



TECHNICAL UNIVERSITY OF MOMBASA

INSTITUTE OF COMPUTING AND INFORMATICS

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

UNIVERSITY EXAMINATION FOR:

BTIT Y3S2

EIT 4312: DISTRIBUTED SYSTEMS

END OF SEMESTER EXAMINATION

SERIES: APRIL 2016

TIME: 2 HOURS

DATE: Pick Date May 2016

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

Question ONE (30 marks)

- (a) Distinguish between a distributed system and a standalone computer? (2 marks)
- (b) Describe any five characteristics of distributed systems [5 marks]
- (c) A distributed system has three major components, state and explain each of these components [6 marks]
- (d) Give five types of hardware resource and five types of data or software resource that can usefully be shared. Give examples of their sharing as it occurs in distributed systems. [10 marks]
- (e) List the three main software components that may fail when a client process invokes a method in a server object, giving an example of a failure in each case. To what extent are these failures independent of one another? Suggest how the components can be made to tolerate one another's failures. [7 marks]

Question TWO (20 marks)

- (a) Describe the meaning of the following terms [3 marks]
 - Distributed file system
 - Remote procedure call
 - Binding
- (b) Explain any four types of distribution transparency [4 marks]

- (c) State and explain any two concurrency problems that may occur in distributed systems [4 marks]
- (d) Briefly explain three categories of faults that occur in distributed systems [6 marks]
- (e) There are various design approaches that have been suggested in building dependable distributed systems that exhibit a high level of stability and fault tolerance, explain any three of these approaches [3 marks]

Question THREE (20 marks)

- (a) Fundamentals models are concerned with the description of properties that are common in all of the architectural models, describe the three main fundamentals models [6 marks]
- (b) State and explain the three types of services provided by a distributed file system [3 marks]
- (c) Security goals of any computer system are decided by its security policy, state and explain three security goals that can be set in a distributed system [6 marks]
- (d) Outline five kinds of security threats to consider when designing and implementing a distributed system [5 marks]

Question FOUR (20 marks)

- (a) A system that fails does not adequately provide services it was designed for, explain four types of failures that may occur in parallel and distributed systems. [4 marks]
- (b) Explain the meaning of the term 'Remote Method Invocation' and how it works in a distributed system [2 marks]
- (c) Describe using diagrams, three algorithms used to achieve mutual exclusion in distributed systems [6 marks]
- (d) Explain four advantages of file replication [8 marks]

Question FIVE (20 marks)

- (a) Distinguish between synchronous and asynchronous communication [2 marks]
- (b) A system that fails is not an adequately providing the services it was designed for. Describe four types of failure in parallel and distributed systems [2 marks]
- (c) Outline the steps involved in remote procedure call between clients and servers [5 marks]
- (d) With appropriate diagrams differentiate between loosely coupled and tightly coupled systems [6 marks]
- (e) State and explain five importance of IPC (Inter-process Communication) [5 marks]