

**CLOUD COMPUTING
(CSE3235)**

Time Allotted : 2½ hrs

Full Marks : 60

Figures out of the right margin indicate full marks.

*Candidates are required to answer Group A and
any 4 (four) from Group B to E, taking one from each group.*

Candidates are required to give answer in their own words as far as practicable.

Group – A

1. Answer any twelve:

12 × 1 = 12

Choose the correct alternative for the following

- (i) How many types of dimensions exist in a Cloud Cube model?
(a) 3 (b) 2 (c) 4 (d) 5
- (ii) Which deployment model of Cloud computing should be used by a business group consisting of multiple companies for its authorized users?
(a) Community Cloud (b) Hybrid Cloud
(c) Public Cloud (d) Private Cloud
- (iii) Horizontal scaling is also known as
(a) Scale up (b) Scale out
(c) Scale about (d) None of the above
- (iv) In Xen which one of these virtualization techniques is used?
(a) Full virtualization (b) Process virtualization
(c) Para virtualization (d) Partial virtualization
- (v) Which Ring is considered as the least privileged mode?
(a) Ring -1 (b) Ring 0 (c) Ring 2 (d) Ring 3
- (vi) Which of the following best describes a Type 1 Hypervisor?
(a) Runs directly on the host's hardware and manages guest operating systems
(b) Runs on top of an existing operating system as an application
(c) Provides virtualization at the operating system level using containers
(d) Enables network segmentation and isolation in virtual environments
- (vii) For the CIDR address 192.0.2.0/24, how many IP addresses are available?
(a) 2^{24} (b) 2^8 (c) 2^{16} (d) 2^4
- (viii) What does the "R" stand for in the AWS service "Amazon RDS"?
(a) Reliable (b) Redundant (c) Real-time (d) Remote

- (ix) A company wants to store data that is not frequently accessed. What is the best and cost-effective solution that should be considered?
 - (a) AWS Storage Gateway
 - (b) Amazon Simple Storage Service Glacier
 - (c) Amazon Elastic Block Store (Amazon EBS)
 - (d) Amazon Simple Storage Service (Amazon S3)
- (x) A SysOps engineer working at a company wants to protect their data in transit and at rest. What services could they use to protect their data?
 - (a) Elastic Load Balancing
 - (b) Amazon Elastic Block Storage (Amazon EBS)
 - (c) Amazon Simple Storage Service (Amazon S3)
 - (d) All of the above

Fill in the blanks with the correct word

- (xi) _____ is a managed service in which the provider supplies the customer with access to a data storage platform.
- (xii) In the VMware full virtualization model, the hypervisor is in Ring _____.
- (xiii) A key pair consists of a public key that _____ stores and a private key file that _____ stores.
- (xiv) Amazon S3 buckets are _____ containers for objects.
- (xv) Three factors that influence the availability of your applications are ____, scalability, and recoverability.

Group - B

2. (a) Consider the following scenario:
 An educational and research organization is interested to install Cloud. The stakeholders are professors, research fellows, and students. Professors share study materials and take online exams. Research fellows execute complex algorithms. Students discuss doubts in forums.
 Answer the following questions:
 - (i) Which deployment model is suitable?
 - (ii) Why have you chosen this deployment model? Explain with proper justification. [[CO1](Apply/HOCQ)]
 - (b) Differentiate between the horizontal scaling and the vertical scaling policies. [[CO1](Understand/LOCQ)]
 - (c) Define the five actors in the NIST Reference model. [[CO1](Remember/LOCQ)]
- (1 + 3) + (1.5 + 1.5) + 5 = 12**
3. (a) Discuss the roles of the following actors of the NIST Reference model:
 - (i) Cloud Provider
 - (ii) Cloud Carrier. [[CO1](Remember/LOCQ)]
 - (b) A bank has some sensitive customer data and transaction data. The transaction data can be needed for analysis. The bank also needs some customer-facing applications which must be scalable. Mention which cloud deployment model will

be appropriate to use in this situation? Clearly explain the reason for choosing the deployment model.

[[CO1](Analyse/IOCQ)]

- (c) Comment on- “Cloud is considered to be a Utility due to its ubiquitousness”.

