CLOUD COMPUTING
(CSEN 5243)

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)   Which cloud model provides infrastructure resources such as virtual machines and storage?
       (a) IaaS   (b) PaaS   (c) SaaS   (d) IDaaS

(ii)   What is the primary purpose of a hypervisor in cloud computing?
       (a) To manage network traffic
       (b) To create and manage virtual machines
       (c) To provide authentication services
       (d) To facilitate cloud storage

(iii) Which of the following is NOT a characteristic of SaaS?
       (a) Subscription-based pricing
       (b) Requires software installation on the client's machine
       (c) Hosted and maintained by a provider
       (d) Accessible over the internet

(iv)   Which of the following is an example of a PaaS provider?
       (a) Microsoft Office 365   (b) Amazon S3
       (c) Google App Engine   (d) Dropbox

(v)   Which file system is used in Hadoop?
       (a) NTFS   (b) HDFS   (c) FAT32   (d) GFS

(vi)   Which cloud storage security measure ensures data remains private even if intercepted?
       (a) Encryption   (b) Load balancing
       (c) Compression   (d) Virtualization

(vii) Which cloud security model addresses compliance requirements?
       (a) Risk-Based Model   (b) Multi-Factor Authentication Model
       (c) Security-as-a-Service Model   (d) Identity Management Model

(viii) What is the primary purpose of SQL Azure?
(a) File storage   (b) Relational database services
(c) Email hosting   (d) Security monitoring

(ix) What is Cloud Federation?
(a) Merging multiple cloud providers to share resources
(b) A new type of cloud deployment model
(c) A security standard for cloud computing
(d) A database replication technique

(x) What is the main function of AWS Lambda?
(a) Database management   (b) Serverless computing
(c) Virtualization   (d) Cloud storage

Fill in the blanks with the correct word

(xi) _____ (XaaS) model allows vendor to provide security as part of the service level agreement. (What is X here?)

(xii) A cloud computing environment that is exclusively used by a single organization is called a _____ cloud.

(xiii) The primary purpose of _____ as a Service is to provide computing resources like virtual machines and storage.

(xiv) In cloud security, encrypting data before storing it in the cloud ensures _____ of information.

(xv) The concept of _____ refers to the interconnection of multiple cloud environments to enhance resource sharing and interoperability.

Group - B

2. (a) Categorize the taxonomy of virtualization techniques.   *[(CO2) (Categorize/IOCQ)]*
   (b) Explain the role of abstraction in cloud computing.   *[(CO2)(Explain/LOCQ)]*
   (c) What is the difference between full virtualization and para-virtualization?
                                                       [(CO2)(Compare/LOCQ)]
   5 + 3 + 4 = 12

3. Using suitable example(s) and/or appropriate schematic diagram(s) describe the following (as per the NIST Reference Model of Cloud Computing):
   (i) The Essential Characteristics of Cloud Computing
   (ii) Different Service Models of Cloud Computing"
   (iii) Various Deployment Models of Cloud Computing.   *[(CO2)(Apply/HOCQ)]*
   (5 + 3 + 4) = 12

Group - C

4. (a) Differentiate between Iaas and Iaas(M) with the help of an example.
                                                       [(CO3) (Analyze/IOCQ)]
   (b) What is HaaS?   *[(CO3) (Analyse/IOCQ)]*

(c) Think about a scenario, when a service provider creates a new service offering for water marking images. It can store any files as web objects and make them accessible via the internet.
What sort of cloud offering is this? Justify with proper explanation?

[(CO3) (Analyse/IOCQ)]

5 + 3 + 4 = 12

5. (a) There is Remote Healthcare Scenario where for patients, there are many services to offer. Please create the SaaS environment (choosing components from SoA) for this mentioning different performance requirements for the following services.
   i. Patients symptoms and disease data collection
   ii. Video Consultation
   iii. Emergency Advice. *[(CO5) (Develop/HOCQ)]*
   (b) How Accessibility and Portability can be achieved in IaaS? What is Server consolidation? How is it achieved? *[(CO3) (Analyze/IOCQ)]*
   (c) What is the purpose of having the User management component in PaaS core Middleware? *[(CO3)(Analyze/IOCQ)]*

6 + 4 + 2 = 12

Group - D

6. (a) Consider the problem scenario: An online shopping (Garments and Gift items) website has been very popular in India. They are using popular service offerings from Amazon for their hosting. Answer the following:
   (i) What is the most important SLA parameter to consider according to you?
   (ii) What kind of instances should be suitable for this shopping website?

   [(CO6)(Recommend/HOCQ)]
   (b) What is privacy? *[(CO4) (Understand/LOCQ)]*
   (c) Mention one real-world application of HDFS. *[(CO4)(Mention/LOCQ)]*

6 + 4 + 2 = 12

7. (a) How is risk management handled in cloud computing? *[(CO4)(Discuss/LOCQ)]*
   (b) Explain the concept of cloud compliance. *[(CO4)(Explain/LOCQ)]*
   (c) Mention one compliance framework for cloud security. *[(CO4)(List/LOCQ)]*

6 + 5 + 1 = 12

Group - E

8. (a) How availability and replication is related in distributed storage systems?
   [(CO5)(Apply/IOCQ)]
   (b) Show the data flow and detailed sequence of WRITE operation in GFS with diagram. *[(CO5)(Show/IOCQ)]*
   (c) What do you mean by 3-2-1 back up? Give one real life example of Unmanaged Cloud Storage. *[(CO5)(Apply/IOCQ)]*

3 + 4 + 5 = 12

9. (a) Name three goals of GFS for acceptability in the Cloud. Explain Garbage Collection in GFS. *[(CO5)(List/LOCQ)]*

(b) What do you mean by Compliance? *[(CO5)(Understand/LOCQ)]*

(c) Explain, with the help of schematic diagram(s), how chunks are handled during reading/write operations involving Client, Master, and Chunk-server in a GFS environment. *[(CO5)(Explain/LOCQ)]*

5 + 2 + 5 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	38.5	36.5	25