PRACTICE PAPER SET 3

Web Computing (Paper Code: 48892)

T.E. Computer Engineering & AI-DS, Semester V

Duration: 3 Hours | Total Marks: 80

By: Nitin Gupta

Instructions to Candidates:

1. Question No. 1 is compulsory
2. Attempt any three questions from remaining five questions
3. Assume suitable data if necessary and justify the assumptions
4. Figures to the right indicate full marks

Q1. Answer the following questions: [20 Marks]

A. [5 Marks]

Explain the role of XML and JSON in web communication. Describe a scenario where XML would be preferred over JSON.

B. [5 Marks]

Write a JavaScript code to display a digital clock on a web page that updates every second. Include hours, minutes, and seconds.

C. [5 Marks]

What is a single page application (SPA)? Explain its advantages and how React facilitates building SPAs.

D. [5 Marks]

Write a JavaScript code to set a cookie on the user's computer with name "username", value "student123", and expiry of 7 days.

Q2. [20 Marks]

A. [10 Marks]

What is React.js? Discuss different features and advantages of React.js. Explain the concept of Virtual DOM and how it improves performance. Why is React popular for modern web development?

B. [10 Marks]

Explain different types of Node.js modules. What are the core modules that provide essential functionality? Write a Node.js program that uses the 'path', 'os', and 'url' core modules to display system information.

Q3. [20 Marks]

A. [10 Marks]

Describe how to manage state in a React application using Redux. Include an example with:

1. Actions
2. Reducers
3. Store configuration
4. Connecting components to Redux store

Explain the complete data flow in Redux architecture.

B. [10 Marks]

Write a stepwise process to create an application using ReactJS. Create a "Hello World" app that:

1. Displays "Hello World" message
2. Has a button to change the message
3. Uses functional components
4. Implements state management with useState

Provide complete code with explanations for each step.

Q4. [20 Marks]

A. [10 Marks]

Compare and contrast the use of classes and inheritance in JavaScript with functional programming paradigms. Provide examples demonstrating:

1. Class-based approach
2. Functional approach with closures

3. Prototypal inheritance
4. When to use each approach

B. [10 Marks]

Write code to process an online Alumni registration form for your college. The form should include:

- Name (required, alphabets only)
- Date of Birth (required, calculate age >= 22 years)
- Email ID (required, must contain @ and .)
- Phone (10 digits)
- Hobbies (checkboxes: Reading, Sports, Music, Coding)
- Branch (radio buttons: Computer, IT, Electronics, Mechanical)

Implement complete JavaScript validation with appropriate error messages. The form should not submit if validation fails.

Q5. [20 Marks]

A. [10 Marks]

Explain the architecture of Node.js with a neat diagram. Describe:

1. Event-driven programming model
2. Non-blocking I/O operations
3. Single-threaded event loop
4. Thread pool
5. How Node.js handles concurrent requests

Explain why Node.js is suitable for I/O intensive applications.

B. [10 Marks]

What is ExpressJS? Explain the features of ExpressJS. Write an Express application that:

1. Uses middleware for logging requests
2. Serves static files from a 'public' directory
3. Implements cookie-parser middleware
4. Has routes for: GET /, POST /login, GET /profile/:id
5. Includes error handling middleware

Q6. [20 Marks]

A. [10 Marks]

Describe the Event Loop in Node.js. Explain different phases:

1. Timers
2. Pending callbacks
3. Idle, prepare
4. Poll
5. Check
6. Close callbacks

Provide an example demonstrating the order of execution in event loop with setTimeout, setImmediate, and process.nextTick().

B. [10 Marks]

Create a web page using HTML and JavaScript that demonstrates:

1. An image that moves across the screen from left to right continuously
2. Buttons to control animation: Start, Stop, Reset
3. Input field to control animation speed
4. Display current position of the image

Provide complete HTML and JavaScript code with detailed explanation of the implementation.

END OF PAPER

Best of luck!

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