## Final Assessment Test(FAT) - Nov/Dec 2024

| Programme | B.Tech. | | |
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| Course Code | BCSE355L | Semester | Fall Semester 2024-25 |
| Course Title | AWS Solutions Architect | Faculty Name | Prof. Om Kumar C U |
| | | Slot | B1+TB1 |
| | | Class Nbr | CH2024250101405 |
| Time | 3 hours | Max. Marks | 100 |

### General Instructions

- Write only Register Number in the Question Paper where space is provided (right-side at the top) & do not write any other details.

### Course Outcomes

1. Demonstrate an in-depth understanding of AWS Cloud architecture, services, and design patterns.

2. Apply security and compliance measures effectively in AWS architectures using encryption, access controls, and monitoring.

3. Optimize cost and performance by selecting appropriate AWS services and utilizing cost-effective resource management strategies.

4. Configure and manage advanced AWS networking features, storage solutions, database technologies, and compute resources.

### Section - I
### Answer all Questions (4 × 10 Marks)

*M - Marks

| Q.No | Question | *M | CO | BL |
|---|---|---|---|---|
| 01. | Mr. Relu is working as a solution architect at EduTechPro, a company that offers a cloud-based learning management system (LMS) for schools and universities. The platform manages large volumes of student data, facilitates online courses, and supports real-time video streaming for virtual classrooms. EduTechPro' recently migrated its infrastructure to AWS to handle the increasing demand for remote learning. Mr. Relu is tasked with designing secure, scalable network architecture to optimize traffic and ensure data privacy while providing a seamless user experience. <br><br> How will you help Mr. Relu design a secure and scalable AWS network architecture for EduTechPro's learning management system using VPC components? Your solution should include all componets of VPC and security groups. Explain how will you help Mr. Relu would route traffic securely between public-facing components and internal systems, while ensuring data privacy for student information. <br><br> i) Provide a diagram to visualize your design.(5 Marks) <br> ii) Explain the role of each component. (5 Marks) | 10 | 1 | 2 |

| 02. | Mr XYZ, working as solution architect in SecureHealth Inc. which provides a cloud-based healthcare management platform. The platform handles sensitive patient data, processes medical records, and offers real-time appointment scheduling for healthcare providers. Mr XYZ Company has recently migrated its infrastructure to AWS. | 10 | 1 | 1 |
|---|---|---|---|---|

What responsibilities does Mr. XYZ hold as the Solution Architect in ensuring the platform's compliance with ISO regulations, and how do AWS and the company understand their individual security roles according to the AWS Shared Responsibility Model? (10 Marks)

| 03. | Ms. Sarah Jenkins is employed with CloudSphere Technologies as a Cloud Architect. A security incident has occurred within your AWS environment. You suspect that an IAM user has compromised credentials. You need to investigate the incident to identify the responsible user, understand the scope of the breach, and take appropriate remediation steps. | 10 | 2 | 2 |
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i) Which AWS monitoring services can assist Ms. Sarah Jenkins in investigating the current scenario? ( 4 Marks)

ii) How can the identified AWS services assist Ms. Sarah Jenkins to address the issue? ( 6 Marks)

| 04. | Ms. Emily Turner is employed with DataBridge Solutions as a Solution Architect. She works for a health tech startup that has developed a telemedicine platform. The platform allows patients to schedule virtual consultations with doctors, and it includes features such as appointment reminders, prescription notifications, and follow-up surveys. However, as the platform has grown in popularity, the company faces several challenges: | 10 | 4 | 4 |
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The current system sometimes fails to send notifications (SMS, email) when a patient's appointment is approaching, which results in missed appointments. Notifications are sent individually, causing performance issues during high-traffic times, such as when reminders for thousands of patients are sent simultaneously. Some processes, such as sending follow-up surveys after consultations, involve multiple systems (e.g., the survey system, the patient records database) and can get delayed or cause bottlenecks.

