



# MACHAKOS UNIVERSITY

University Examinations for 2022/2023

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

THIRD/FOURTH YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR SCIENCE (INFORMATION TECHNOLOGY)

SIT 374/411: DISTRIBUTED SYSTEMS

DATE:

TIME:

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## INSTRUCTIONS:

Answer Question ONE and any other TWO Questions

### QUESTION ONE (COMPULSORY) (30 MARKS)

- a) You have been requested to design a distributed system for a fast-growing micro-finance. Discuss FOUR design goals to consider for such a system. (8 marks)
- b) Using a hypothetical consistency scenario discuss monotonic read and monotonic write in distributed systems. (6 marks)
- c) Differentiate between synchronous-RPC and Asynchronous-RPC. (6 marks)
- d) Sketch a diagram of a Library system and use the diagram to discuss three-tier system architecture of a library system. (6 marks)
- e) You have been tasked with the responsibility of managing replication and consistency in a distributed system. Explain TWO replication types that you would consider for this task. (4 marks)

### QUESTION TWO (20 MARKS)

- a) The growth of IoT has created a new type of distributed system. Explain the new type and how it differs from the other two types. (6 marks)
- b) Discuss THREE proposed solutions of locating an entity in a distributed system. (6 marks)
- c) Explain TWO election algorithms (how they work) as used in coordination in Distributed systems. (8 marks)

### QUESTION THREE (20 MARKS)

- a) Fault tolerance is synonymous with dependable system. Explain FOUR concepts related to dependability that you would consider in a distributed system. (8 marks)
- b) Differentiate between edge server systems and collaborative systems. (4 marks)
- c) When searching for files in an unstructured peer-to-peer system, it may help to restrict the search to nodes that have files similar to yours. Explain how gossiping can help to find those nodes. (6 marks)
- d) Define parameter marshalling as used in distributed systems. (2 marks)

### QUESTION FOUR (20 MARKS)

- a) Using a diagram explain the passing by value RPC in distributed systems (8 marks)
- b) An organization you are working for is in the process of implementing secure distributed system. Armed with the knowledge in distributed security you are required to discuss FOUR security mechanisms to apply. (8 marks)
- c) Briefly explain any TWO services of cloud computing (4 marks)

### QUESTION FIVE (20 MARKS)

- a) Giving relevant examples explain TWO reasons for replication in distributed system. (6 marks)
- b) Discuss THREE reasons for code migration in distributed systems. (6 marks)
- c) Explain the difference between asynchronous and synchronous communication in distributed systems. (4 marks)
- d) Discuss the benefits of multithreading in a distributed system. (4 marks)