



FACULTY OF SCIENCE

ACADEMY OF COMPUTER SCIENCE AND SOFTWARE ENGINEERING

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

DATE: 02-12-2021

SESSION: 08:00 - 10:00

ASSESSOR(S):

MR. T MOODLEY
MS. M FOURIE

MODERATOR:

DR. J.L. DU TOIT

DURATION: 120 MINUTES

MARKS: 100

Please read the following instructions carefully:

1. Downloading and Reading time: 08:00 - 08:10
2. Writing time: - 08:10 - 10:10
3. Upload time: 10:10 - 10:40 (No extra time will be awarded)
4. Test support is available on Discord: Please see the email sent to you
5. Answers may be typed or hand-written and photographed.
6. Where possible, provide answers in the form of a list.

7. Where possible, upload your submission as a single PDF document.
 8. Please DO NOT compress (ZIP, RAR, etc.) your submission.
 9. Write *cleanly* and *legibly*.
 10. You may use a non-programmable calculator to answer the questions.
 11. This paper consists of 5 pages.
 12. Upload all of your answers before the close of the submission time at 10:40
-

QUESTION 1

- (a) According to the table below, provide an appropriate description for each property under the appropriate column. (1 mark for each description) **Write down the letter and the correct answer next to it. e.g. (f) Foo** [3]

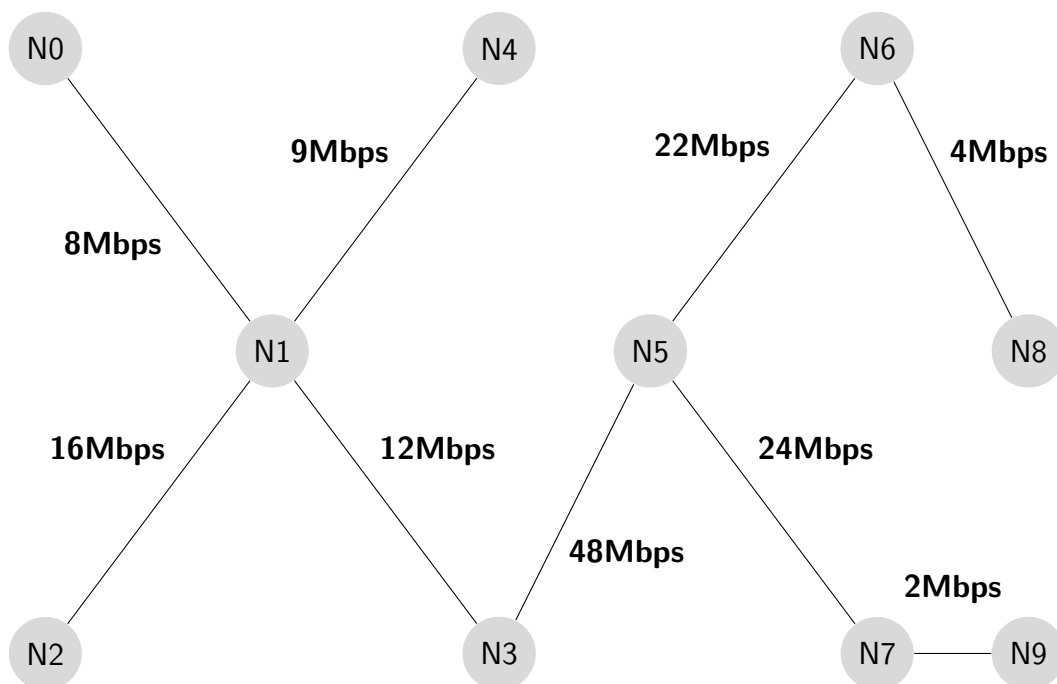
Type of network	Hybrid Fibre Coaxial Cable Network	Satellite
Directionality of Medium	(a)	(b)
Material of Medium	Coaxial Cable and Fiber Optics	Radio Waves
Transmission speed	Up to 45 Mbps per channel	(c)

- (b) The internet consists of various layers and service models, why should we layer within the internet? [02]

