Graphic Era
HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act, 1956

End Term (Even) Semester Examination May-June 2025

Roll no......2394036......

Name of the Program and semester: **B.Tech** and **4ᵗʰ Semester**
Name of the Course: **Virtualization and Cloud Computing**
Course Code: **TCS-451**

Time: 3 hour   Maximum Marks: 100

Note:
- *(i)* All the questions are compulsory.
- *(ii)* Answer any two sub questions from a, b and c in each main question.
- *(iii)* Total marks for each question is 20 (twenty).
- *(iv)* Each sub-question carries 10 marks.

Q1.   (2X10=20 Marks)

a.   Describe the Infrastructure as a Service (IaaS) cloud computing paradigm with its key features, advantages, and disadvantages. Provide a real-world example of an IaaS provider and the services it offers.   **(CO2, CO6)**

b.   Explain the concept of Total Cost of Ownership (TCO) in cloud computing. How does cloud computing reduce TCO compared to traditional IT systems?   **(CO1)**

c.   Define cloud computing. Discuss in detail the characteristics of cloud computing as defined by NIST.   **(CO1)**

Q2.   (2X10=20 Marks)

a.   Elaborate on the concept of Platform as a Service (PaaS). Discuss the benefits it offers to developers and explain the different types of PaaS offerings available, providing examples.   **(CO2, CO6)**

b.   Compare and contrast Utility-Oriented Computing, Web 2.0, and Service-Oriented Architecture in the context of cloud computing paradigms.   **(CO2)**

c.   Compare and contrast the different taxonomy of virtualization techniques, including hardware emulation, para-virtualization, and operating system-level virtualization. Highlight the trade-offs between them.   **(CO3)**

Q3.   (2X10=20 Marks)

a.   Discuss the Software as a Service (SaaS) delivery model. Explain its characteristics and provide at least two examples of widely used SaaS applications, highlighting their key functionalities.
                                                                               (CO2, CO6)

b.   Discuss the pros and cons of virtualization in detail, considering aspects such as resource utilization, cost efficiency, security, and management overhead.   **(CO3)**

c.   Compare and contrast Para-virtualization (Xen) and Full Virtualization (VMware). What are the pros and cons of each? Explain Type-1 and Type-2 hypervisors.   **(CO3)**

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Q4. (2X10=20 Marks)

a. Explain the fundamental differences between parallel and distributed computing. Discuss the key elements of parallel computing and the hardware architectures commonly used for parallel processing. **(CO4)**

b. Explain the elements and levels of parallelism in parallel computing. Why is it important in large-scale data processing? **(CO4)**

c. Describe the components and architectural styles of a distributed computing system. How does inter-process communication work in such systems? **(CO4)**

Q5. (2X10=20 Marks)

a. Describe the cloud services provided by Amazon Web Services (AWS), Google App Engine, and Microsoft Azure. Compare their features and use cases. **(CO5 and CO6)**

b. Discuss the different types of cloud deployments, highlighting their key characteristics, advantages, and disadvantages for organizations. **(CO5)**

c. Analyze the key open challenges in cloud computing, including interoperability and standards, scalability and fault tolerance, and security, trust, and privacy. Suggest potential approaches to address these challenges. **(CO5 and CO6)**