



MACHAKOS UNIVERSITY

University Examinations for 2017/2018

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR
BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)

SIT 411: DISTRIBUTED SYSTEMS

DATE: 15/12/2017

TIME: 8:30 – 10:30 AM

INSTRUCTIONS

Answer Question ONE and any other TWO Questions

QUESTION ONE (30 MARKS)

- a)
 - i) Define the terms distributed systems. (2 marks)
 - ii) Outline four reasons why companies are adopting distributed systems. (4 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 (2marks)
 - ii) Give any four types of transparencies found in distributed systems. (4 marks)

QUESTION TWO (20 MARKS)

- a) Assume that Machakos University wishes to implement a distributed system to harmonize the operations of all its affiliated centers to make them more efficient and effective. Assume also that you are the systems administrator and have been appointed to oversee the implementation of this project. State and justify any five considerations you would put in place while designing such a system, so as to ensure that the system is fully distributed (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 THREE (20 MARKS)

- a) Explain the significance of protocol suites in distributed systems. (3 marks)
- b) With the use of well-labeled diagrams, describe the following suites.
- i TCP/IP protocol stack (5 marks)
 - ii OSI reference model (7 marks)
- c) i State what you understand by distributed file systems. (2 marks)
- ii Outline three properties of distributed file systems. (3 marks)

QUESTION FOUR (20 MARKS)

- a) Differentiate between a client and a server in distributed systems. (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)

QUESTION FIVE (20 MARKS)

- a) i) State what you understand by concurrent transactions. (2 marks)
- ii) Outline four properties of concurrent transactions. (4 marks)
 - iii) Describe any four problems associated with 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) Differentiate between logical and physical clocks as used in distributed systems. (2 marks)
- d) Outline an algorithm used for clock synchronization in distributed system. (2 marks)