ Defines elements and attributes.
→ Ensures valid XML structure.
→ Supports internal and external DTD

Advantages →

- Simple and easy.
- Improves data consistency.

Disadvantages →

- Not namespace-aware
- Limited data typing.

DTD for the Given XML:

```
<!DOCTYPE booklib [
<!ELEMENT booklib (book+, pubinfo)>
<!ELEMENT book (author, title)>
<!ELEMENT author(#PCDATA)>
<!ATTLIST author ac CDATA #IMPLIED bank CDATA#IMPLIED>
<!ELEMENT title(#PCDATA)>
<!ATTLIST title bksrl CDATA #REQUIRED>
<!ELEMENT pubinfo (pcom, vol, pdate)>
<!ELEMENT pcom (#PCDATA)>
<!ELEMENT vol (#PCDATA)>
<!ELEMENT pdate (#PCDATA | month)*>
<!ELEMENT month (#PCDATA)>
]>
```

Q6: Explain why JSON is used. Discuss JSON Schema.

Ans: Why JSON is used.

→ Lightweight and fast
→ Easy to read and write
→ Language independent
→ widely supported by APIs

JSON Schema.

→ JSON Schema defines the structure of JSON data. It includes keywords like type, properties, required, etc.

Significance: → It validates JSON data to ensure it meets required formats (e.g. ensuring a "price" field is a number and not a string) before processing it.
→ Improves API reliability.
→ Ensures correct data format.

Q7: Explain AJAX, including its key features and advantages. Explain how AJAX loads data synchronously and fetches API, including its workflow.

Ans: AJAX - (Asynchronous JavaScript and XML).
- AJAX allows data exchange with server without reloading the page.

Key features: → Asynchronous communication.
→ Faster response
→ partial page update.
→ uses XMLHTTPRequest/Fetch API

Advantages: → Improved performance.
→ Better user experience.
→ Reduced server load.

AJAX workflow:

user event (button click)

↓

JavaScript creates XHR/Fetch Request.

↓

Asynchronous HTTP request to server. (e.g. API endpoint)

↓

Server processes and returns data (JSON/XML)

↓

JavaScript handles response

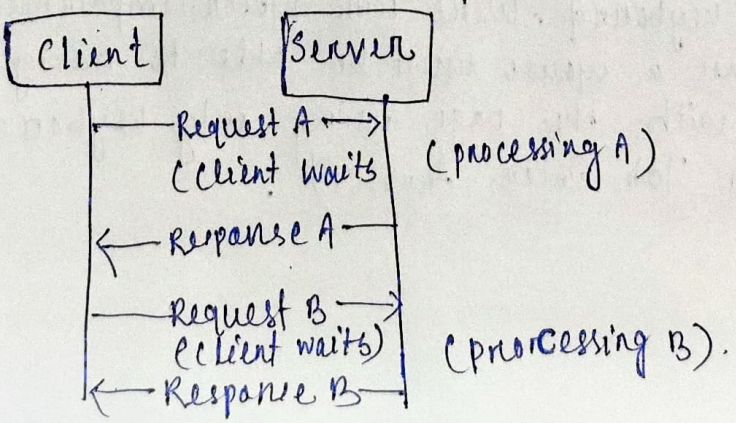
↓

Dom updates specific page elements without reload.

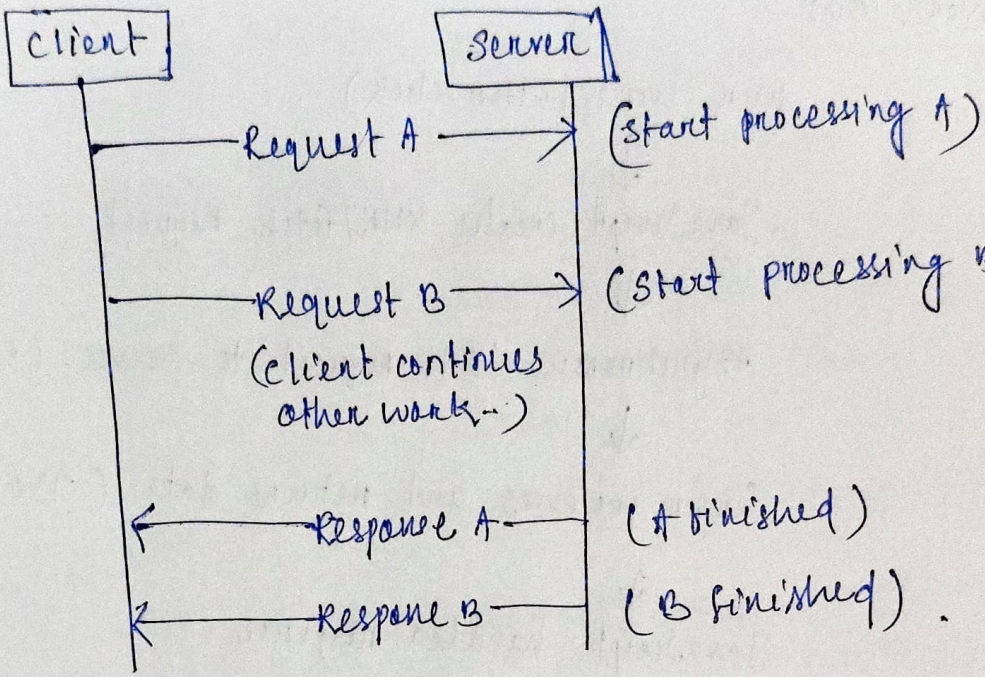
Q8: Describe the differences between Synchronous and Asynchronous communication, using diagrams to illustrate both.

Ans:

	Synchronous	Asynchronous
Execution →	Blocking	Non-Blocking
waiting →	Required	Not required
speed →	slow	fast
Example →	Form Submit	AJAX, fetch.



∴ Synchronous.



∴ Asynchronous

Q9: Write about WCAG. Explain any two guidelines.

Ans: WCAG: (Web content Accessibility Guidelines).

- WCAG means WCAG ensures web content is accessible to people with disabilities.

Two Guidelines:

1. Text Alternatives (Perceivable): provide text alternatives for any non-text content so that it can be changed into other forms people need, such as large print, braille, speech, symbols, or simple language. (e.g. using alt tags on images).

2. Keyboard Accessible (Operable): Make all functionality available from keyboard. users with motor impairments who cannot use a mouse must be able to navigate and interact with the page using only keyboard controls. (like Tab, Enter, Arrows).

Q10: Importance of Form Accessibility and Keyboard Support.

Ans: Importance:

- Screen Readers: Blind users rely on screen readers that navigate forms using keyboard shortcuts.
- Motor Disabilities: Users who cannot use a mouse rely on the Tab key to jump between form fields.

Example:

```
<label for="email">Email:</label>
<input type="email" id="email" required>
```

- Labels improve screen-reader support.
- Keyboard users can navigate easily.

Q11: Compare the 3 main types of mobile applications: Native, Web, and Hybrid.

Ans:

	Native Apps	Web Apps	Hybrid Apps
Development →	Built for specific OS (IOS, Android, etc).	Built using web tech running in a browser.	Web apps wrapped in a native container (React, Native, Flutter).
performance →	Highest performance	Depends on internet connection and browser capabilities	Good performance but slightly slower than native.
Device Access →	Full Access to camera, GPS, contacts, etc.	Limited access to device hardware.	Access to device features via plugins/APIs
Distribution →	Appstores (Play store, Appstore).	Accessed via URL	App stores.