CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DIPLOMA IN COMPUTER SCIENCE

COSC 0262: DISTRIBUTED SYSTEMS

STREAMS: DIPLOMA (COMPUTER SCIENCE) Y2S2 **TIME: 2 HOURS**

DAY/DATE: THURSDAY 23/09/2021 **11.30 A.M – 1.30 P.M.**

INSTRUCTIONS:

- Answer question one and any other two from section B
- Do not write on this paper

SECTION A {compulsory}

Question One (30 Marks)

a) Describe the following terms used in distributed system
   i. Distributed systems. (1mark)
   ii. Remote procedure call. (1mark)
   iii. Openness. (1mark)
   iv. Transparency. (1mark)

b) Differentiate tightly coupled systems from loosely coupled systems. (4marks)

c) Explain three main characteristics that differentiate a distributed system from a centralized system. (3 marks)

d) What is a computer Network? With the use of relevant examples, discuss **two** types of computer topologies. (5 marks)

e) A number of corporate organizations have of late gone full blast in adopting distributed systems. Briefly explain **three** reasons behind most organizations adopting a distributed system as opposed to the traditional mainframe or centralized computing. (6 marks)

f) Differentiate between administrative and geographical scalability. (2 marks)

g) Using suitable illustrations where necessary, differentiate the following distributed system service models: (6 marks)
   i. Centralized model and Client-server model.
   ii. Thin and Fat client model.

SECTION B: ANSWER ANY TWO QUESTIONS FROM THIS SECTION

Question Two (20 Marks)

a) Distributed systems can be very complex during the design as well as the implementation stage. Some issues must therefore be handled with care to ensure a smooth-running system. Discuss the following issues in distributed systems to ensure your system works well;

i. Fault tolerance. (2 marks)
ii. Replication. (2 marks)
iii. Synchronization. (2 marks)
iv. Security. (2 marks)

b) A data packet is transmitted to an application residing on a different computer on the Internet. Describe the journey of the data packet through the communication network layers, explaining how each layer contributes in delivering the data to the destination application. (12 marks)

Question Three (20 Marks)

a) Define the term middleware. (2 marks)
b) Explain the role of middleware in distributed systems. (4 marks)
c) With an aid of a diagram, discuss the TCP 3-way handshake. (6 marks)
d) Concurrency arises in a system when several processes run in parallel. If these processes are not controlled then inconsistencies may arise in the system. Using appropriate examples explain four main types of problems caused by uncontrolled interleaving of sub-operations of concurrent transactions. (8 marks)

Question Four (20 Marks)

a) You have been assigned the task of implementing a distributed system in an NGO that has branches in major towns in Kenya. Discuss at least five issues you would consider in your design layout. (10 marks)
b) Explain the three advantages and three disadvantages of distributed systems compared with centralized systems. (6 marks)
c) Explain two advantages of file replication. (4 marks)

Question Five (20 Marks)

a) Describe the term distributed system memory. (2 marks)

b) Identify and describe four features of a good distributed file system. (8 marks)

c) Due to the absence of shared memory, all communication in distributed systems in based on exchanging messages over an unreliable network such as the Internet. Discuss any THREE widely-used modes of communications in Distributed Systems. (6 marks)

d) Briefly explain FOUR security threats in distributed systems. (4 marks)
