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
<u>any 5 (five)</u> from Group B to E, taking <u>at least one</u> 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 category of cloud computing model does AWS fall under?
           (a) Compliance as a Service   (b) Platform as a Service
           (c) Software as a Service   (d) Infrastructure as a Service.

    (ii)   Which one of the following is <u>not</u> really an advantage of cloud computing?
           (a) Paying only for what you use
           (b) Worry-free about running out of storage
           (c) Ubiquitous access to computing set-up
           (d) Handling diverse network types.

    (iii) Geographic distribution of data across a cloud provider's network is perceived as a major problem for many enterprises because it
           (a) complicates regulatory compliances   (b) adds to latency
           (c) heightens security concerns   (d) makes data recovery harder.

    (iv)   Which one of these is <u>not</u> a cloud computing pricing model?
           (a) Perpetual   (b) Pay per use
           (c) Subscription   (d) Free trial.

    (v)   Which of these are vital for creating cloud-computing environments?
           (a) Internet and Localization
           (b) Personalization and Virtualization
           (c) Virtualization and Internet
           (d) Localization and Personalization.

    (vi)   Which service model of cloud computing provides the servers, storage devices and networks for a subscriber?
           (a) Platform as a Service   (b) Infrastructure as a Service
           (c) Software as a Service   (d) Identity as a Service.

    (vii) 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.

    (viii) Which one of the following is still considered as a major concern about cloud computing?
           (a) Information security   (b) Accessibility issues
           (c) Too expensive   (d) Too slow.

    (ix)   Who should have the primary responsibility of managing the database for a SaaS-based cloud computing environment like Salesforce.com?
           (a) Service Provider   (b) Service Subscriber
           (c) Both of them   (d) Neither of them.

    (x)   Which category of cloud computing model does Microsoft Azure fall under?
           (a) Infrastructure as a Service   (b) Platform as a Service
           (c) Software as a Service   (d) Compliance as a Service.

Group – B

2. (a) What is virtualization in the context of cloud computing? 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.   With respect to the NIST Reference Model of Cloud Computing, what are the following?
         (i) the Essential Characteristics,

(ii) different Service Models, and
(iii) various Deployment Models
Use suitable example(s) and/or appropriate schematic diagram(s) that you feel will help establish your understanding.

(5 + 3 + 4) = 12

Group – C

4. (a) What is 'multi-tenancy' in the context of SaaS? Explain in brief.

 (b) 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.

 (c) "Cloud computing can replace expensive personal computer hardware and/or costly software licenses" — explain with suitable example(s).

2 + 6 + 4 = 12

5. (a) What is Infrastructure-as-a-Service (IaaS) and what are the main characteristics of an IaaS solution?

 (b) Explain some typical situations where: (i) IaaS makes sense, and (ii) where IaaS may not be suitable.

 (c) What advantages does Platform-as-a-Service (PaaS) provide? Explain in brief with one example.
 Use suitable example(s) and/or appropriate schematic diagram(s) that you feel will help establish your understanding.

4 + 4 + 4 = 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 influence 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) Explain, with a tabular chart, how the security responsibilities are divided between the customer and the vendor for the four different deployment models of cloud.

 (b) What are the main characteristics of cloud-based storage? Explain, in brief, why cloud-based storage can be perceived either as an IaaS model or as a SaaS model.

 (c) Explain, with a tabular chart, how the cloud management responsibilities are divided between the service provider and the service subscriber for the three different service models of cloud.

4 + 5 + 3 = 12

Group – E

8. (a) What is Google's GWT? Explain, in brief, its core components, using a schematic architecture diagram.

 (b) What is Google API? Describe, in brief, its API's for Calendar, Checkout, and Maps.

 (c) What is Azure SQL? Describe, in brief, its role in Database as a Service.

4 + 5 + 3 = 12

9. (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 API's; 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