CHUKA UNIVERSITY

UNIVERSITY EXAMINATIONS

FOURTH YEAR EXAMINATION FOR THE AWARD OF BACHELOR OF SCIENCE (COMPUTER SCIENCE)

COMP 414: DISTRIBUTED SYSTEMS

STREAMS: BSC (COMP. SCI) (Y4S2) **TIME: 2 HOURS**

DAY/DATE: THURSDAY 11/4/2019 **11.30 A.M. – 1. 30 P.M.**

INSTRUCTIONS:

- Answer question **ONE in section A** and any other **TWO** questions from section B
- Do not write on this question paper
- This is a **closed book exam**, Reference materials are not allowed in exam room

SECTION A: COMPULSORY

QUESTION 1 [30 MARKS]

a) Explain the role of middleware in distributed systems. [4 marks]

b) Explain what is meant by (distributed) transparency; give examples of different types of transparency. [8 marks]

c) If a client and a server are placed far apart, we may see network latency dominating overall performance. How can this problem be solved? Use sketches to illustrate your answer. [8 marks]

d) Use sketches to illustrate the working of client-server architecture as they occur in Distributed Systems. [4 marks]

e) Discuss the issues in designing a distributed operating system. [4 marks]

f) Explain the implementation of RPC in a distributed system. [2 marks]

SECTION B: ANSWER ANY TWO QUESTIONS FROM THIS SECTION

Question 2 [20 Marks]

a) Explain the desirable features of a good global scheduling algorithm. [10 marks]

b) What is process Migration? Discuss the various issues that need to be addressed when Designing process migration facility. [10 marks]

Question 3 [20 marks]

a) What is a physical clock, Explain how clock synchronization done in distributed system [10 marks]

b) Explain consistency model used in a distributed shared memory. [10 marks]

Question 4[20 marks]

A client sends a 200 byte request message to a service, which produces a response containing 5000 bytes. Estimate the total time to complete the request in each of the following cases, with the performance assumptions listed below:

i) Using connectionless (datagram) communication (for example, UDP); [6 marks]

ii) Using connection-oriented communication (for example, TCP); [8 marks]

iii) The server process is in the same machine as the client. [6 marks]

Question 5 [20 marks]

a) Discuss how Mutual Exclusion is implemented in distributed systems. [10 marks]

b) Discuss in details, an election algorithm as it occurs in distributed systems [10 marks]
