



# VIT<sup>®</sup>

**Vellore Institute of Technology**  
(Deemed to be University under section 3 of the UGC Act, 1956)

Reg. No. :

22ACE5187

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

Programme	B.Tech.	Semester	Fall Semester 2024-25
Course Code	BCSE355L	Faculty Name	Prof. Priyaadharshini M
Course Title	AWS Solutions Architect	Slot	F1+TF1
		Class Nbr	CH2024250101141
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 (10 × 10 Marks)

\*M - Marks

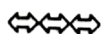
Q.No	Question	*M	CO	BL
01.	As of January 2016, Xlight OTT has expanded into 130 new countries. It uses multiple AWS Cloud regions which are spread all over the world to create a better and more enjoyable streaming experience for Xlight members. Xlight demands scalability, computing, and storage, business logic and distributed databases. Cloud Computing has made it possible to survive failures without impacting the member experience. Xlight could easily move all its existing systems to AWS. It took the cloud-native approach, to rebuilt all their technology and fundamentally changed the way they operate the whole company. Xlight migrated from a single application to thousands of micro-services. What are the possible services used by the Xlight for their above successful business and purpose of using each service?	10	1	2
02.	Nilton is a large e-commerce online shopping portal migrated their applications to EC2 instances in AWS cloud platform. The complete shopping application of Nilton is made available and active through EC2. If the CPU usage on EC2 reaches 80%, the load needs to be reduced to ensure effective functioning of online portal. The complete shopping application relies on S3 for critical data storage which need to ensure high availability and redundancy as failure to do so may result in reduction of customer's count. (i). Depict the complete architecture for effective functioning of online portal. (4 Marks) (ii). Elaborate how the S3 features could help in achieving high availability and redundancy? (6 Marks)	10	1	3

03.	<p>Sarah's company operates two AWS VPCs: one designated for the development environment and another for production. The development team occasionally requires access to production resources, but security regulations demand stringent control over this access. Furthermore, the two VPCs are in different AWS regions, creating challenges with latency for certain real-time applications. To facilitate communication, Sarah's must establish a secure and efficient cross-region VPC peering connection. This solution must balance security, performance, latency, and cost efficiency. Her task is to design this connection while ensuring that only necessary resources are accessible between the two VPCs.</p> <p>(i). Design a secure cross-region VPC peering solution that limits development environment access to only necessary production resources. Include relevant security configurations such as Security Groups, and IAM policies. (5 Marks)</p> <p>(ii). Consider the latency challenges and the cost implications of cross-region VPC peering. Illustrate AWS services to optimize real-time performance and optimize the cost with required data transfer charges. ( 5 Marks)</p>	10	3	3
04.	<p>Luca, a data analyst at a large chemical manufacturing company, is tasked with monitoring the company's cloud infrastructure for performance and security. The company has recently migrated its applications to AWS, and Luca needs to ensure that the cloud environment is both efficient and secure, especially given the sensitive nature of confidential data</p> <p>(i). Suggest and illustrate Luca to use AWS monitoring and audit services to monitor and manage the company's cloud resources effectively. (5 Marks)</p> <p>(ii). Discuss the specific metrics you would track, how you would set up alarms for performance anomalies? and the significance of CloudTrail for auditing user activities in your cloud environment. (5 Marks)</p>	10	2	3
05.	<p>Martina Insurance, a car insurance company has been experiencing rapid growth in customer sign-ups and claim process. To improve its database management, the company decides to migrate its existing database to Amazon RDS. They want to implement high availability and access of resources from nearby location for web and mobile applications.</p> <p>(i). Illustrate how to achieve the above requirement for Martina Insurance? (5 Marks)</p> <p>(ii). Explain the methods to improve the performance of their applications and describe a potential application to implement these requirements. (5 Marks)</p>	10	3	3
06.	<p>Conweb organization migrates a sensitive application to AWS that handles financial transactions and stores personally identifiable information (PII). The expert team is responsible for ensuring application security, compliant with regulations and resilient against potential threats. Consider yourself as a security expert, implement AWS security services and best practices for the responsibilities shared between Conweb organization and AWS.</p> <p>(i). To protect the security of the AWS, illustrate the Shared Responsibility Model for applications. What key management practices would you implement for data at rest and transit. (5 Marks)</p> <p>(ii). Design a security plan incorporating AWS WAF and AWS Shield to protect the application from web exploits and DDoS attacks. What specific rules should be configured in AWS WAF? (5 Marks)</p>	10	2	4



