CLOUD COMPUTING WITH AWS
(CSEN 3222)

Time Allotted : 2½ hrs   **Full Marks : 60**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and
<u>any 4 (four)</u> from Group B to E, taking <u>one</u> 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) Which of the following cloud computing infrastructures automatically manage your capacity?
    (a) Small Instance
    (b) High-Memory Extra Large Instance
    (c) High-CPU Extra Large Instance
    (d) Reserved Instance.

    (ii) All Google File System metadata is kept in
    (a) Master node and chunk server
    (b) Chunk server
    (c) Master node
    (d) Client's main memory.

    (iii) Elasticity means
    (a) Pulling the computing resources to provide services to multiple customers
    (b) Allowing customers to use cloud computing as required without human contact between consumers and service providers
    (c) Accessing the data of the cloud or upload the data to the cloud from anywhere just with the help of a device and an internet connection
    (d) From the standpoint of the client, cloud computing resources should look limitless and can be purchased at any time and in any quantity.

    (iv) In hardware level virtualization hypervisor provides which of the following to virtual machines?
    (a) Application Programming Interface
    (b) Application Binary Interface
    (c) Instruction Set Architecture
    (d) None of the mentioned.

    (v) Amazon S3 is designed for X.Y % of durability. The total 9s in X and Y is
    (a) 9   (b) 11   (c) 4   (d) 8

(vi)   Which of the following attributes should be unique?
    (a) Identity   (b) Digital identity
    (c) Mashup   (d) Password.

(vii)   The concept of the particular enterprise and application in an on-premise deployment is defined as
    (a) Multi-tenancy   (b) SaaS
    (c) Vendor Lock in   (d) Resource pooling.

(viii) SaaS supports multiple users and provides a shared data model through:
    (a) single-tenancy   (b) multi-tenancy
    (c) multiple-instance   (d) share responsibilitites

(ix)   Which of the following is a wrong statement?
    (a) SaaS applications come in all shapes and sizes
    (b) Every computer user is familiar with SaaS systems
    (c) SaaS software is not customizable
    (d) None of the mentioned.

(x)   Which of the following cloud concept is related to pooling and sharing of resources?
    (a) Polymorphism   (b) Abstraction
    (c) Virtualization   (d) SLA.

Fill in the blanks with the correct word

(xi)   A hypervisor recreates a hardware environment in which _____ operating systems are installed.

(xii)   In the VMware full virtualization model, the hypervisor is in Ring _____.

(xiii) _____ Hardware addresses is the assignment of a network identity to a specific MAC address that allows systems to be found on networks..

(xiv) _____ is one of the functions enabled by managed execution.

(xv)   The term _____ identifies an isolated execution environment where instructions can be filtered and blocked before being translated and executed in the real execution environment

Group - B

2. (a)   Explain "Resource pooling" and "Pay-as-you-go". What is the role of the cloud broker in the NIST Reference Architecture?   *[(CO2)(Understand/LOCQ)]*

    (b)   Rearrange the options row wise:

Application	User	Deployment model	Service Model
Online Classroom	Reader	Community/Hybrid	SaaS
ITcompany facility	Student	On premise private	SaaS
Article sharing system	Engineer	Public/Community	IaaS

[(CO2)(Apply/IOCQ)]

(2 + 2 + 2) + 6 = 12

3. (a) What do you mean by Service level agreement (SLA)? Describe how SLA gets maintained in case of poor network service performance by the network provider. *[(CO1)(Analyse/HOCQ)]*

   (b) Explain how Scalability and Elasticity are related. How do these concepts support rapid provisioning? *[(CO2)(Remember/LOCQ)]*

   (c) What do the internal and external dimensions of the cloud cube model signify? *[(CO2)(Understand/LOCQ)]*

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

Group - C

4. (a) How are Type-I and Type-II hypervisors different from each other? When is the interpreter module of the hypervisor called? *[(CO3)(Analyse/IOCQ)]*