Total: 5

QUESTION 2

Assume there is a copper network with 8 nodes (N0, N1, N2, N3, N4, N5, N6 and N7) 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: 20km • N1-N4: 8m • N5-N7: 32km
- N1-N2: 24km • N3-N5: 6km • N6-N8: 30km
- N1-N3: 4km • N5-N6: 28km • N7-N9: 12km

Answer the following questions:

- (a) Determine the **approximate transmission rate** when communicating between N0 and N8. [1]
- (b) Taking this **approximate transmission rate** into account, how *long* (in seconds) will it take to transfer a 40 MegaByte **file** from node N0 to N8? [02]
- (c) If it is determined that the copper installed in this network **propagates** a signal at a speed of 50 000 km/s. Calculate the **propagation delay** for communications between N0 to N8. [03]
- (d) Assuming that there is no nodal processing delay or queueing delay, *calculate* the **total time** taken to transfer a 40 MegaByte file from from N0 to N8? [04]

Total: 10

QUESTION 3

Using a diagram discuss how the HTTP protocol works. Be sure to label and refer back to your diagram in your answer.

Total: 5

QUESTION 4

- (a) Discuss the FTP protocol **and** draw a diagram to support your answer. [05]

Total: 5

QUESTION 5

- (a) RDT 2.0 has a fatal flaw, *discuss* this flaw and how we can mitigate this fatal flaw. [04]
- (b) Using a diagram *discuss* the performance improvement that RDT 3.0 *stop and wait* operation yields. [06]

Total: 10

QUESTION 6

The table below represents the payload of a UDP segment. Calculate the **sum** of the following three 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	0	0	0	1	0	1	0	1	0	1	1	0	1	0	1	1
Number 2	1	0	1	0	1	0	0	0	1	1	1	0	1	0	0	1
Number 3	0	0	1	0	0	0	0	0	1	1	1	0	1	0	0	1

Total: 5

QUESTION 7

- (a) In the network layer, we have what is called virtual circuits and datagram networks. [08]
*Fully discuss **datagram networks** and how they work. Draw a diagram to support your answer.*
- (b) Name **two** reasons for IPv6. [02]

Total: 10

QUESTION 8

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

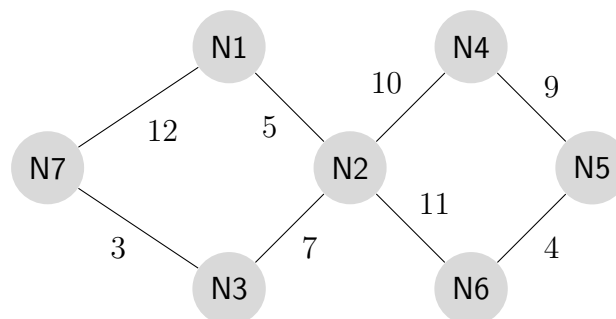
UJ wants 63 computers with an IP address of 222.8.34.21

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



- (a) What is the path with the **least cost** when communicating between N7 and N5. Is this the **only** cost effective path? [02]
 (b) Given the local datagram **forwarding table** for node N2 below and the destination address is 74.4.125.246, which link will this packet be forwarded to? Please ensure to show all your calculations. [03]

Destination Address range	Output Link Interface
01001011 00000100 01111101 111101**	N1
01001011 00000100 01111101 1111***	N2
01001011 00000100 01111101 1111****	N3
Otherwise	N4

Total: 5

QUESTION 10

- (a) *Discuss* the random access MAC protocol: **CSMA**. *Explain* how this protocol can be improved to consider collisions? [06]
- (b) There are many different Ethernet Standards. *Define* Ethernet and *discuss* the Fast Ethernet Standard. [04]

Total: 10

QUESTION 11

- (a) You have been approached by a seller of second-hand books to create a mobile app to sell their books and manage purchases. *Provide two* reasons why the **Android** platform would be a good choice for the creation of this app. [02]
- (b) *Briefly discuss* what a web service is and how it works. [03]

Total: 5

QUESTION 12

Provide Java source code for a **UDP Server** that runs on port 2021 and receives a greeting message from a UDP client. The server then appends the words "So nice to meet you!" to the client's message and sends it back to the client.

Total: 10

QUESTION 13

The code below illustrates a **TCP client** that receives a binary file using the `getFile()` method. 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!