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**ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)**  
**ORGANISATION OF ISLAMIC COOPERATION (OIC)**  
**Department of Computer Science and Engineering (CSE)**

SEMESTER FINAL EXAMINATION  
 DURATION: 3 HOURS

SUMMER SEMESTER, 2022-2023  
 FULL MARKS: 150

### CSE 6273: 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.

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| 1. | a) Mobile devices could benefit from cloud computing; explain the reasons you think that this statement is true or provide arguments supporting the contrary. Discuss several cloud applications for mobile devices, then explain which one of the three cloud computing delivery models, SaaS, PaaS, or IaaS, would be used by each one of the applications and why.  | 15               |
|    | b) Overprovisioning is the reliance on extra capacity to satisfy the needs of a large community of users when the average-to-peak resource demand ratio is very high. Give an example of a large-scale system using overprovisioning and discuss whether overprovisioning is sustainable in that case and what its limitations are. Is cloud elasticity based on overprovisioning sustainable? Give arguments to support your answer.  | 10               |
| 2. | a) Compare Grid and cloud computing from various perspectives, such as architecture, business model, and resource management.  | 10               |
|    | b) Assume that you are the IT manager of a mid-sized organization. You want to move your online order system to the cloud for one month during the Ramadan. As we know, cloud service providers offer a variety of billing options to their customers. Which billing models would you suggest for your business, and why?  | 15               |
| 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 the following aspects: <ol style="list-style-type: none"> <li>i. Memory virtualization</li> <li>ii. Processor virtualization</li> <li>iii. Virtualization of a communication channel.</li> </ol> b) What is a virtual machine monitor (VMM)? Describe the essential functions of a VMM.  | 15               |
| 4. | a) Analyze the benefits and the problems posed by the four approaches to the implementation of resource management policies: control theory, machine learning, utility-based, and market-oriented.<br>b) Discuss the responsibilities of cloud schedulers at various levels. What is the objective of a cloud scheduler for batch systems and real-time systems?   | 15               |
| 5. | a) The quality-of-service (QoS) requirements differ for different classes of cloud applications and demand different scheduling policies. With examples, discuss the QoS requirements for best-effort and real-time applications.<br>b) Differentiate, with examples, between the following: <ol style="list-style-type: none"> <li>i. Horizontal Scaling and Vertical Scaling.</li> <li>ii. Operating System-based Virtualization and Hardware-based Virtualization.</li> </ol> c) Briefly Discuss the common benefits associated with adopting cloud computing | 10<br>5 + 5<br>5 |

6. a) What are the most pressing concerns with cloud security? Discuss about the cloud security requirements. 10
- b) Cloud security utilizes a layered technological strategy to safeguard users, devices, data, applications, and the network. Discuss the vulnerabilities that the following cloud deployment layer presents. 15
- i. Application and interface layer
  - ii. Platform layer
  - iii. Infrastructure layer