



Continuous Assessment Test (CAT) – II OCTOBER 2025

Programme	: B.Tech. Computer Science and Engineering	Semester	:	Fall Semester 2025-26
Course Code & Course Title	: BCSE355L- Cloud Architecture Design	Class Number	:	CH2025260101059 CH2025260101054 CH2025260101057 CH2025260101058 CH2025260101060 CH2025260101055 CH2025260101062
Faculty	: Dr. K. Palani Thanaraj Dr. Priyaadharshini M Dr. Priyadarshini R Dr. Om Kumar C U Dr. Selvam D Dr. Sandosh S Dr. Parvathy A K	Slot	:	F1+TF1
Duration	: 1 hour 30 minutes	Max. Mark		50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information
- Only non-programmable calculator without storage is permitted

Answer all questions

Q. No	Sub Sec.	Description	Marks	CO	BT Level
1		A social media analytics startup manages a PostgreSQL database that records millions of daily user interactions. The database needs to efficiently handle heavy write operations from user activity, while also supporting complex read-heavy analytics queries that must not degrade the performance of the write operations. The team wants to ensure: • Read operations can scale independently from writes. • Data remains consistent across multiple copies of the database despite possible delays in updates. • Backup and recovery processes do not interrupt ongoing user activity. • The system can continue serving requests if the main database becomes unavailable. a) Propose an AWS-based architecture that addresses the need for separating read and write workloads. Illustrate the mechanism that keeps the different database instances in sync, and how this improves both performance and availability. [5 Marks] b) Analyse how backups can be integrated into this architecture without burdening the primary database, how synchronization	10	4	K4

		delays are handled, the scalability limits regarding multiple instances, and what happens during a failure of the primary system. [5 Marks]			
2		Assume that you are an AWS solutions architect tasked with designing a secure and compliant logging solution for a multinational corporation operating in multiple AWS regions. The corporation requires comprehensive auditing of all API calls across its AWS accounts, with specific needs for real-time monitoring, cross-region log aggregation. - Design and justify a centralized, multi-account logging architecture that ensures tamper-proof, immutable logs while adhering to the principle of least privilege. [5 Marks] - Evaluate and propose a resilient, cross-region log aggregation strategy. Justify the technical mechanisms required to validate logs from disparate geographical regions into a single, centralized S3 bucket for long-term retention and analysis. [5 Marks]	10	1	K5
3		A start-up organization manages customer transactions on AWS. Currently, all workloads (production, staging, and development) are deployed under a single AWS account. A recent internal audit revealed the following concerns: Root account is frequently used for daily operations. - IAM users have broad AdministratorAccess policies without restrictions. - No multi-account structure is in place, making it difficult to isolate production from development. - Billing reports are not segregated, causing lack of visibility into cost centers. - No centralized logging or monitoring is implemented for security events. Management has asked you, as the AWS Cloud Administrator, to design a robust AWS Account Management strategy that ensures: - Secure handling of root and IAM accounts. - Implementation of a multi-account strategy using AWS Organizations. - Use of Service Control Policies (SCPs) to enforce least privilege. - Enabling MFA, CloudTrail, and centralized logging. - Clear billing segregation and cost optimization across teams/projects. - Propose with an illustration a detailed AWS Account Management strategy addressing the requirements. [5 marks] - Justify how your approach improves security, cost management, and compliance. [5 marks]	10	2	K4
4		SoFi a personal finance company is building a digital wallet and online payment platform on AWS. Their application runs on Application Load			

	Balancer (ALB) with Amazon EC2, customer transaction data is stored in Amazon RDS, and financial records are archived in Amazon S3. The company is concerned about: 1.Large-scale DDoS attacks during peak transaction hours. 2.Data confidentiality and compliance with PCI DSS and RBI (Reserve Bank of India) regulations. As the cloud security architect: a) Design a defense strategy with an illustration using suitable service to ensure high availability and continuous protection against DDoS attacks on the fintech application. Justify why this solution is suitable for a financial platform. [5 Marks] b) Explain how AWS Key Management Service (KMS) can be used to secure customer financial data in RDS and S3, focusing on key rotation, auditability, and access control. Show how this supports fintech regulatory compliance. [5 Marks]	10	2	K4
5	A rapidly growing e-commerce startup, EcomKart, relies heavily on AWS for its backend infrastructure, including multiple database services like Amazon RDS for transactional data, DynamoDB for session management, and Redshift for analytics. Over the last quarter, EcomKart has observed a significant and unexpected surge in its AWS database billing, impacting its profitability targets. The CFO has tasked your team with identifying the root causes and proposing a sustainable cost optimization strategy. a) Analyze the potential cost drivers for EcomKart's increasing database expenses across Amazon RDS, DynamoDB, and Redshift. Show a sample financial breakdown highlighting the distribution of costs. [3 Marks] b) Propose specific metrics and AWS tools that would be essential for a detailed cost audit to pinpoint the primary areas of expenditure with justification. [4 Marks] c) Based on your audit findings, recommend and justify a prioritized set of three distinct cost optimization strategies for EcomKart, considering both short-term impact and long-term sustainability. For each strategy, discuss potential trade-offs and how you would monitor their effectiveness. [3 Marks]	10	3	K4
*****All the best *****				