MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF COMPUTING AND INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE

UNIVERSITY ORDINARY EXAMINATION

2023/2024 ACADEMIC YEAR

THIRD YEAR **FIRST** SEMESTER EXAMINATION FOR BACHELOR OF SCIENCE IN SOFTWARE ENGINEERING

SCS 303 – DISTRIBUTED SYSTEMS

DURATION: 2 HOURS

INSTRUCTIONS TO CANDIDATES:

1. Answer question one and any other TWO Questions.
2. Mobile phones are not allowed in the examination room.
3. You are not allowed to write on this examination question paper.

SECTION A – ANSWER ALL QUESTIONS IN THIS SECTION

QUESTION ONE (30 MARKS)

a) Define the following terms as used in distributed systems. (4 marks)
   i. Cluster computing
   ii. Transparency
   iii. Peer to peer architecture
   iv. Remote procedure call

b) It is a requirement that resilient distribution systems have to be fault tolerant. State any four possible scenarios of crashes failure and how they are resolved. (4 marks)

c) Explain the main benefits of logical clocks over physical clock. (4 marks)

d) Explain the six steps of actions taken in CORBA if a client invokes a method where server responsible for this object is not running. (6 marks)

e) Discuss two mechanisms that can be used to ensure performance in distributed systems. (4 marks)

f) Discuss each of the following types of models for developing distributed systems. (6 marks)
   i. Interaction model
   ii. Failure model
   iii. Security model

g) Explain why transparency is an important property that a distributed systems designer should achieve. (2 marks)

SECTION B – ANSWER ANY TWO QUESTIONS IN THIS SECTION

QUESTION TWO (20 MARKS)

a) Explain three challenges of designing a scalable distributed system. (6 marks)

b) Discuss the three characteristics of a distributed system architectural model. (6 marks)

c) Discuss three services provided by middleware layer of a distributed system. (6 marks)

d) Highlight two categories of distributed system threats. (2 marks)

QUESTION THREE (20 MARKS)

a) State four disadvantages of a distributed system. (4 marks)

b) Explain the three types of remote procedure call as used in distributed system. (6 marks)

c) Discuss any two types of communication paradigm in distributed system. (4 marks)

d) Using three relevant examples, explain the application that require persistent and asynchronous. (6 marks)

QUESTION FOUR (20 MARKS)

a) With aid of an example, explain the concept of omission failure. (6 marks)

b) Highlight the differences between networking operating systems, distributed operating systems and middleware based distributed system. (3 marks)

c) Discuss three main goals of peer to peer architecture in distributed systems. (6 marks)

d) With the aid of a diagram, explain the three layers of implementing a remote method innovation (RMI). (5 marks)