



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND  
TECHNOLOGY**

**SCHOOL OF INFORMATICS AND INNOVATIVE SYSTEMS**

**UNIVERSITY EXAMINATION FOR THE DEGREE IN BUSINESS**

**INFORMATION SYSTEMS AND THE DEGREE IN INFORMATION AND  
COMMUNICATION TECHNOLOGY**

**4<sup>th</sup> YEAR 1<sup>st</sup> SEMESTER 2024/2025 ACADEMIC YEAR**

**MAIN CAMPUS**

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**COURSE CODE: ITB 2402**

**COURSE TITLE: DISTRIBUTED SYSTEMS**

**EXAM VENUE: LR 2**

**STREAM: BIS, ICT**

**DATE: 17/4/2025**

**EXAM SESSION: 9.00-11.00**

**TIME: 2 HOURS**

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***INSTRUCTIONS***

Answer question ONE and any other TWO questions

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### Question 1 (30 Marks)

- (a) Define a **Distributed System** and explain its key **characteristics**. (10 marks)
  - (b) Describe **at least five types of transparency** in Distributed Systems, giving a real-world example for each. (10 marks)
  - (c) Discuss **fault tolerance** in distributed systems. Explain two techniques used to achieve fault tolerance. (10 marks)
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### Question 2 (20 Marks)

- (a) Explain the difference between **Message Passing** and **Remote Procedure Call (RPC)** in distributed systems. (10 marks)
  - (b) Discuss **synchronous and asynchronous communication**, highlighting their advantages and disadvantages. (10 marks)
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### Question 3 (20 Marks)

- (a) Explain the **main components of a Distributed Operating System (DOS)** and their functions. (10 marks)
  - (b) Compare **two distributed file system case studies** (e.g., **Sun's NFS vs. Andrew File System**), focusing on their architectures and key features. (10 marks)
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### Question 4 (20 Marks)

- (a) Explain the **ACID properties** in transaction management and why they are important in distributed databases. (10 marks)
  - (b) Discuss **replication in distributed systems** and explain the role of **consistency models** in managing replicated data. (10 marks)
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### Question 5 (20 Marks)

- (a) Identify **three key challenges** of **Mobile Distributed Systems** and propose possible solutions for each. (10 marks)
  - (b) Explain the impact of **Internet-based Distributed Applications** and discuss **two protocols** (e.g., **HTTP, TCP/IP**) that support distributed computing. (10 marks)
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