FACULTY/COLLEGE	College of Business and Economics
SCHOOL	School of Consumer Intelligence and Information Systems
DEPARTMENT	Applied Information Systems
CAMPUS(ES)	APB
MODULE NAME	Communications Networks 2A
MODULE CODE	CMN02A1
SEMESTER	First
ASSESSMENT OPPORTUNITY, MONTH AND YEAR	Supplementary Summative Assessment July 2019

ASSESSMENT DATE	18 July 2019	**SESSION**	08.00 – 11.00
ASSESSOR(S)	Dr Barnabas Gatsheni		
MODERATOR(S)	Mr. Tino Museba		
DURATION	3 hours (180 min)	**TOTAL MARKS**	100

NUMBER OF PAGES OF QUESTION PAPER (Including cover page)	3 AND ANNEXURE

INFORMATION/INSTRUCTIONS:

- This is a closed-book assessment.
- There are 4 questions. **Answer All questions**
- Read the questions carefully and answer only what is required.
- Number your answers clearly and correctly as per the question paper.
- Write neatly and legibly on both sides of the paper in the answer book, starting on the first page.

QUESTION 1 **[25 MARKS]**

1.1 Find the class of the following classful IP addresses:

a) 130.35.54.12 b) 200.36.2.3 c) 245.24.2.8 (3)

1.2 A classless address is given as 167.199.170.82/**27**
You have been given address mask as 256.256.256.224
a) What is the number of addresses in the block? (1)
b) What is the first address of the block? (3)
c) What is the last address of the block? (3)

1.3 Compare the star topology with the ring topology in networking. (4)

1.4 Define multiplexing and then state advantage(s) of multiplexing. (4)

1.5 5 Draw the voltage representation of the bit pattern 10010011 for these digital encoding schemes the Differential Manchester (7)

QUESTION 2 **[25 MARKS]**

2.1 Exhaustively compare a hub with a switch (5)

2.2 You are given the following codewords:

d(10000, 00000), b) d(10101, 10000) c) d(00000, 11111)

What is the minimum hamming distance? (5)

2.3 Determine if the datagram with the following information is a first fragment, a middle fragment, a last fragment or the only fragment:

a) M bit is set to 1 and the value of the offset field is zero. (4)

b) M bit is set to 1 and the value of the offset field is nonzero (4)

2.4 In an IPv4 packet, the value of HLEN is (1010)base 2. How many bytes of options are being carried by this packet? (7)

QUESTION 3 **[25 MARKS]**

3.1 A category of error detecting (and correcting) code, called the Hamming code, is a code in which dmin = 3. The code can detect up to two errors (or correct one single error). In this code, the values of *n, k* and *r* are related as: $n = 2^r - 1$.

If the number of redundant bits r =3;
a) What is the number of bits in a codeword n? (2)

b) What is the number of bits in a dataword k? (2)

3.2 Given the bit rate of a synchronous TDM is 1 Mbps. You are given that the unit of data is 1 bit.

a) Calculate the input bit duration (2)
b) Calculate the output bit duration (2)
c) Calculate the output bit rate (2)
d) Calculate the output frame rate (2)

3.3 Fully explain the idea of multiplexing using frequency division multiplexing (8)

3.4 You want to send to the receiver data in the form a list of these numbers 10, 7, 12, 3, 6**.** Show how the receiver will use the checksum to either discard the data or accept the data. (5)

QUESTION 4 **[25 MARKS]**

4.1 Assuming even parity, find the parity bit for each of the following data units:

a) 1001011 b) 0001100 c) 1110111 (3)

4.2 Compare synchronous time division multiplexing with statistical time division multiplexing. (4)

4.3 State the 4 advantages of the Multi-Protocol Label Switching (MPLS). (4

4.4 With the help of a diagram, describe the process of label substitution (swapping) within the MPLS network. (8)

4.5 Describe how an address resolution protocol (ARP) works and then state why the ARP is important in networking (6)