   (b) Consider a Healthcare Scenario for patients with many services to offer. Create the PaaS environment for these mentioning different performance requirements for the following services.
   i. Registration
   ii. Doctor Consultation
   iii. Quick Advice
   iv. Payment. *[(CO6)(Apply/IOCQ)]*

   (c) How does the Programming Language level Virtualization differ from OS virtualization? Explain with an example. *[(CO2)(Understand/LOCQ)]*

   (3 + 1) + 4 + (2 + 2) = 12

5. (a) How does binary translation perform better in the long run than interpretation? *[(CO3)(Analyse/IOCQ)]*

   (b) Draw the Xen paravirtualization architecture. How is the guest OS modified to provide paravirtualization? *[(CO2)(Understand/IOCQ)]*

   (c) Think about a scenario, when a service provider creates a new service offering, which allows the customers to store any files as web objects and make them accessible via the internet. What sort of cloud offering is this? Explain. *[(CO6)(Evaluate/HOCQ)]*

   (d) Think about a scenario, when a service provider creates a new service offering, which allows the customers to deploy virtual machines and specify their network configuration. What sort of cloud offering is this? Why? *[(CO3)(Judge/HOCQ)]*

   2 + (2 + 2) + (1 + 2) + 3 = 12

Group - D

6. (a) Write four features of Amazon EC2. Why security groups are created? *[(CO2)(Understand/LOCQ)]*

   (b) State whether the following are TRUE/FALSE with explanation:
   i. EBS volumes can be attached at any time only to a single instance.
   ii. EBS volumes can contain any file system.
   iii. The Google Compute Engine implements the API of Amazon EC2.
   iv. In S3, the file extension of uploaded files is essential for the way, the storage service treats the file. *[(CO3, CO6) (Apply/LOCQ)]*

   (4 + 2) + (1.5 × 4) = 12

7. (a) What is Dark Web? Mention at least two Google API categories. Name at least two products of each category. Mention one disadvantage of Google App Engine.
[(CO1)(Remember/LOCQ)]

(b) Amazon Web Service (AWS) decides to provide free access to a public cloud dedicated to higher education. Which one of the three cloud computing delivery models, SaaS, PaaS, or IaaS should it embrace and why? Which AWS offerings would be most beneficial for the students? Will this solution have an impact on distance learning? Why?
[(CO3)(Apply/HOCQ)]

(1 + 2 + 2 + 1) + (2 + 2 + 2) = 12

Group - E

8. (a) What are the architectural differences between GFS and HDFS?
[(CO4)(Gain Insight/IOCQ)]

(b) What do the terms "audit" and "compliance" mean in terms of data security in the cloud?
[(CO5)(Identify/HOCQ)]

(c) Describe the Garbage Collection in HDFS.
[(CO4)(Understand/LOCQ)]

4 + 4 + 4 = 12

9. (a) What is OAuth? How does it work?
[(CO5)(Remember/LOCQ)]

(b) What is AWS IAM? Clearly state one of the benefits of having IAM.
[(CO3)(Remember/LOCQ)]

(c) What is a security boundary? According to the shared responsibility model, what are the responsibilities of the cloud service provider and the user identity access management?
[(CO5)(Identify/HOCQ)]

(1 + 2) + (1 + 2) + (2 + 4) = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	47.92	25	27.08

Course Outcome (CO):

After the completion of the course students will be able to

CSEN3222.1. Appreciate the benefits and limitations of cloud-based computing environments.

CSEN3222.2. Understand the underlying principles of cloud virtualization, cloud storage, cloud security.

CSEN3222.3. Analyze the suitability and/or applicability of various cloud computing models, platforms, services, solution offerings and tools such as AWS.

CSEN3222.4. Gain insight into various distributed computing issues (like performance, scalability, availability, reliability) in light of distributed file systems (such as HDFS, GFS).

CSEN3222.5. Identify security and privacy issues in cloud computing with provided security products and services.

CSEN3222.6. Apply Knowledge to provide solution for real life problems using learnt tools.

*LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question.