PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

SEMESTER 1 EXAMINATION - 2023

CS211 NETWORKING I

SECOND YEAR BACHELOR OF SCIENCE IN COMPUTER SCIENCE

TIME ALLOWED: 3 HOURS

INFORMATION FOR CANDIDATES

1. Write your student number and name clearly on the front of the answer booklet.
2. You have 10 minutes to read this paper. You must not begin writing during this time.
3. **There are two sections to this exam. Section A consists of <u>Multiple Choice Questions</u> and Section B consists of Short Answer Questions with marks indicated beside each of the questions. You should attempt all the questions.**
4. Write all answers for Section A on one page. Start your answer to each question in Section B on a new blank page of your answer booklet.
5. Do **not** use pencil or red pen to write your answers.
6. **MOBILE PHONES MUST BE SWITCHED OFF** for the entire duration of the examination. Students failing to do so will be penalised.
7. Scientific calculators are permitted.

MARKING SCHEME

Marks are indicated at the beginning of each question. The total is **111 Marks**.

SECTION A: MULTIPLE CHOICE QUESTIONS. [1 Mark each = 20 Marks]

Choose only one answer from the options provided of which you think is the right answer.

Question 1

How many bits are equivalent to one octet in a 32 bit IP address?

(a) 8 bits.
(b) 4 bits.

(c) 16 bits.
(d) 10 bits.

Question 2

How many layers are described in the OSI model?

(a) 6.
(b) 7.

(c) 8.
(d) 9.

Question 3

How many layers are described in the TCP/IP model?

(a) 6.
(b) 5.

(c) 4.
(d) 3.

Question 4

The TCP/IP model is also known as the _____.

(a) Network model.
(b) OSI model.

(c) Intranet model.
(d) Internet model.

Question 5

Provide the respective names given to packets in Network and Data Link Layer.

(a) Segments and Frames.
(b) Frames and Payloads.

(c) Datagrams and Frames.
(d) Segments and Datagrams.

Question 6

Which two layers in the TCP/IP model are further divided in the OSI model to describe discrete functions that must occur?

(a) Application and Transport layer.
(b) Transport and Network Access layer.
(c) Network Access and Application layer.
(d) Network Access and Internet layer.

Question 7

The process used to add a protocol header when sending data from the web-client to webserver is called

(a) Message.

(b) Encapsulation.

(c) De-capsulation.

(d) Decapitation.

Question 8

The process used to remove a header (protocol), when receiving data from webserver is called

(a) De-capsulation.

(b) Encapsulation.

(c) Message.

(d) None of the above answers are correct.

Question 9

In what year was the Internet protocol suite (TCP/IP) introduced as the standard networking protocol on the ARPANET?

(a) 1982.

(b) 1981.

(c) 1986.

(d) 1980.

Question 10

PDU is a general name used at layers 5 and above to refer it to as a

(a) Segment.

(b) Data.

(c) Frames.

(d) Packet.

Question 11

Total length of the data to be transmitted in bytes is measured and it is equals to

(a) Data + Packet.

(b) Header + Frames.

(c) Data + Header.

(d) Segment + Data.

Question 12

During fragmentation, D bits and M bits are set to value 1. What does it means by setting the value to 1?

(a) Do not fragment.

(b) More fragments.

(c) Do not fragment and or more fragments.

(d) Fragmentation and more fragments.

Question 13

Which frame forwarding method on cisco switches receive the entire frame and computes the CRC?

(a) Store-and-forward switch.
(b) Cut-through switch.
(c) Port-based memory.
(d) Shared memory.

Question 14

Which of the protocols below controls the flow of data from host to destination?

(a) SMTP/CD.   (c) CMSA/CD.
(b) TCP/IP.   (d) CSMA/CD.

Question 15

Which communication mode supports the protocol mentioned above (Question 14)?

(a) Simplex mode.   (c) Full-duplex mode.
(b) Half-duplex mode.   (d) Video conferencing.

Question 16

Which frame forwarding method on cisco switch forwards the frame before it is entirely received?

(a) Port-based memory.   (c) Shared memory buffering.
(b) Cut-through switch.   (d) Store-and-forward switch.

Question 17

Apart from MAC and IP addresses, what other names can substitute them?

(a) Logical and IP addresses.   (c) Physical and MAC addresses.
(b) DLL and Physical Layer.   (d) Physical and Logical addresses.

Question 18

Provide the name of the interaction that occurs at the application and presentation layer and then presentation and session layer when data is passed from one layer below/above the other layer.

(a) Same layer interaction.   (c) Presentation layer interaction.
(b) Adjacent layer interaction.   (d) Adjacent and Same layer interaction.

Question 19

Which of the standards below define layer 2 protocol and layer 1 technologies?

(a) Ethernet.

(b) Logical Link Control.

(c) Media Access Control.

(d) TCP/IP.

Question 20

What is the binary number value equivalent of the decimal number 96?

(a) 0111111.

