FACULTY OF SCIENCE

ACADEMY OF COMPUTER SCIENCE AND SOFTWARE ENGINEERING

MODULE	CSC2B10 COMPUTER SCIENCE 2B
CAMPUS	AUCKLAND PARK CAMPUS (APK)
	SSA EXAM

DATE: 2021-01-21 **SESSION:** 08:00 - 10:00

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MODERATOR: MR J.L. DU TOIT

DURATION: 120 MINUTES **MARKS:** 100

Please read the following instructions carefully:

1. Answer **all** the questions
2. Write *clearly* and *legibly*.
3. You may use a non-programmable calculator to answer the questions.
4. This paper consists of 5 pages.

QUESTION 1

(a) Circuit switching makes use of FDM and TDM, briefly describe the manner in which each principle works. [02]

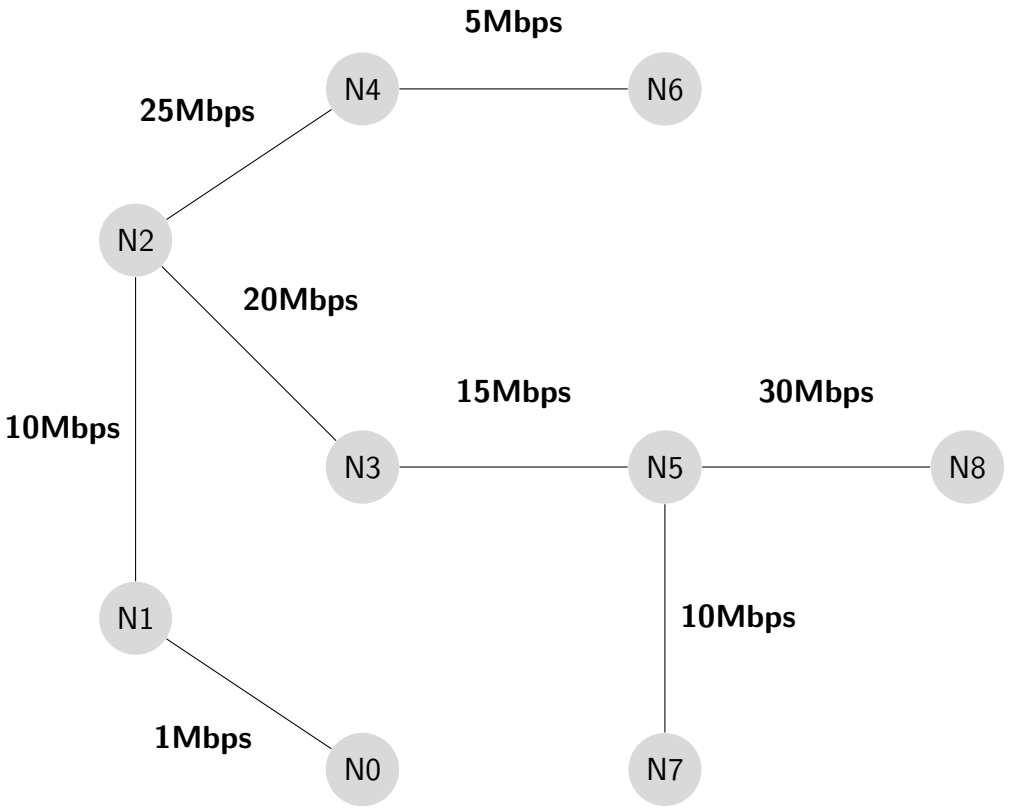
(b) *Briefly describe* two network-core functions. [02]

(c) What is the IoT? [01]

Total: 5

QUESTION 2

Assume there is a copper network with 9 nodes (N0, N1, N2, N3, N4, N5, N6, N7 and N8) and the transmission rates between these nodes are as follows:



It is also determined that the distances between the nodes are as follows: (Note that all working out must be shown, failure to do this may result in the student receiving zero for the question)

- N0-N1: 8km
- N1-N2: 4km
- N2-N3: 32km
- N2-N4: 2km
- N4-N6: 16km
- N3-N5: 6km
- N5-N7: 64km
- N5-N8: 32km

Answer the following questions (Do not round off):

(a) *Determine* the **approximate transmission rate** when communicating between N6 and N8. [1]

(b) Taking this **approximate transmission rate** into account, how *long* (in seconds) will it take to transfer a 160 MegaByte **file** from node N6 and N8? [02]

(c) If it is determined that the copper installed in this network **propagates** a signal at a speed of 100 000 km/s. *Calculate* the **propagation delay** for communications between N6 and N8. [03]

(d) Assuming that there is no nodal processing delay or queueing delay, *calculate* the **total time** taken to transfer a 120 MegaByte file from from N6 and N8? [04]

Total: 10

QUESTION 3

What is a DNS server? *List* and *briefly describe* the three different levels of servers.

Total: 5

QUESTION 4

The following question is about the **POP** protocol.

