

**CLOUD COMPUTING  
(CSEN 6141)**

**Time Allotted: 3 hrs**

**Full Marks: 70**

*Figures out of the right margin indicate full marks.*

*Candidates are required to answer Group A and*

*Any 5 (five) from Group B to E, taking at least one from each group.*

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

**Group - A**

**(Multiple Choice Type Questions)**

1. Choose the correct alternative for the following: **10 × 1 = 10**
- (i) Which of these techniques is vital for creating cloud-computing environments?  
(a) Virtualization (b) Personalization  
(c) Localization (d) All of these.
  - (ii) Which deployment model of cloud computing should be used for a single organization and its authorized users?  
(a) Community Cloud (b) Hybrid Cloud  
(c) Public Cloud (d) Private Cloud.
  - (iii) Which deployment model of cloud computing is managed by a service provider, uses an infrastructure that is off-premises, and is accessible to the general users?  
(a) Community Cloud (b) Hybrid Cloud  
(c) Private Cloud (d) Public Cloud.
  - (iv) Which service model of cloud computing provides the servers, storage devices and networks for a subscriber?  
(a) Infrastructure as a Service (b) Platform as a Service  
(c) Software as a Service (d) Identity as a Service.
  - (v) Which service model of cloud computing model does AWS fall under?  
(a) Infrastructure as a Service (b) Platform as a Service  
(c) Software as a Service (d) Compliance as a Service.

- (vi) Which one of these is not a cloud computing pricing model?  
(a) Free trial (b) Pay per use  
(c) Subscription (d) Perpetual.
- (vii) Which one of these cloud-based solutions is not considered to be a PaaS offering?  
(a) Force.com (b) Amazon EC2  
(c) Microsoft Azure Services (d) All of these
- (viii) Virtual Machine Ware (VMware) is an example of  
(a) Infrastructure Service (b) Platform Service  
(c) Software Service (d) None of these.
- (ix) Which of the following widely used software systems is not built around cloud-based technology?  
(a) YouTube (b) Twitter  
(c) Linux (d) Gmail
- (x) Geographic distribution of data across a cloud provider's network is perceived as a major problem for many enterprises because it:  
(a) Adds to latency (b) Makes data recovery harder  
(c) Complicates regulatory compliances (d) Heightens security concerns.

**Group - B**

2. (a) What is virtualization? Depict, using a classification chart, the taxonomy of various virtualization techniques.
- (b) Compare the two types of virtualization for execution environments – Process-level and System-level – with respect to technique and virtualization model.
- (c) Explain through suitable schematic diagram(s) and some necessary explanation(s) the following: (i) Type-I (or Native) Hypervisor, and (ii) Type-II (or Hosted) Hypervisor.
- 4 + 4 + 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
- and

(iii) Various Deployment Models of Cloud Computing.

**5 + 3 + 4 = 12**

**Group - C**

4. (a) Explain, in brief, the concepts of IaaS, PaaS, and SaaS. Use suitable example(s) and/or appropriate schematic diagram(s) that you feel will help establish your understanding.
- (b) Smart Stock Enterprises, a start-up organization specializing in software services for stock-trading, has decided to engage On Cloud Nine, one reputed cloud-based services provider, as a vendor for managing its entire computing environment. With the help of one single schematic diagram, depict how the responsibility of managing the various layers of the different parts of this computing environment is expected to get distributed between Smart Stock Enterprises and On Cloud Nine.

**9 + 3 = 12**

5. (a) "Cloud computing can replace expensive personal computer hardware and/or costly software licenses" -- explain with suitable example(s).
- (b) What is 'multi-tenancy' in the context of SaaS? Explain in brief.
- (c) Mention three characteristics of a typical SaaS solution that you think are significant; explain with suitable example(s) and/or appropriate schematic diagram(s) that you feel will help establish your understanding.

**4 + 2 + 6 = 12**

**Group - D**

6. (a) What is 'GFS', and what role does it serve in a cloud computing environment?
- (b) Name three goals of GFS that are so typical in a distributed computing scenario.
- (c) Mention three important design considerations that influenced the basic architecture of GFS.
- (d) What is a 'chunk' in GFS? Explain, with the help of schematic diagram(s), how chunks are handled during read/write operations involving Client, Master and Chunk-server in a GFS environment

**2 + 3 + 3 + 4 = 12**

7. (a) What is the significance of cloud-based storage? Explain in brief.
- (b) Mention the main advantages and disadvantages of the two types of storage devices -- Block and File -- being used as cloud-based storage.
- (c) Through a tabular chart, compare / contrast the two types of cloud-based storage -- Unmanaged and Managed -- with respect to their key characteristics and typical usage in cloud computing.

**4 + 4 + 4 = 12**

**Group - E**

8. (a) What is Amazon's AWS? Explain in brief.
- (b) Describe, in brief, the following two broad categories of services that AWS provides through its range of APIs; use suitable example(s) and/or schematic diagram(s) that you feel will establish your understanding.
- (i) Data as a Service (e.g., ECS, Historical Pricing)
- (ii) Infrastructure as a Service (e.g., SQS, S3, EC2)

**(2 + 4) + 6 = 12**

9. (a) What is Google API? Describe, in brief, its APIs for Calendar, Checkout, and Maps.
- (b) What is Google's GWT? Explain, in brief, its core components, using a schematic architecture diagram.
- (c) What is Azure SQL? Describe, in brief, its role in Database as a Service.

**4 + 5 + 3 = 12**