

CHUKA



UNIVERSITY

RESIT/ SPECIAL EXAMINATIONS

**EXAMINATION FOR THE AWARD OF DEGREE OF
BACHELOR OF SCIENCE APPLIED COMPUTER SCIENCE**

ACMP 271: FOUNDATIONS OF DATA COMMUNICATIONS AND NETWORKS

STREAMS:

TIME: 2 HOURS

DAY/DATE: MONDAY 23/7/2018

8.30 AM – 10.30 AM

INSTRUCTIONS:

- 1. Answer question 1 in section A and any other TWO from section B**
- 2. Marks are awarded for clear and concise answers**
- 3. Note that only Question ONE (Section A) and the first TWO attempted questions in section B will be marked.**

SECTION A-COMPULSORY

Question ONE-30 Marks

(a) Give a brief description of the following performance metrics and their units of measure when used in data Communication **[9 Marks]**

- (i) Bandwidth
- (ii) Data Rate
- (iii) Throughput

(b) Give **THREE** features of routers that make them superior to bridges **[6 Marks]**

(c) Differentiate between Nyquist Capacity and Shannon Capacity **[4 Marks]**

(d) Differentiate between packet Delay and packet delay variation **[4 Marks]**

(e) Suppose you have been asked to configure a class C equivalent network and you want to configure computer **XXX** with the IP address 192.168.0.10. What number would you configure as corresponding subnet mask **[7 Marks]**

SECTION B-Answer any TWO questions from this section

Question TWO-20 Marks

- (a) Compare and contrast channels using electrical cables and those using optic cables
[6 Marks]
- (b) Give **TWO** applications of satellite communication and **TWO** applications of terrestrial microwave communication
[4 Marks]
- (c) Show how the seven layers of OSI model map to TCP/IP model
[6 Marks]
- (d) Distinguish Star and bus topology
[4 Marks]

Question THREE-20 Marks

- (a) Transport layer protocols provide end to end delivery of application data. Give **TWO** scenarios when UDP protocol is applicable as a transport protocol. For each Scenario, give **TWO** examples of such an application
[4 Marks]
- (b) List the seven members of the electro-magnetic spectrum and indicate those that are useful in data communication
[12 Marks]
- (c) Give **FOUR** types of delays that affect data communication between sender and receiver
[4 Marks]

Question FOUR

- (a) Create a Supernet from the following networks
- (i) 128.143.137.144 and 128.143.132.144 [3 Marks]
 - (ii) 128.143.144.200 and 128.145.144.200 [3 Marks]
- (b) Consider a computer X with the following IPV4 network configurations:
- | | |
|-----------------|-----------------|
| IP Address | 172.143.136.140 |
| Subnet Mask | 255.255.0.0 |
| Default Gateway | 172.143.25.3 |
| DNS Server | 200.65.200.222 |
- (i) What is the address of the network that Computer X is attached to [3 Marks]
 - (ii) What is the host number of computer X [3 Marks]
 - (iii) Suppose computer X requests a web access to **http://www.mail.yahoo.com**,

which IP address will computer X query first in order to determine the IP address of www.mail.yahoo.com [3 Marks]

(iv) Suppose the addresses are based on classes, which class would you classify the network that Computer X is attached to [3 Marks]

(v) Suppose the addresses are based on CIDR, how would you represent the IP address of machine X using slash (/) notation [2 Marks]

Question Five-20 Marks

(a) Consider a channel with a 1-MHz bandwidth. The SNR for this channel is 63. How many signal levels are required to achieve Shannon Capacity [6 Marks]

(b) Give **TWO** differences between hub and a switch [4 Marks]

(c) Briefly explain the operation of the following network devices stating the OSI Layer they are associated with [6 Marks]

- (i) Switch
- (ii) Router

(d) Give **TWO** differences between **IP** addresses and **MAC** addresses [4 Marks]
