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**GASABO DISTRICT**

**DISTRICT COMPREHENSIVE ASSESSMENT, RTQF LEVEL… 2023-2024**

**SECTOR:** **ICT and Multimedia**

**TRADE: Software Development**

**MODULE CODE:** **SWDBD 401**

**MODULE NAME:** **Develop a Backend Application using Node Js**

**DATE OF EXAM: 15/03/2024**

**DURATION: 3 HOURS**

**SCHOOL YEAR: 2023-2024**

**TERM: 2**

**Instructions:**

1. **Attempt all questions in section A (55 Marks)**
2. **Attempt three questions in section B (30 Marks)**
3. **Attempt one question in section C (15 Marks)**

**ATTEMPT ALL QUESTIONS IN SECTION A /(55 Marks)**

1. Explain the significance of Node.js in backend development. [5 Marks]

2. Differentiate between synchronous and asynchronous programming in Node.js. Provide examples for each. [4 Marks]

3. Discuss the purpose and usage of npm (Node Package Manager) in Node.js development. [4 Marks]

4. What is middleware in the context of Express.js? How is it used in building web applications? [5 Marks]

5. Explain the role of callbacks in Node.js. Provide a code example demonstrating the use of a callback function. [4 Marks]

6. Discuss the concept of RESTful APIs and how they are implemented in Node.js using Express.js. [5 Marks]

7. Describe the purpose and benefits of using MongoDB as a NoSQL database with Node.js applications. [5 Marks]

8. Explain the concept of routing in Express.js. Provide an example of defining multiple routes. [4 Marks]

9. Discuss the role of Promises in handling asynchronous operations in Node.js. Provide an example demonstrating the use of Promises. [4 Marks]

10. What are the advantages of using the MVC (Model-View-Controller) architecture pattern in Node.js web applications? [4 Marks]

11. Explain the concept of middleware chaining in Express.js. Provide an example illustrating the chaining of middleware functions. [4 Marks]

12. Discuss the purpose of environment variables in Node.js applications. How are they accessed and utilized? [4 Marks]

13. Explain the role of error handling middleware in Express.js applications. Provide an example of implementing error handling middleware. [5 Marks]

14. Discuss the use of authentication and authorization middleware in Node.js web applications. Explain their importance and implementation. [5 Marks]

15. What are WebSockets? How are they used in real-time communication in Node.js applications? [4 Marks]

16. Explain the purpose and usage of JSON Web Tokens (JWT) for authentication in Node.js applications. [4 Marks]

17. Describe the steps involved in deploying a Node.js application to a production environment. [5 Marks]

**2. ATTEMPT THREE QUESTIONS IN SECTION B /(30 Marks)**

1. Discuss the role of Express.js in building RESTful APIs. Provide examples of defining routes and handling HTTP requests. [10 Marks]

2. Explain the concept of middleware in Express.js. Discuss various types of middleware and their usage in web applications. [10 Marks]

3. Describe the integration of MongoDB with Node.js using Mongoose. Discuss the advantages of using Mongoose for database operations. [10 Marks]

4. Discuss the use of authentication middleware in Express.js for user authentication. Explain the implementation of authentication using JWT (JSON Web Tokens). [10 Marks]

5. Explain the concept of sessions and cookies in Express.js applications. Discuss their usage and security considerations. [10 Marks]

**3.** **ATTEMPT ONE QUESTION IN SECTION C /(15 Marks)**

1. Discuss the role of testing in Node.js application development. Explain different testing strategies and tools available for testing Node.js applications. [15 Marks]

2. Describe the deployment process of a Node.js application to popular hosting platforms such as Heroku or AWS. Include steps for configuration and monitoring. [15 Marks]

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