

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

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

ACSC 261: FOUNDATIONS OF DATA COMMUNICATIONS AND NETWORKS

STREAMS:

TIME: 2 HOURS

DAY/DATE: WEDNESDAY 6/12/2017

8.30 A.M – 10.30 A.M

INSTRUCTIONS:

- Answer question 1 in section A and any other TWO from section B
- Marks are awarded for clear and concise answers
- 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. [6 Marks]
- (i) Bandwidth
 - (ii) 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) Consider a noiseless channel with a bandwidth of 3000 Hz transmitting a signal with two signal levels. Compute the maximum bit rate [4 Marks]
- (e) How can you distinguish class A, B and C based on bit arrangements [3 Marks]
- (f) Differentiate between packet Delay and packet delay variation [4 Marks]
- (g) 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. [3 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) Illustrate 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) Give **TWO** differences between **IP** addresses and **MAC** addresses [4 Marks]
- (b) 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. [6 Marks]
- (c) List the seven members of the electro-magnetic spectrum and indicate those that are useful in data communication. [6 Marks]
- (d) 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) Describe the role of the following application layer protocols [10 Marks]

- (i) DNS
- (ii) Telnet
- (iii) SMTP
- (iv) FTP
- (v) HTTP

(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
-