THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND COMMUNICATIONS ENGINEERING

FIRST SEMESTER EXAMINATION (2022)

EE314 DATA COMMUNICATION AND COMPUTER NETWORKS

THIRD YEAR (COMMUNICATION) BEEC 3

TIME ALLOWED: 3 HOURS

<u>**INFORMATION FOR STUDENTS**</u>

1. You have **TEN (10) MINUTES** to read the paper. You must not begin writing during this time.

2. **Answer all questions**.

3. All answers must be written in the **ANSWER BOOK** supplied.

4. **COMPLETE THE DETAILS REQUIRED ON THE FRONT COVER OF YOUR ANSWER BOOK – DO THIS NOW**.

5. Only drawing instruments and calculators are permitted on your desk. Textbooks and notebooks are **NOT** permitted.

6. If you are found cheating in the Examination, the penalties specified by the University shall apply.

7. TURN OFF all Mobile Phone and place them on the floor under your seat before the start of Examination.

Question 1 General [10 Marks]

In computer networking, it is processes or applications running on end systems which communicate with each other. With regard to a network application or program, and getting its data from the source end system to the destination end system, clearly explain:

A) The role of <u>MAC addresses</u>, <u>IP addresses</u> and <u>port numbers</u> in end-to-end routing. [**3 marks**]

B) What encapsulation is and why it is necessary. [**2 marks**]

C) Why networks are important. [**3 marks**]

D) Why edge networks are also referred to as access networks. [**2 marks**]

Question 2 Applications [10 Marks]

Data communication is all about processes on different end systems talking to each other or effecting data exchanges between them. In relation to these data exchanges:

A) What is the importance and role of network or communication protocols? [**4 marks**]

B) Servers and router interfaces are assigned static IP address and not dynamic IP addresses (via DHCP). Why is it important to do this? [**4 marks**]

C) Data networks use packet switching while telephone networks use circuit switching. Explain the difference between packet switching and circuit switching. [**2 marks**]
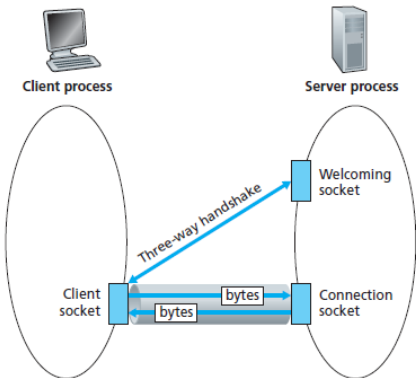
Question 3 TCP and UDP [10 Marks]

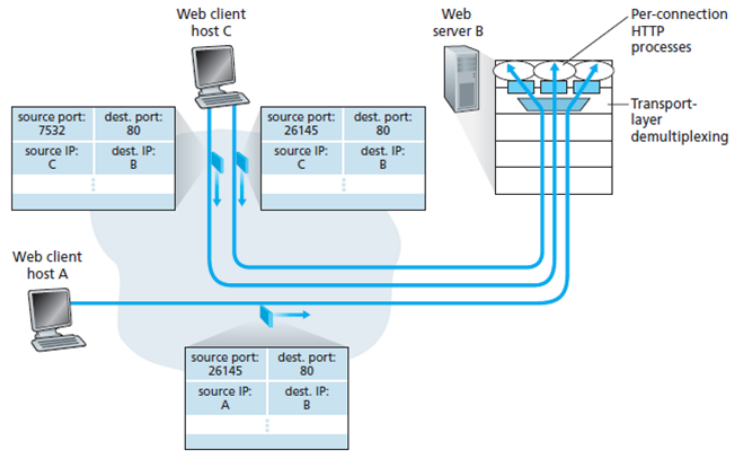Figure 2.29 The TCP Server process has two sockets.

Figure 3.5 Two clients, using the same destination port number (80) to communicate with the same Web server application.

Using Figure 2.29 and Figure 3.5 above as reference,

A) Clearly explain connectionless demultiplexing. [**3 marks**]

B) Clearly explain connection-oriented demultiplexing. [**3 marks**]

C) Data networks (networks utilizing both TCP and UDP) use packet switching. Why is it that TCP is said to be connection-oriented while UDP is said to be connectionless? [**4 marks**]

Question 4 Subnetting and IP Addressing [10 Marks]

For the network setup shown below, the Server LAN is on the 172.16.0.0/16 network with all the addressing details shown. The remaining network will be assigned addressing information from the 202.38.10.0/24 network. Assuming 3 bits will be borrowed for subnetting, i.e. a /27 prefix, subnet the network and show your address plan for the rest of the unaddressed network.
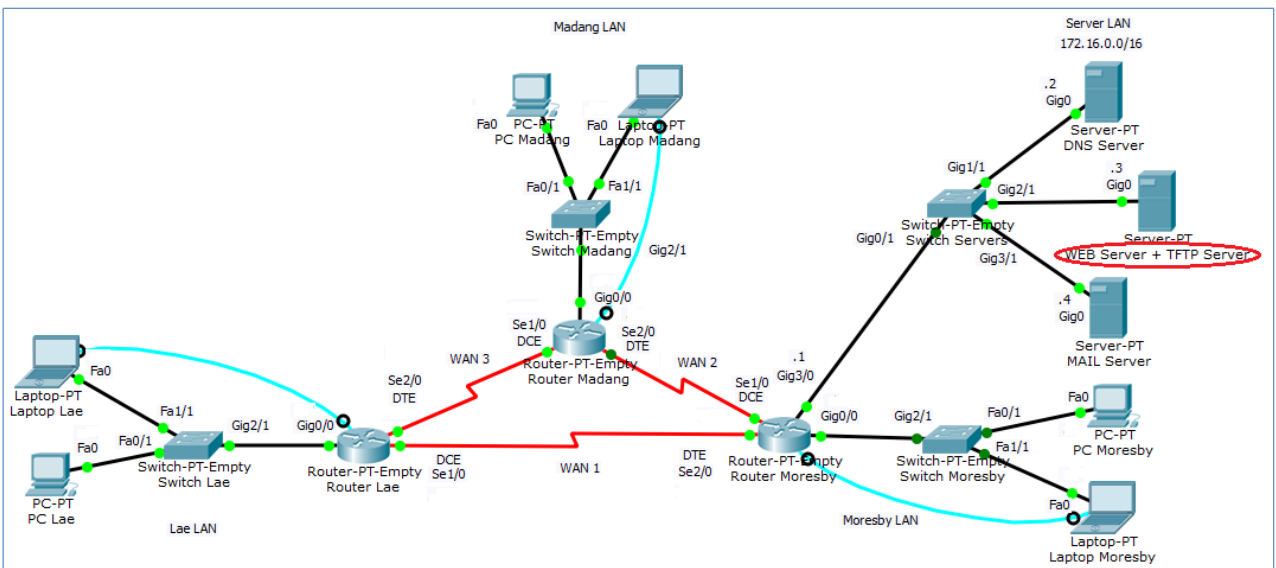
Question 5 Router Configuration [10 Marks]

Continuing from Question 4 above, show your configuration script for the **Moresby router alone** using addressing information from your address plan in Question 4. The additional information you need are:

- secret (encrypted) password: class
- all other passwords: cisco
- routing protocol: RIPv2

Commence your configuration with the user mode prompt, Router>.

END OF EXAMINATION