07.	Genix continuously generate large volume of data for analysis, store data efficiently and reliably. The data processing pipelines involves scientific analysis for large scale ordered execution of steps with parallelization across multiple machines. The scientific analysis data consist of various components like pairs of images, stitching of multi-gigapixel panoramas images, and tiling of these gigapixel images to load the data on demand. Consider this process to be assigned to workers, tracks their progress, and maintains their state, including details on their completion of analysis. Illustrate the suitable AWS service to build, track, and scalable resources for the above requirement and run the jobs parallelly.	10	3	4
08.	<p>A travel booking company operates a platform where users can book flights, hotels, and car rentals. The system handles a high volume of concurrent booking requests, and each booking triggers multiple actions like payment processing, reservation confirmation, and sending notifications. To ensure scalability and reliability, the company uses Amazon SQS to manage communication between microservices that process the bookings and Amazon SNS to send real-time notifications (email, SMS, and app notifications) to customers about their bookings.</p> <p>(i). Explain how the combination of Amazon SQS and Amazon SNS can be used to build a reliable and scalable booking system for this travel platform? (6 Marks)</p> <p>(ii). Illustrate the role of SQS in decoupling the backend services. (4 Marks)</p>	10	4	2
09.	<p>UltraLabs has one of the biggest malware signature databases in the world. When the company began to outgrow its infrastructure, it needed to take action to improve the performance and stability of its cloud databases. UltraLabs opted to replace its database engines and migrate to AWS services. Using AWS, UltraLabs reduced CPU usage, improved query processing times, and achieved lower latency. To reduce costs, UltraLabs decided to change its database engine from SQL to PostgreSQL. UltraLabs needed to migrate over 40 TB of data, replicating ongoing changes during the migration process and source database remains fully operational and secure.</p> <p>(i). Explain the services used by UltraLabs to achieve these benefits. (5 Marks)</p> <p>(ii). Discuss the process of various types of migration for the database. (5 Marks)</p>	10	4	3
10.	<p>A financial institution is migrating its legacy Database Systems to the cloud and wants to transition its on-premises Application Servers to AWS. They require solution that ensure continuous data replication and source database to be operational during migration process. Also, automatic conversion of physical servers to the AWS with minimal downtime and non-disruptive test before migration.</p> <p>Explain the process of migration for both the requirements which is to be adopted by the financial institution for cost optimization and zero downtime.</p>	10	4	4

**BL-Bloom's Taxonomy Levels - (1.Remembering, 2.Understanding, 3.Applying, 4.Analysing, 5.Evaluating, 6.Creating)**





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

Programme	B.Tech.	Semester	Fall Semester 2024-25
Course Code	BCSE355L	Faculty Name	Prof. Gayathri R
Course Title	AWS Solutions Architect	Slot	F2+TF2
		Class Nbr	CH2024250101146
Time	3 hours	Max. Marks	100

### General Instructions

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### Course Outcomes

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### Section - I

Answer all Questions (10 × 10 Marks)

\*M - Marks

Q.No	Question	*M	CO	BL
01.	a. When an IAM principal makes an AWS API request, how does IAM evaluate policies in order to decide whether or not to allow access? Illustrate the process in detail. (5 marks) b. Compare IAM users and roles. When to use each of this for an application? (5 marks)	10	1	3
02.	Sysco is a global food service distribution company that sells, markets, and distributes to restaurants, healthcare and educational facilities, lodging establishments, and other customers in more than 90 countries. AWS enabled Sysco to consolidate its data into a single data lake, allowing the company to run analytics on its data and gain business insights. They migrated large volume of older data into the cloud, thereby making it secure and cost-effective using AWS service. a. Describe how consolidating data into a single data lake on AWS has benefited Sysco in terms of analytics, business insights, and cost savings. (5 marks) b. Identify and describe the AWS services and features Sysco could have used to securely migrate and store its data in the cloud, reduce storage costs by 40 percent, and improve agility. (5 marks)	10	1	3



03.	<p>As a cloud architect for a healthcare company, you are tasked with deploying a secure infrastructure for a patient data management system that includes a web-based application for healthcare providers to access patient records. To ensure compliance, some parts of the infrastructure must remain highly secure and not exposed to the internet, while others need public access for user interactions. You need to create a Virtual Private Cloud (VPC) with a CIDR block of 10.0.0.0/16 and set up two subnets: a public subnet in us-east-1a (10.0.1.0/24) for front-end web servers and a private subnet in us-east-1b (10.0.2.0/24) for back-end database servers. You will launch an EC2 instance in the public subnet to host the web application, ensuring it is accessible via SSH and able to serve HTTP traffic. Additionally, you will launch an EC2 instance in the private subnet to host the database server, which must not be directly accessible from the internet but should communicate with the web server.</p> <p>a. What steps will you take to create the VPC and configure the subnets? How will you configure routing tables for communication between the subnets and external networks? <b>(5 Marks)</b></p> <p>b. What measures will you implement to ensure internet access for the public EC2 instance, and how will you configure the private EC2 instance to communicate with the public one while restricting direct internet access? <b>(5 Marks)</b></p>	10	2	4
04.	<p>TechCo is launching a global e-commerce platform that requires fast content delivery to provide an optimal user experience. To achieve low latency and high availability for customers worldwide, TechCo is considering Amazon CloudFront as the content delivery network (CDN).</p> <p>a. Explain how Amazon CloudFront can enhance content delivery for TechCo's global e-commerce platform, focusing on the benefits of using a CDN for low-latency, high-availability service for worldwide traffic. <b>(5 marks)</b></p> <p>b. Describe the steps TechCo would take to set up Amazon CloudFront, including configuring origins, behaviors, and caching settings for optimal performance. How could CloudFront be integrated with other AWS services like Amazon S3 and AWS Lambda, and what monitoring tools would ensure performance and user experience? <b>(5 marks)</b></p>	10	2	3
05.	<p>InnovateTech is developing a new online platform that requires a robust backend for handling user data and transactions. The platform will leverage a relational database for complex queries and transactions, while also needing a NoSQL solution for high-velocity data generated by user interactions, such as session data, logs, and product recommendations.</p> <p>a. Design a solution using Amazon RDS to meet InnovateTech's requirements. Discuss the benefits of using RDS for this application, including features like automated backups, high availability, and scaling options. How would you configure RDS to ensure optimal performance during peak usage times? <b>(6 Marks)</b></p> <p>b. Explain how DynamoDB can be implemented to handle InnovateTech's requirements for scalability and performance. Discuss the advantages of using DynamoDB for this type of data, focusing on features such as automatic scaling, low-latency access, and flexible data models. <b>(4 Marks)</b></p>	10	3	3

