CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

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

ACSC 261: DATA COMMUNICATION AND NETWORKS

STREAMS: BSC (APPLIED COMPUTER SCIENCE) Y2S1 **TIME: 2 HOURS**

DAY/DATE: FRIDAY 14/12/2018 **11.30 A.M. – 1.30 P.M.**

INSTRUCTIONS:

Attempt **Question ONE (Section A) and any other **TWO** from **SECTION B**

**Marks are awarded for clear and concise answers

*ONLY the first **THREE** Questions attempted will be marked **(Question one inclusive)**

SECTION A- Compulsory

Question ONE [30 Marks]

(a)Describe **TWO** features of routers that make them superior to bridges **[4 Marks]**

(b)Illustrate the format of an Ethernet frame showing the order of the key fields **[6 Marks]**

(c)Differentiate IPV4 address from MAC address in relation to the address size and the layer in which each operates **[4 Marks]**

(d)What are the key features of extended service set (ESS) architecture in a WLAN **[6 Marks]**

(e) What is the role of a sequence number in a TCP session **[4 Marks]**

(f)Give **THREE** functions of OSI application layer **[3 Marks]**

(g) Create a Supernet from the following networks: **192.168.55.244** and **192.168.55.120 [3 Marks]**

SECTION B- Attempt any **TWO** questions from this **SECTION**

Question TWO [20 Marks]
Ethernet is a 'multi-access' technology employing broadcast medium that is shared by many hosts.Simultaneous transmissions result in collisions.
(a)Describe the multiple access and collision mechanism employed by Ethernet **[8 Marks]**

(b)Other than the base Ethernet, describe **THREE** Ethernet technology options giving the data rates and atleast **TWO** physical media standards in each **[12 Marks]**

Question THREE [20 Marks]

(a)The MAC layer frame of IEEE 802.11 contains nine fields.Explain the size and the role of each of the following fields:

(i)Frame control **[2 Marks]**

(ii)FCS **[2 Marks]**

(iii)Sequence control **[2 Marks]**

(iv)Frame body **[2 Marks]**

(b)Using a diagram illustrate the CSMA/Collision Avoidance media access mechanism employed by IEEE 802.11 wireless networks clearly showing RTS-CTS exchange**[12 Marks]**

Question FOUR [20 Marks]

(a)Backbone ISPs obtain large block of IP addresses space and then reallocate portions of their address blocks to their clients. Suppose an ISP assigns the public IP address block **206.120.68.64/30** to a client. From this address block, establish the specific addresses available to the client for use **[8 Marks]**

(b)When Internet addresses were standardized (early 1980s), the Internet address space was divided up into classes. By the early 1990s, the original classful address scheme had a number of problems leading to abandonment of this approach.

(i)Explain **THREE** problems that led to abandoning of class based IP addresses **[6 Marks]**

(ii)Explain how each of the problems were addressed by classless IP addressing **[6 Marks]**

Question FIVE [20 Marks]
(a)Explain how the IP protocol in network/internet layer works with transport layer to identify conversations from various sources and pass them to the appropriate application **[8 Marks]**

(b)Distinguish between the role played by **applications** and that played by **services** within the application layer of TCP/IP model **[4 Marks]**

(c)Private IP addresses concept was introduced as a short-term mitigation to IP address exhaustion problem.

(i)What is a private IP address **[2 Marks]**

(ii)Give atleast **THREE** circumstances under which private addresses can be used instead of globally unique addresses **[3 Marks]**

(iii)Explain how the concept is used to address IP address exhaustion problem **[3 Marks]**