(a) *What* does **POP** stand for? [01]

(b) What port does the **POP** protocol run on? [01]

(c) *What* is the purpose of the **POP** protocol? [03]

Total: 5

QUESTION 5

(a) There are 3 known costs of congestion, discuss each cost. [04]

(b) *List* the steps that take place in the TCP **three-way** handshake. [03]

(c) *Discuss* two (2) differences between the Internet (IP) and ATM (VC) network layer protocols, along with why you think IP is used more. [03]

Total: 10

QUESTION 6

The table below represents the payload of a UDP segment. Calculate the **sum** of the following two 16-bit integers, along with their associated 1s complement **checksum**:

Note that all working out must be shown, failure to do this may result in the student receiving zero for the question

Number 1	1	1	1	0	1	0	0	0	0	0	0	0	1	1	1	1
Number 2	1	1	1	0	0	0	0	1	1	0	1	0	1	1	1	1

Total: 5

QUESTION 7

(a) With the aid of a diagram, *discuss* **IP fragmentation** and **re-assembly**. [06]

(b) *Discuss* the problems that exist with Network Address Translation. [04]

Total: 10

QUESTION 8

Given the following **IP address** and **computer number**, answer the questions that follow:

UJ wants 128 computers with an IP address of *154.232.82.18*

(a) What is the **CIDR** for this network? [02]

(b) Provide this address in **binary** notation. [02]

(c) Assuming classful addressing was used, what **class** does this address belong to? [02]

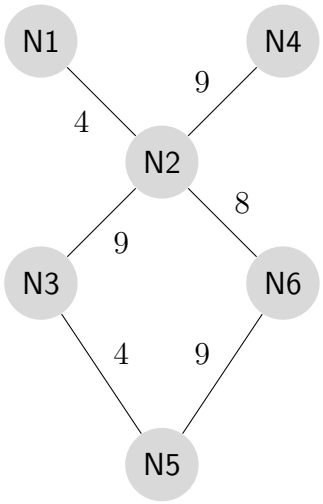
(d) Calculate the **network address** of this block in dotted decimal notation. [02]

(e) Calculate the **broadcast address** of this block in dotted decimal notation. [02]

Total: 10

QUESTION 9

Given the below network **routing graph** (with costs), answer the following questions that follow:



(a) What is the path with the **least cost** when communicating between N5 and N1. Is this the **only** cost effective path? [02]

(b) Given the local datagram **forwarding table** for node N2 below and the destination address is 196.82.37.136, which link will this packet be forwarded to? [03]

Destination Address range	Output Link Interface
11000100 01010011 00100101 100011***	N1
11000100 01010011 00100101 10001**	N3
11000100 01010011 00100101 100010**	N4
Otherwise	N6

Total: 5

QUESTION 10

(a) *Compare* channel partitioning MAC protocols with random access MAC protocols. Which one of these protocols would you recommend for a network that is known to have a high load? [05]

(b) *Routers and switches are both store-and-forward devices*. Discuss the difference between these two devices. [04]

(c) *What* is PPP? [01]

Total: 10

QUESTION 11

(a) You have been approached by a new videography company to create a mobile app to sell their packages and manage bookings. *Explain* why the **Android** platform would be a good choice for the creation of this app. [03]

(b) *Name and briefly discuss* the network command that is used to find out how a packet reaches its destination. [02]

Total: 5

QUESTION 12

Provide Java source code for a **UDP Server** that runs on port 9999 and receives a greeting message from a UDP client. The server then appends the words " to you too" to the client's message and sends it back to the client.

Total: 10

QUESTION 13

The code below illustrates a **TCP client** method that receives a file from a server and saves it to disk. Fill in the missing code for sections A to I. Clearly label your answers.

```
1  import java.io.*;
2  import java.net.*;
3
4  class TCPBinGet
5  {
6    public void getfile(String address, int port, String filename, int
       length)
7    {
8      File newFile = new File(filename);
9      FileOutputStream fos = null;
10     Socket fileSocket = null;
11     try
12     {
13       fileSocket = __( A (1 marks) )__;
14       InputStream is = __( B (1 marks) )__;
15       fos = new FileOutputStream(newFile);
16       byte[] buffer = new byte[512];
17       int n = 0;
18       int totalBytes = __( C (1 marks) )__;
19       while (totalBytes != length)
```

```
20        {
21          __( D (2 marks) )__;
22          __( E (1 marks) )__;
23          fos.flush();
24          __( F (1 marks) )__;
25        }
26      }
27      catch (FileNotFoundException ex) { ex.printStackTrace(); }
28      catch (IOException ex) { ex.printStackTrace(); }
29      finally
30      {
31        if()__( G (1 marks) )__
32        {
33          try { __( H (1 marks) )__; }
34          catch (IOException e) { e.printStackTrace(); }
35        }
36        if (fos != null)
37        {
38          try {__( I (1 marks) )__ ; }
39          catch (IOException e) { e.printStackTrace(); }
40        }
41      }
42    }
43  }
```

Total: 10

The End!