



MACHAKOS UNIVERSITY

University Examinations for 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)

SIT411: DISTRIBUTED SYSTEMS

DATE: 30/4/2019

TIME: 2.00-4.00 PM

INSTRUCTIONS

Answer **question ONE** and any other **TWO** questions.

QUESTION ONE (30 MARKS)

- a) With the use of appropriate diagrams, distinguish a distributed system from a centralized system. (6 marks)
- b)
 - i Define the term middleware. (2 marks)
 - ii With the use of a diagram, show and explain the middleware positioning in a typical distributed system. (6 marks)
- c)
 - i Define the terms Distributed Operating Systems (2 marks)
 - ii Explain any four models of communication in distributed processing. (8 marks)
- d)
 - i State what you understand by the term transparency (2 marks)
 - ii Give any four types of transparencies found in distributed systems. (4 marks)

QUESTION TWO (20 MARKS)

- a) Client and server are commonly used terms in distributed systems. Define each of these two terms. (2 marks)
- b) Differentiate between the following:
 - (i) fat vs thin clients
 - (ii) stateful vs stateless servers (4 marks)
- c) Using well-illustrated diagrams, differentiate 2-tier from 3-tier client/server architectures. Provide and justify an appropriate application area of each. (9 marks)

- d) i State what you understand by distributed file systems. (2 marks)
- ii Outline three properties of distributed file systems. (3 marks)

QUESTION THREE (20 MARKS)

- a) Describe five important design features of a distributed system. (10 marks)
- b) Describe the differences between the following: (8 marks)
 - (i) **Loosely** coupled and **Tightly** coupled distributed systems.
 - (ii) Network operating systems and Distributed operating systems.
- c) State what you understand by binding in distributed systems communication. (2 marks)

QUESTION FOUR (20 MARKS)

- a) i State what you understand by the term transaction. (2 marks)
- ii Outline four properties of concurrent transactions. (4 marks)
- iii Describe the lost update problem experienced in concurrent transactions. (6 marks)
- b) Explain the meaning of the following terms as used in concurrent transactions: (4 marks)
 - i Critical region
 - ii Race condition
- c) i Differentiate between logical and physical clocks as used in distributed systems. (2 marks)
- ii Outline an algorithm used for clock synchronization in distributed system. (2 marks)

QUESTION FIVE (20 MARKS)

- a) Define the term binding as used in communication between different computers in a network. (2 marks)
- b) i State what you understand by a Remote Procedure Call (RPC). (2 marks)
- ii Outline two reasons why a client may need to make a RPC. (2 marks)
- iii Using a well-labeled diagram, explain the components of a RPC. (6 marks)
- iv Describe the steps followed while making a RPC. (6 marks)
- c) State the main difference between a RPC and a Remote Method Invocation (RMI). (2 marks)