



(Knowledge for Development)

KIBABII UNIVERSITY

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MAIN CAMPUS

UNIVERSITY EXAMINATIONS

END OF SEMESTER EXAMINATION

2021/2022 ACADEMIC YEAR

FOURTH YEAR FIRST SEMESTER EXAMINATION

FOR THE DEGREE OF BACHELORS OF SCIENCE IN

(INFORMATION TECHNOLOGY)

COURSE CODE: BIT 417

COURSE TITLE: DISTRIBUTED SYSTEMS

DATE: 23/05/2022 TIME: 9.00 A.M. – 11.00 A.M. 2HRS

INSTRUCTIONS TO CANDIDATES:

ANSWER QUESTION ONE AND ANY OTHER TWO.

Paper Consists of 4 Printed Pages. Please Turn Over ➡

QUESTION ONE [COMPULSORY] [30 MARKS]

- a. In your own words and understanding describe a distributed system. [2 marks]
- b. Explain what is meant by (distribution) transparency, and give examples of different types of transparency. [4 marks]
- c. Give five advantages of using distributed systems over centralized systems. [6 marks]
- d. If a client and a server are placed far apart, we may see network latency dominating overall performance. How can we tackle this problem? [4 marks]
- e. Name a few advantages and disadvantages of using distributed systems over centralized servers. [6 marks]
- f. Discuss the two architectural models of distributed systems. [4 marks]
- g. Differentiate between weak migration and strong migration [4 marks]

QUESTION TWO [20 MARKS]

- a. Differentiate between parallel virtual machine (PVM) and message passing interface (MPI). [6 marks]
- b. Explain the four goals of a distributed system. [4 marks]
- c. Describe the role of middleware in a distributed system? [2 marks]
- d. Give a compelling (technical) argument why the tit-for-tat policy as used in BitTorrent is far from optimal for file sharing in the Internet. [2 marks]
- e. Describe the procedure of how a procedure call is implemented. [6 marks]

QUESTION THREE [20 MARKS]

- a. Describe the following election algorithms as used in distributed systems. [9 marks]
 - i. Bully algorithm
 - ii. Ring Algorithm
- b. Would it make sense to limit the number of threads in a server process? Explain [5 marks]
- c. Differentiate between a process and a thread. [6 marks]

QUESTION FOUR [20 MARKS]

- a. Communication within distributed systems can take place in different ways. Discuss the following methods of intersystem communication between distributed systems.
 - i. Remote Procedure Call
 - ii. Remote Object Invocation
 - iii. Message-Object Oriented

- iv. Layered protocols
- v. Remote Method Invocation (RMI) [10 marks]
- b. Not every node in a peer-to-peer network should become super peer. What are reasonable requirements that a super-peer should meet? [4 marks]
- c. Describe CORBA features of a distributed system. [6 marks]

QUESTION FIVE [20 MARKS]

- a. We already gave some examples of distributed pervasive systems: home systems. Electronic health-care systems and sensor networks. Extend this list with more examples. [3 marks]
- b. Explain the following terms as used in Distributed systems [5 marks]
- i. Openness
 - ii. Transparency
 - iii. Scalability
 - iv. concurrency
 - v. Middleware
- c. What do you understand by the term clock Synchronization? [4 marks]
- d. List and explain any five properties of distributed algorithms. [8 marks]