



VIT

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

REG.NO.:

SLOT: A1 + TA1

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST - I
FALL SEMESTER 2026-2027

Programme Name & Branch	: B.TECH. CSE (All Programmes)	
Course Code and Course Name	: BCSE355L – Cloud Architecture Design	
Faculty Name(s)	: Common to All Faculty	
Class Number(s)	: VL2026270102219,2104,2165,2176,2148,2092,2144, 2986, 3004,2068,2112,2944,2195,2182,2215,2217.	
Date of Examination	: 09-Aug-2026	Maximum Marks: 50
Exam Duration	: 90 minutes	

General instruction(s):

- Answer All Questions
- M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
- Course Outcomes:-
 - CO 1** - Demonstrate an in-depth understanding of AWS Cloud architecture, services, and design patterns.
 - CO 4** - Configure and manage advanced AWS networking features, storage solutions, database technologies, and compute resources.

Q. No	Question	M	CO	BL
1	CloudRetail Ltd. suffered a security breach. Forensic analysis revealed the following five facts: (A) The EC2 instance's Security Group allowed Remote Desktop Protocol access on port 3389 from all IP addresses (0.0.0.0/0). (B) A critical Windows Remote Code Execution (RCE) patch had been missing on the instance for 6 months. (C) The instance had an attached IAM Role with overly broad permissions specifically s3:* on Resource: "*" which the attacker used to exfiltrate data from an S3 bucket. (D) Cloud logs showed that no console login over the past 12 months used Multi-Factor Authentication. (E) AWS had already applied the latest Xen/Nitro hypervisor patches on the underlying physical host. a) Classify each fact (A–E) as either AWS responsibility or Customer responsibility. For each fact that falls under Customer responsibility, state the exact remediation step required to fix it. (7M) b) Sketch a split-view diagram of the AWS Shared Responsibility Model and map each fact (A through E) to its correct side. (3M)	10	1	3
2	An architect proposes a deployment for an Indian banking application that serves users across all major Indian cities. Regulations require all customer and transaction data to be stored and processed exclusively within India. Two Indian AWS Regions are available: ap-south-1 (Mumbai, 3 Availability Zones) and ap-south-2 (Hyderabad, 3 Availability Zones). The proposed architecture is as follows: (i) Primary deployment in ap-south-1 (Mumbai), spread across all 3 Availability Zones. (ii) Disaster recovery in ap-south-2 (Hyderabad), deployed in a single Availability Zone with a Recovery Time Objective of 15 minutes. (iii) Amazon DynamoDB Global Tables replicate data from ap-south-1 to eu-west-1 (Ireland) for faster internal analytics reads. (iv) Amazon S3 Cross-Region Replication copies data from ap-south-1 to us-east-1 (N. Virginia) for offsite backup. (v) Static assets (40 GB) are served directly from the S3 origin bucket in ap-south-1 with no Content Delivery Network, since all users are within India. This architecture contains multiple errors. Identify each error, explain why it is problematic and provide the corrected configuration.	10	1	4



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3	An isolated AWS account runs a legacy, non-containerizable genomic sequencing application on Amazon EC2. The application runs for exactly 12 hours each day and remains completely idle for the other 12 hours. Its multi-threaded execution requires at least 8 GB of RAM per vCPU. Falling below this ratio causes out-of-memory errors during dataset mapping. The architecture has two layers. The Core Processing Node coordinates all state and cannot tolerate any involuntary runtime interruptions. It builds a complex, volatile in-memory data structure upon startup, which takes 45 minutes to initialize. This RAM state must be preserved across the 12-hour idle window so the application can resume instantly without repeating the initialization. The Scaling Worker Tier is an Auto Scaling Group that processes stateless data chunks pulled from a queue to handle unpredictable volume spikes. Workers require no data or RAM preservation across runs, and sudden termination of any worker causes no data loss. a) Identify the single correct EC2 Instance Family for this workload and justify. (2M) b) Identify the correct pricing plan for the Core Processing Node and justify. (2M) c) Identify the correct pricing plan for the Scaling Worker Tier and justify. (2M) d) Sketch an EC2 Instance Lifecycle diagram showing the transition states and billing status for both the Core Node and the Worker Tier. (4M)	10	4	3
4	A media company stores raw video in S3. Its access pattern is - Days 1-90: frequent, unpredictable access needing millisecond latency with automatic cost optimisation. Days 91-365: rare access (~quarterly), up to 5-min retrieval acceptable. Days 366-2555 (7 yrs): legal retention only, <1 access/year, up to 12-hr retrieval acceptable. After Day 2555: permanently delete. a) Design the S3 Lifecycle configuration specifying the exact storage class at each stage and the expiration rule. (5M) b) Company policy bans wildcard Deny statements ("Principal": "*") to prevent root lockout. Use a positive-authorisation approach granting lifecycle modification exclusively to the StorageAdmin IAM role. Write one S3 bucket policy statement in JSON ensuring only StorageAdmin can modify lifecycle configuration. (5M)	10	4	3
5	A VPC (10.0.0.0/16) in eu-west-1 is configured, but the web server is unable to reach the internet. The AWS VPC configuration is show below: Network Config – i) Internet Gateway igw-ABC is created but not attached to any VPC. ii) Public Subnet (10.0.1.0/24, eu-west-1a) has auto-assign public IP disabled. iii) NAT Gateway nat-XYZ is placed in the Private Subnet (10.0.2.0/24) with Elastic IP 52.18.x.x. Routing Config – iv) Public Subnet route table has only 10.0.0.0/16 → local. v) Private Subnet route table has 10.0.0.0/16 → local and 0.0.0.0/0 → nat-XYZ. Compute Config: vi) Web Server EC2 is in Public Subnet with Security Group allowing inbound HTTP (port 80) from 0.0.0.0/0 and all outbound. Backend EC2 is in Private Subnet with Security Group allowing all outbound only. Identify all the misconfigurations. For each: (i) state the issue, (ii) explain why it causes failure, (iii) specify the exact fix.	10	4	4