[[CO1](Analyse/IOCQ)]

(2 + 2) + 4 + 4 = 12

Group - C

4. (a) What are the security rings and privilege modes of instruction execution? Give a suitable schematic diagram with necessary explanation.

[[CO2](Analyse/IOCQ)]

- (b) Explain the components “guest”, “host”, and “virtualization layer” in a virtualized environment.

[[CO2](Remember/LOCQ)]

- (c) Write short notes on the following:

(i) Memory Virtualization

(ii) Operating System level Virtualization.

[[CO2](Understand/LOCQ)]

3 + 3 + (3 + 3) = 12

5. (a) In VMware the guest OS can run unmodified on top of the hypervisor--Why? Give a clear explanation. Also, is keeping the guest OS unmodified advantageous or disadvantageous? Explain.

[[CO2](Understand/IOCQ)]

- (b) What is meant by inbound and outbound data transfer in AWS? How is data transfer charged in AWS pricing model?

[[CO3](Remember/LOCQ)]

- (c) Is there a chance of performance degradation due to virtualization? If so, why?

[[CO2](Analyse/LOCQ)]

(3 + 3) + (2 + 2) + 2 = 12

Group - D

6. (a) The customer uses Amazon Simple Storage Service (Amazon S3) to store data. The customer configured a virtual private cloud (VPC) with Amazon Virtual Private Cloud (Amazon VPC). The EC2 instance and the Oracle database instance that they created both run in the VPC.

Based on the above information, please fill up the table below:

Process	Who is Responsible? AWS or Customer?
1. Upgrades and patches to the operating system on the EC2 instance?	
2. Physical security of the data center?	
3. Virtualization infrastructure?	
4. EC2 security group settings?	
5. Configuration of applications that run on the EC2 instance?	
6. Oracle upgrades or patches if the Oracle instance runs as an Amazon RDS instance?	
7. Oracle upgrades or patches If Oracle runs on an EC2 instance?	
8. S3 bucket access configuration?	

- (b) Define IAM Policy and IAM Role. [[CO6)(Apply/LOCQ)]
 (c) AWS services and resources can be accessed by using the ____, ____, and _____. [[CO3)(Analyze/LOCQ)]
 (d) Write two uses of AWS CloudTrail. [[CO3)(Analyze/LOCQ)]
- 4 + (2 × 2) + 2 + 2 = 12**

7. (a) A company wants to store data that is not frequently accessed. What is the best and most cost-effective solution that should be considered? [[CO4)(Analyze/LOCQ)]
 (b) Name a data archiving service provided by AWS. Explain the terms archive, vault and vault access policy. [[CO4)(Analyze/LOCQ)]
 (c) What is the speciality of Amazon Elastic File System? Why Amazon Simple Storage Service is called a managed service? [[CO4)(Analyze/LOCQ)]
- 1 + [1 + (3 × 2)] + (2 + 2) = 12**

Group - E

8. (a) DynamoDB supports two different kinds of primary keys. What are those and what are their significances? [[CO4)(Analyze/LOCQ)]
 (b) DynamoDB runs exclusively on _____. [[CO4)(Analyze/LOCQ)]
 (c) Fill up the following table:
- | What are my requirements? | Solution |
|--|----------|
| Enterprise-class relational database | |
| Fast and flexible NoSQL database service for any scale | |
- [[CO4)(Analyze/LOCQ)]
- (d) Which is a fully managed NoSQL database service? Write four cases of when to use Amazon RDS. [[CO4)(Analyze/LOCQ)]
- (2 + 2) + 1 + 2 + (1 + 4) = 12**
9. (a) Elastic Load Balancing distributes incoming application or network traffic _____. [[CO5)(Gain insight and understand/LOCQ)]
 (b) How is Amazon CloudWatch used? Mention the four uses. [[CO6)(Apply/LOCQ)]
 (c) Write if the following CloudWatch alarms are correct. If incorrect, then please rectify it.
- (i) If average CPU utilization is > 60% for 5 minutes
 - (ii) If the number of simultaneous connections is > 10 for 1 minute
 - (iii) If the maximum bucket size in bytes is around 3 for 1 day
 - (iv) If the number of healthy hosts is < 5 for 10 minutes
 - (v) If the volume of read operations is > 1,000 for 10 seconds. [[CO6)(Apply/LOCQ)]
- 2 + 4 + 6 = 12**

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	53	43	4