06.	<p>FinTech Innovations, a financial services company, is managing its AWS infrastructure to support various applications, including online banking and data analytics. Recently, the company noticed an increase in unexpected API activity that raised security concerns. Simultaneously, management is worried about rising AWS costs and wants to optimize resource usage without sacrificing performance or security.</p> <p>a. Explain how FinTech Innovations can utilize AWS CloudTrail to monitor and investigate the unexpected API activity. Describe the specific log data and metrics that should be analyzed to identify potential security threats and unauthorized access. <b>(5 Marks)</b></p> <p>b. Discuss how FinTech Innovations can use AWS Trusted Advisor to identify cost-saving opportunities in their AWS environment. Outline the specific recommendations that Trusted Advisor might provide to help the company optimize resource usage while ensuring the security and performance of their applications. <b>(5 Marks)</b></p>	10	3	4
07.	<p>An e-commerce platform on AWS sees regular traffic and spikes during promotions but has recently faced malicious traffic like SQL injection, cross-site scripting, and a DDoS attack. To secure the platform, there are plans to use AWS WAF (Web Application Firewall) and AWS Shield.</p> <p>a. How would AWS WAF be configured to block SQL injections, cross-site scripting, and other common web attacks? <b>(5 Marks)</b></p> <p>b. Describe how AWS Shield can help protect against DDoS attacks, especially when combined with AWS WAF, and what metrics or logs would be monitored to detect potential threats in real time. <b>(5 Marks)</b></p>	10	3	3
08.	<p>Developing a high-traffic ticket-booking application that experiences peak demand during popular event releases. To avoid backend overload, there are plans to use Amazon SQS (Simple Queue Service) to queue booking requests and Amazon SNS (Simple Notification Service) to notify users of booking confirmations or errors.</p> <p>a. How would SQS be configured to handle large request volumes, ensuring message order and preventing duplicates? <b>(4 Marks)</b></p> <p>b. Analyze how SNS would be used for real-time notifications, setting up topics for different notification types like confirmations or errors. Describe a retry strategy for failed messages, incorporating SQS dead-letter queues and SNS message filtering, and outline how SQS and SNS performance would be monitored and optimized to ensure timely message processing. <b>(6 Marks)</b></p>	10	4	3
09.	<p>A retail company, RetailMax, is undergoing a digital transformation to enhance its online presence. The company is planning to migrate its on-premises applications and databases to AWS to leverage cloud scalability and reduce costs. They aim to use AWS DMS (Database Migration Service) for migrating their database and AWS SMS (Server Migration Service) for migrating their application servers.</p> <p>a. Experiment with the use of AWS Database Migration Service (DMS) for RetailMax to migrate its on-premises database to Amazon RDS. <b>(5 Marks)</b></p> <p>b. Implement the utilization of AWS Server Migration Service (SMS) by RetailMax to migrate its application servers to AWS. Outline the process of setting up SMS, including how to configure replication for the servers and ensure that the migration is seamless with minimal disruption to business operations. <b>(5 Marks)</b></p>	10	4	4

10. DataCorp plans to migrate a large volume of archival data from multiple on-premises data centers to AWS, including terabytes of data stored on legacy systems that are hard to access over the internet. To ensure an efficient and secure transfer without disrupting operations, DataCorp is considering AWS Snowball, Snowball Edge, and Snowmobile based on the data volume. 10 4 4
- a. How would the decision be made regarding which service to use, and what factors would influence the choice? Outline the steps for executing the data transfer with AWS Snowball, including data preparation and integration once it arrives in AWS. **(5 Marks)**
  - b. If data processing at the edge is required, explain how Snowball Edge could help, and what types of workloads could optimize migration. Finally, what measures would be implemented to ensure data integrity and security during the transfer, and how would the data be validated after it reaches the cloud? **(5 Marks)**

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