How would Ms. Emily Turner redesign the notification and reminder system using SQS (Simple Queue Service) and SNS (Simple Notification Service) to:

i) Ensure notifications are delivered reliably and at scale, even during periods of high traffic? (5 Marks)

ii) Efficiently manage the different types of notifications (appointment reminders, prescription notifications, follow-up surveys) and their delivery to multiple endpoints? (5 Marks)

## Section - II
### Answer all Questions (4 × 15 Marks)

| Q.No | Question | *M | CO | BL |
|---|---|---|---|---|
| | | *M - Marks | | |
| 05. | Mr James working as a cloud architect at SmartMedia Corp that manages a global video streaming platform. The platform hosts a variety of content, including movies, TV shows, and user-generated videos. To optimize storage and reduce costs, SmartMedia uses Amazon S3 to store all the media assets and related data. The company has different content categories, such as new releases, archived content and user-generated content.  i) Design an appropriate S3 lifecycle transition rules for different content categories. (8 marks)  ii) Explain how the lifecycle policies help optimize storage costs for SmartMedia Corp. without compromising content accessibility. (7 marks) | 15 | 4 | 4 |

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| 06. | Mr. William is employed with AdvantagePro Company Ltd. as a solution architect. The company was assigned the task of implementing a managed database solution that is renowned in the banking industry for its outstanding performance and scalability. Recently, the application has experienced significant growth, leading to an increase in read and write operations related to customer transactions and account management. During peak usage periods, latency issues have surfaced, negatively affecting user experience in an environment where speed and reliability are critical for financial transactions and regulatory compliance. To tackle these challenges, your team must focus on ensuring high availability, optimizing performance, and managing backups effectively.<br><br>i) Which AWS database service would be the best fit for your requirements in the banking sector, and what are the reasons for your selection and what specific strategies would you adopt to enhance database performance and minimize latency during high-traffic periods in a banking application? **(7 Marks)**<br><br>ii) How would you set up the database for high availability to guarantee minimal downtime and data loss in the event of failures? **(4 Marks)**<br><br>iii) What backup strategies would you implement to ensure data durability and enable quick recovery in a banking context? **(4 Marks)** | 15 | 3 | 3 |
| 07. | Mr. John Martinez is employed with TechNova Systems as a Solution Architect. Your organization is adopting a multi-cloud strategy to increase flexibility, resilience, and cost-effectiveness. However, you're concerned about the security of sensitive data that is shared across multiple AWS and non-AWS environments. How can you leverage AWS KMS to ensure that the data remains encrypted and secure throughout its lifecycle?<br><br>i) Analyze the potential security risks associated with sharing sensitive data across multiple AWS and non-AWS environments. Discuss how AWS KMS can be leveraged to mitigate these risks and ensure data security throughout its lifecycle. **(5 marks)**<br><br>ii) Evaluate the technical challenges and best practices for integrating AWS KMS with Non-AWS cloud environments to enable cross-cloud encryption and key management. Consider factors such as compatibility, performance, and security. **(5 marks)**<br><br>iii) Assess the key considerations for selecting appropriate encryption algorithms and key lengths to protect data in a multi-cloud environment. How can you ensure that the chosen encryption methods are compatible with different cloud platforms and meet regulatory requirements? **(5 marks)** | 15 | 2 | 5 |
| 08. | Mr. Raj Patel is employed with NextGen Innovations as a Solution Architect. He work for a large media production company with multiple branch offices around the world. The company needs to move several petabytes of raw video footage from its remote locations to a central AWS data center for processing. The footage is currently stored on on-premises servers in different formats, and your network bandwidth in these remote locations is very limited, making it impractical to transfer this data over the internet.<br><br>Additionally, the company needs to ensure that the transfer is secure and that the data is not compromised during transit. Once the data is migrated to AWS, it will be processed using advanced algorithms for video enhancement and archiving in Amazon S3.<br><br>i) How would you help Mr. Raj Patel leverage the AWS Snowball family to securely and cost-effectively transfer this large volume of data to AWS? **(5 marks)**<br><br>ii) Which specific service (Snowball, Snowball Edge, or Snowmobile) would use, and why? **(5 marks)**<br><br>iii) What steps would Mr. Raj Patel take to ensure data integrity and security throughout the process? **(5 marks)** | 15 | 4 | 6 |