



NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF COMPUTING AND INFORMATICS
DEPARTMENT OF COMPUTER SCIENCE

QUALIFICATION: BACHELOR OF COMPUTER SCIENCE, SYSTEMS ADMINISTRATION	
QUALIFICATION CODE: 07BACS	LEVEL: 6
COURSE NAME: DISTRIBUTED SYSTEMS	COURSE CODE: DTS620S
DATE: NOVEMBER 2022	PAPER: THEORY
DURATION: 2 HOURS	MARKS: 70 (100%)

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
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THIS QUESTION PAPER CONSISTS OF 3 PAGES (Including this front page)

INSTRUCTIONS

- 1) Answer ALL the questions on the answer scripts provided.
- 2) Be guided by the number of marks allocated when answering the questions.
- 3) Write clearly and neatly.
- 4) Show all your calculations.
- 5) Number your questions clearly.

Question 1:

1. What is the main idea of designing a distributed system? (2)
2. List and explain any **four (4)** characteristics of distributed systems. (8)
3. Explain the role of middleware in supporting the development of distributed applications and services. (4)
4. Explain why Heterogeneity is unavoidable in distributed systems (3)
5. Justify why systems in **Education, e-commerce, and environment management** can be classified as distributed. (6)

[23 Marks]

Question 2

1. Explain the concept of independent failure in distributed systems. (3)
2. Group Communication paradigm routes messages via multicast, using various communication protocols; at times the message sent is never received by the receiver; why is this the case? (4)
3. If a communication paradigm is synchronous, is it also time-coupled, with an example, explain the characteristics of this paradigm. (3)
4. Explain the concept of indirect communication (space and time uncoupling) in relation to the communication that takes place on Microsoft Teams. (4)
5. Why is scalability an important feature in the design of a distributed system? (2)
6. Explain why transparency is a major requirement in a distributed file system. (3)
7. Differentiate between Concurrency transparency and Location transparency (4)
8. Many of the information resources that are made available and maintained in distributed systems have a high intrinsic value to their users. Their security is therefore of considerable importance. List and explain the 3 components of information resources (6)
9. Discuss how the following security challenges can be experienced in distributed systems. (6)
 - a) Denial of service attacks:
 - b) Security of Mobile code:

[35 Marks]

