

## ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)

ORGANISATION OF ISLAMIC COOPERATION (OIC)

## Department of Computer Science and Engineering (CSE)

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SEMESTER FINAL EXAMINATION

WINTER SEMESTER, 2022-2023

DURATION: 3 HOURS

FULL MARKS: 150

**CSE 4749: Introduction to Cloud Computing**

Programmable calculators are not allowed. Do not write anything on the question paper.

Answer all 6 (six) questions. Figures in the right margin indicate full marks of questions whereas corresponding CO and PO are written within parentheses.

1. a) You are given a host machine with 128 GB RAM and asked to use a VMM to create as many virtual machines as possible. Each of the virtual machines requires 8 GB RAM but only uses 6.0 GB RAM. How can you maximize the number of VMs your host machine can support? Calculate the amount of memory saved if you used memory overcommit. 5  
(CO2)  
(PO2)
- b) Write short notes on the following: 3 × 4
- i. Cloud Deployment Models. (CO1)
  - ii. Simple Storage Service (S3) (PO1)
  - iii. OpenStack
- c) Explain the Google File System (GFS) architecture. 8  
(CO1)  
(PO1)
2. a) Describe the concept of MapReduce with an example. 10  
(CO1)  
(PO1)
- b) Consider two lists that contain information about online transactions and customer reviews. The first list includes transaction details: (transaction-id, product-id, customer-id). The second list provides customer feedback: (customer-id, product-id, rating). If a particular product/customer pair appears in one input list but not the other, include that pair in the output with empty lists for ratings. For each unique pair of product and customer, the output should provide a list of transaction ids and a list of ratings for transactions associated with that product and customer. 8  
(CO2)  
(PO2)
- Design a MapReduce solution to identify unique pairs of product and customer.
- c) Discuss the shared responsibility model in cloud security. 7  
(CO1)  
(PO1)
3. a) Explain the process of Virtualization at Hardware Abstraction. 6  
(CO1)  
(PO1)
- b) Discuss the different threats to IaaS and SaaS. Describe the ways to block these security threats in a cloud environment. 9  
(CO3)  
(PO1)
- c) What is HDFS? Explain job management in HDFS with Architecture. 10  
(CO1)  
(PO1)

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| 4. | <p>a) XYZ Corporation, a rapidly growing e-commerce giant, is facing a significant challenge in handling and analyzing vast amounts of user data generated on its platform. The traditional database systems are struggling to keep up with the scale, leading to performance issues and cost inefficiencies. Managing and analyzing terabytes of user activity data in real time has become a bottleneck.</p> <p style="margin-left: 20px;">i. Discuss how each of the five Vs of Big Data applies to XYZ Corporation's problem.</p> <p style="margin-left: 20px;">ii. Propose solutions to address XYZ Corporation's Big Data problem.</p> <p>b) Discuss the essential characteristics of cloud computing.</p> <p>c) What is YARN in the Hadoop ecosystem?</p> | <p>5 + 5<br/>(CO3)<br/>(PO1)</p> <p>8<br/>(CO1)<br/>(PO1)</p> <p>7<br/>(CO1)<br/>(PO1)</p>     |
| 5. | <p>a) Create an architectural diagram for a cloud-based healthcare information system that ensures compliance with data protection regulations. Highlight features such as secure data transmission, access controls, and audit trails.</p> <p>b) Discuss the trade-offs between full virtualization and paravirtualization in terms of security and performance. Provide a scenario where one approach might be more suitable than the other.</p> <p>c) What are the best practices to maintain account security on a cloud platform like AWS?</p>  | <p>12<br/>(CO4)<br/>(PO2)</p> <p>6<br/>(CO2)<br/>(PO1)</p> <p>7<br/>(CO1)<br/>(PO1)</p>        |
| 6. | <p>a) How is cloud computing related to mobile computing? Discuss the evolution of cloud services into mobile computing.</p> <p>b) What is a columnar database? With the help of a diagram, explain the step-by-step process of writing to a file in the HBase architecture.</p> <p>c) What is Fault tolerance? What are the techniques to enhance fault tolerance in Cloud Computing?</p>   | <p>4 + 6<br/>(CO1)<br/>(PO1)</p> <p>2 + 8<br/>(CO1)<br/>(PO1)</p> <p>5<br/>(CO1)<br/>(PO1)</p> |