(b) 1100000.
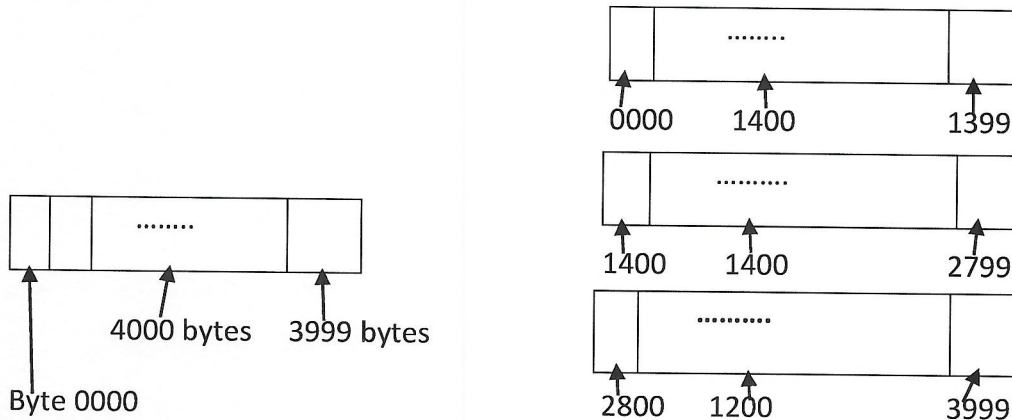
(c) 1110000.

(d) 1010000.

SECTION B: SHORT ANSWER QUESTIONS   [91 Marks]

Please make sure to attempt all the questions and write their respective answers in the answer booklet.

Question 21   [3 + 1 + 3 + 2 + 1 = 10 Marks]

(a) Calculate the fragmentation offset from the illustrated image below.

(b) By how much is fragmentation offset measured?

(c) Name the three flags in fragmentation.

(d) In the process of fragmentation, D bits and M bits are set to value 0. What does this value imply?

(e) In the first fragment, fragment offset is set to 0. Explain why?

Question 22   [7 + 2 + 5 + 2 + 2 + 3 + 2 + 1 = 24 Marks]

(a) Name the layers of the OSI model from the top layer to the bottom layer as always seen.

(b) In which two layers of the OSI model are packets referred to as datagrams and frames respectively?

(c) Name the TCP/IP 5 – layered model.

(d) There are four protocols used at the network layer of the TCP/IP protocol suite. Name only two from the four.

(e) Name the two protocols used in the transport layer of TCP/IP protocol suite.

(f) Provide the three job specifications or tasks that IPv4 does.

(g) As shown from the table below, provide any two of the corresponding physical cabling and network for the standards listed.

Standards	Physical Cabling & Network
802.3	(i)
802.7	(ii)
802.8	(iii)
802.11	(iv)

(h) Which of the standards listed in (g) above uses 2.4GHz frequency band to transmit data up to 2mbps?

Question 23 [6 + (1+1+1) + 4 + 2 + 2 + 3 = 20 Marks]

(a) In a network, messages are being send from one device to another. Name the three modes that are used in message transmission and define each of them?

(b) Indicate the communication mode that best fits the scenarios/examples stated below.

  (i)   A husband is calling from Australia and the wife is receiving the call from Lae via a WhatsApp call.

  (ii) A computer sends print commands to the printer and the printer prints or accepts the commands.

  (iii) Two security officers communicating via a walkie talkie radio.

(c) In a computer system, networking hardware are divided into two sections. Name the two sections and provide an example for each.

(d) Name the two sub layers of Data link sub layers.

(e) Name the two Media Access Control methods.

(f) Frames have three basic parts. Name these three basic parts of a frame.

Question 24 [3 + 4 + (1+1) + 2 + 2 + 2 = 15 Marks]

(a) All communication methods have three elements in common. Name these three elements.

(b) There are three types of messages that are being sent through the network. Name two of the messages and their delivery options respectively.

(c) Communication between a webserver and a web client is an example of an interaction between several protocols. Define the two protocols listed below.

  (i) HTTP.

  (ii) Ethernet.

(d) Provide the names of the TCP/IP reference model layers at which the protocols mentioned in (d) are used.

(e) Name the two Frame Forwarding methods on Cisco Switches.

(f) There are two types of Memory Buffering on switches. Name them.

Question 25   [1 + 2 + 3 + 3 + 1 = 10 Marks]

(a) What address resides at layer 2 and has a 48-bit binary value expressed as 12 hexadecimal digits?

(b) Name the two characteristics of the Internet Protocol.

(c) Migration techniques can be divided into three categories for IPv4 and IPv6 coexistences. Name the three categories.

(d) There are three types of IPv6 addresses. Name all of them.

(e) Of these two protocols – IPv4 and IPv6, which one does not have a broadcast address?

Question 26   [3 + 3 + 3 + 3 = 12 Marks]

For this questions, show the working out.

(a) Convert 192.168.11.1 to binary positional value.

(b) Convert the binary positional value of 10111000 to decimal value.

(c) Convert the IPv4 binary positional value of 11000000.10101000.00001010.00000010 to decimal.

(d) Convert the decimal value 255 to its binary equivalent.

END OF EXAMINATION