



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**SCHOOL OF INFORMATICS AND INNOVATIVE SYSTEMS**  
**UNIVERSITY EXAMINATION FOR THE DEGREE IN COMPUTER SECURITY**  
**AND FORENSICS AND BSC ICT**  
**3RD YEAR 1<sup>ST</sup> SEMESTER 2021/2022 ACADEMIC YEAR**  
**MAIN CAMPUS**

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COURSE CODE: ICB 3303

COURSE TITLE: DISTRIBUTED SYSTEMS

GROUP: CSF

DATE: EXAM SESSION:

TIME: 2 HRS

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**INSTRUCTIONS**

Answer question **one** and any other **two** questions

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### Question One

- a) What is a Distributed System and a Parallel System? **(3 Marks)**
- b) Discuss the common characteristics of distributed systems **(8 Marks)**
- c) To understand the fundamental building blocks of a distributed system, it is necessary to consider four key questions, mention and explain each question in broad **(4 Marks )**
- d) Why would you design a system as a distributed system? List any two advantages of distributed systems. **(4 marks)**
- e) List any four disadvantages or problems of distributed systems that local only systems do not show (or at least not so strong) **(4 marks)**
- f) List three properties of distributed systems **(3 marks)**
- g) Give a definition of middleware and show in a small diagram where it is positioned. **(4 marks)**

### Question Two

- a) What are the advantages of distributed systems over centralized systems? **(6 Marks)**
- b) What are the entities that communicate in the distributed system? Illustrate the communication paradigm as used **(5 Marks)**
- c) If a communication paradigm is asynchronous, is it also time-uncoupled? Explain your answer with appropriate examples. **(5 Marks)**
- d) Examine some steps for migrating legacy applications into web services **(4 Marks)**

### Question Three

- a) What kind of reliable connection is provided by a tcp/ip based socket? Is this reliability enough for distributed calls or when does it break down? **(6 marks)**
- b) What are the delivery guarantees with: best effort, at least once, at most once. Which one is mostly used in distributed systems? **(6 marks)**
- c) What is the advantage if your server side processing uses threads instead of a single process? **(4 marks)**
- d) What is the problem behind keeping state for a client on a server? **(4 marks)**

#### **Question Four**

a) What is service identification **( 2 Marks )**

b) Differentiate between the following terms as used in distributed systems

**(6 Marks)**

i. Transaction integrity and load balancing

ii. Asynchronous Messaging and synchronous Messaging

c) Differentiate between service oriented architecture and Service-oriented software engineering in distributed systems **( 6 Marks )**

d) Describe I AAA technology parameter used in securing systems transactions **( 6 Marks )**

#### **Question Five**

a) Explain the concept of an object reference in a distributed system. Why do remote objects need one and who creates it? (4 marks)

b) What is the purpose of an Interface Definition Language? Why does CORBA not just use the Java inter-face construct? (4 marks)

c) Remote objects built with Java RMI are usually registered in a so called "registry". Why? (4 marks)

d) List any Four (4) ways to invoke a method on a remote object (4 marks)

e) How does a server know that one of his remote objects provided by him is no longer used by clients and can be collected? How does Java RMI handle this problem and what alternatives are there? (4 marks)