CLOUD COMPUTING
(CSEN 5243)

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 of the following is created based on Hadoop upon EC2?
            (a) Autoscaling   (b) RDS   (c) MapReduce   (d) SimpleDB.

    (ii)   Point-in-time (PIT) backups is also known as
            (a) 3-2-1 backup   (b) Snapshot backup
            (c) Reverse Delta backup   (d) Differential backup.

    (iii)   Point out the wrong statement.
            (a) Abstraction enables the key benefit of cloud computing: shared, ubiquitous access
            (b) Virtualization assigns a logical name for a physical resource and then provides a pointer to that physical resource when a request is made
            (c) All cloud computing applications combine their resources into pools that can be assigned on demand to users
            (d) All of the mentioned.

    (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 of the following type of virtualization is also characteristic of cloud computing?
            (a) Storage   (b) Application
            (c) CPU   (d) All of the mentioned.

    (vi)   In Java Virtual Machine (JVM), which one of these virtualization techniques is used?
            (a) Hardware Level   (b) Process Level
            (c) System Level   (d) Application Level.

(vii)   WSDL description file of a service contains which one among the given alternatives?
(a) Requester's address   (b) Provider's feedback
(c) Binding information   (d) Guarantees.

(viii) The technology used to distribute service requests to resources is referred to as _____
(a) load performing   (b) load scheduling
(c) load balancing   (d) all of the mentioned.

(ix)   Point out the correct statement.
(a) A client can request access to a cloud service from any location
(b) A cloud has multiple application instances and directs requests to an instance based on conditions
(c) Computers can be partitioned into a set of virtual machines with each machine being assigned a workload
(d) All of the mentioned.

(x)   Which of the following layer in Web Service Protocol Stack is responsible for encoding messages in a common XML format so that messages can be understood at either end?
(a) - Service Transport   (b) - XML Messaging
(c) - Service Description   (d) - Service Discovery.

Group – B

2. (a)   Explain Utility Computing. What are the necessary cloud computing characteristics for healthcare SaaS applications? Why? *[(CO1,CO2)(Remember/LOCQ)]*
    (b)   What is the role of Cloud Carrier in NIST architecture?   *[(CO2)(Understand/LOCQ)]*
    (c)   What do you mean by on premise cloud deployment? Give one example scenario where it is suitable.   *[(CO3)(Analyze/IOCQ)]*
    (1 + 2 + 2) + 3 + (2 + 2) = 12

3. (a)   Virtualization simplifies the use of resources, isolates users from one another, and supports replication and mobility, but exacts a price in terms of performance and cost. Analyze each one of these aspects for (i) memory virtualization, (ii) processor virtualization, and (iii) virtualization of a communication channel.   *[(CO3)(Analyze/IOCQ)]*
    (b)   Explain virtualization security management.   *[(CO4)(Evaluate/IOCQ)]*
    (c)   Explain briefly about virtual threats.   *[(CO3)(Analyze/IOCQ)]*
    6 + 3 + 3 = 12

Group – C

4. (a)   Critically comment on: abstraction and virtualization are same concept and can be used interchangeably.   *[(CO3)(Analyze/IOCQ)]*
    (b)   What are the different types of execution level virtualization exist?
    [(CO3)(Remember/LOCQ)]

(c) Describe the differences of type I and II hypervisors with proper diagram. As per your opinion, which one is more efficient and why? *[(CO3)(Relate/IOCQ)]*

(d) Why cloud migration is needed? State differences between two techniques of application level virtualization. *[(CO2)(Compare/LOCQ)]*

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

5. (a) What do you mean by "Vendor Lock-in"? Which service model is mostly affected by it and why? *[(CO1,CO3)(Understand/LOCQ)]*

(b) What is IdaaS? Give example of a real world application of IdaaS. *[(CO5)(Relate/IOCQ)]*

(c) Critically comment and Justify:
(i) For Web Hosted Application development PaaS type II is an open choice.
(ii) SOAP and REST are equally capable. *[(CO1,CO2)(Analyze/IOCQ)]*

(d) What do you mean by third party aggregation in cloud? How it is implemented in PaaS? Give example. *[(CO3,CO6)(Judge/HOCQ)]*

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

Group – D

6. (a) What kind of Meta data is stored in the Master node for GFS? *[(CO4)(Relate/IOCQ)]*
(b) Explain Read Algorithm in GFS with suitable diagram. *[(CO4)(Remember/LOCQ)]*
(c) Why is it called single point of failure in case of HDFS? What are the replication strategies used by GFS and HDFS? *[(CO4)(Compare/LOCQ)]*
(d) Critically comment: MapReduce is adapted by both GFS and HDFS. *[(CO4)(Remember/LOCQ)]*

2 + 4 + (2 + 2) + 2 = 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. *[(CO4)(Evaluate/IOCQ)]*

(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. *[(CO4)(Evaluate/IOCQ)]*

(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. *[(CO4)(Evaluate/IOCQ)]*

4 + 5 + 3 = 12

Group – E

8. (a) 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. *[(CO5,CO6)(Criticise/HOCQ)]*

(b) A private cloud platform service is to be deployed when the application is already developed with Google App Engine. Assemble and explain which type of

platform you will choose and name any platform service inside an infrastructure that can be used as alternative to your mobile personal computer.

[(CO6)(Analyse/IOCQ)]
(2 + 2 + 2) + (2 + 2 + 2) = 12

9. (a)
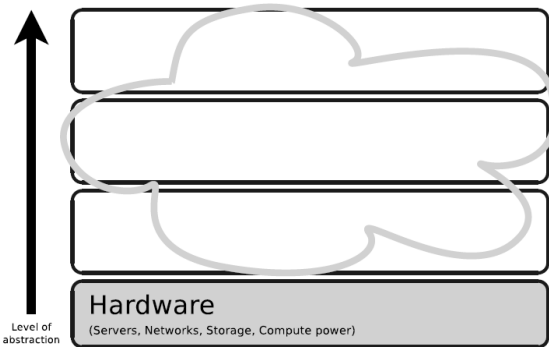
Assign these cloud service offerings to the layers in the figure
- Google App Engine • Google Cloud Print • Amazon Elastic Compute Cloud
- Amazon Mechanical Turk   • eyeOS   • EC2 Cluster Compute Instances
- Google Apps   • OnLive   • Amazon Simple Storage Service
- Windows Azure • Microsoft Office 365   • AWS Elastic Beanstalk

[(CO6)(Evaluate/HOCQ)]

(b) Consider the scenario: Linda is a good photographer. She captures shots and often tries to give special effects on pictures using her own set up with an AWS account. She plans to distribute her collection of beautiful images to the world. What services she should select and why? *[(CO3,CO6)(Develop/HOCQ)]*

(c) What is Elastic IP? Why it is useful? Explain on which factors cost of AMI depends generally? *[(CO2,CO3)(Analyze/IOCQ)]*
4 + 4 + (1 + 1 + 2) = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	28.12	54.17	17.71

Course Outcome (CO):

After the completion of the course students will be able to
1. Identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud.
2. Describe the core issues of cloud computing such as security, privacy, and interoperability to choose the appropriate technologies, algorithms, and approaches for the identified problems.
3. Analyze various cloud computing solutions.
4. Evaluate cloud Storage systems and Cloud security, the risks involved, its impact.
5. Apply knowledge for solving real life cloud computing problem scenario and illustrate solutions.
6. Develop appropriate cloud computing solutions and recommendations according to the applications used.

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