

CLO #: 1

17
[20 marks]

Q1: Multiple choice questions

1. Which event is triggered when the user clicks on an element in JavaScript?
a) onchange
b) ☒ onclick
c) onhover
d) onsubmit
2. Which jQuery method is used to hide an element?
a) hideElement()
b) display(false)
c) ☒ hide()
d) none()
3. Which lifecycle is closest in behavior to `useEffect(() => {}, [])`?
a) `componentDidUpdate`
b) `componentWillUnmount`
c) ☒ `componentDidMount`
d) `componentWillMount`
4. Redux stores data in which format?
a) Array
b) String
c) ☒ Object
d) JSON file
5. What command is used to initialize a Node.js project?
a) `node init`
b) ☒ `npm init`
c) `npm start`
d) `init node`
6. What does `useRef` return?
a) A function
b) ☒ A mutable object with a `.current` property
c) A DOM element directly
d) A copy of state
7. In Redux Toolkit, `createAsyncThunk` is used for:
a) Creating reducers
b) ☒ Handling async logic
c) Writing middleware
d) Setting initial state
8. In Express.js, what does `next()` do inside middleware?
a) Ends the request
b) ☒ Moves to the next middleware
c) Skips routing
d) Logs error

9. What is the role of `path.join()` in Node.js?

a) Combines string values

☒ c) Normalizes and joins paths

b) Joins two servers

d) Creates a new directory

10. Which method is used in Mongoose to update one document by ID?

a) `update()`

c) `updateOne()`

b) `updateId()`

☒ d) `findByIdAndUpdate()`

11. What will the following path method return?

`path.basename('/home/user/file.txt');`

a) `/home/user`

c) `user`

☒ b) `file.txt`

d) `.txt`

12. What method is used in Mongoose to find a document by ID?

a) `findBy()`

c) `findById()`

b) `getById()`

☒ d) `find()`

13. What does `res.cookie()` in Express.js do?

a) Sends cookies to the server

☒ c) Sets a cookie in response

b) Reads cookies

d) Encrypts cookies

14. What is the default behavior of Redux if no middleware is used?

a) Async by default

c) Automatically fetch data

☒ b) Purely synchronous

d) Returns null

15. What does `fs.readFileSync("file.txt")` return?

a) A stream

☒ c) File contents as string

b) Buffer

d) File path

16. Which MongoDB command would retrieve all users aged greater than 25?

a) `db.users.find({ age: >25 })`

☒ c) `db.users.find({ age: { $gt: 25 } })`

b) `db.users.filter({ age: { $gt: 25 } })`

d) `db.users.get({ age: >25 })`

17. In Express, what does this code do?

`app.use(express.json());`

☒ a) Parses JSON in incoming requests

c) Encrypts the JSON payload

b) Validates incoming JSON

d) Creates routes

18. What does this Node.js code log?

`const fs = require('fs');`

`fs.readFile('file.txt', 'utf8', (err, data) => {`

`if (err) throw err;`

`console.log('1', data);`

`});`

`console.log('2');`

☒ a) 1 [file content], then 2

c) Only 2

b) 2, then 1 [file content]

d) Throws an error before logging anything

19. What does this `useEffect` block do?

`useEffect(() => {`

`window.addEventListener('resize', handleResize);`

`return () => window.removeEventListener('resize', handleResize);`

`}, []);`

- a) Adds resize event permanently
c) Adds and then cleans up on unmount
b) Throws error
d) Runs only after window loads
20. What will the following Node.js code log?

```
const EventEmitter = require('events');  
const emitter = new EventEmitter();
```

```
emitter.on('greet', name => {  
  console.log(`Hello, ${name}`);  
});
```

```
emitter.emit('greet', 'ChatGPT');
```

- a) Hello
c) undefined

- b) Hello, ChatGPT
d) Throws error

CLO #: 3

[30 mark]

Q2: Answer all questions. Each question carries 6 marks.

1. Explain the difference between `useMemo` and `useCallback` in React.
 - a. When would you use each in a performance-optimized React app?
 - b. Provide a brief code snippet demonstrating both in context (e.g., preventing re-renders or recalculations).
2. In Express.js, describe the role of middleware in authentication and error handling.
 - a. What are the different types of middleware?
 - b. Write a custom Express middleware that logs incoming requests and checks if a user is authenticated based on a token in headers
3. Compare and contrast `findOneAndUpdate` vs `updateOne` in Mongoose.
 - a. Discuss the return values and use-cases for each.
 - b. Provide a code sample where one is preferred over the other, such as updating and returning user profile data.
4. Explain how Redux Toolkit's `createSlice` and `createAsyncThunk` simplify Redux architecture.
 - a. What problems of classic Redux do they solve?
 - b. Show a minimal example where `createAsyncThunk` is used to fetch data, and `createSlice` handles the response lifecycle.
5. Describe how React renders JSX and how the Virtual DOM optimizes performance.
 - a. What happens under the hood when `setState` is called?
 - b. Use a small example to demonstrate how unnecessary re-renders can be prevented with `React.memo`

CLO #: 4

[30 marks]

Q3: Analyze the requirements and propose the solution

1. Design a complete Redux Toolkit + React workflow for managing a product list. [15]

You are building a product list view for an e-commerce app. Your task is to:

1. Create a Redux slice to manage product state. [6]
2. Use `createAsyncThunk` to fetch products from a fake API (e.g., <https://fakestoreapi.com/products>). [5]
3. Use `useEffect()` in a React component to dispatch the thunk when the component mounts. [2]
4. Display a loading state, error messages (if any), and the product list. [2]

Sample API response:

```
[
  { "id": 1, "title": "Product A" },
  { "id": 2, "title": "Product B" }
]
```

Note: You must do the complete implementation not only the slice but for the Redux toolkit store as well.

2. Build a secure authentication system using Express and MongoDB. [15]

- a. User Registration: [4]
 - i. Store user with hashed password using `bcryptjs`
- b. Login Endpoint: [4]
 - i. Verify credentials
 - ii. Generate JWT token with secret
- c. JWT Middleware: [4]
 - i. Protect private routes using `jsonwebtoken`
- d. Mongoose User Model with validation [3]

Sample user object:

```
{
  "name": "John",
  "email": "john@example.com",
  "password": "123456"
}
```

Sample output:

```
{ "message": "User registered successfully" }
```

Sample Login input:

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```
{  
  "email": "john@example.com",  
  "password": "123456"  
}
```

Note: You have to provide complete implementation with routes using best practices. You have to add authorization for two routes and leave one route without authorization.

state, attr-value)