



PAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF COMPUTING AND INFORMATICS
DEPARTMENT OF COMPUTER SCIENCE

QUALIFICATION: BACHELOR OF COMPUTER SCIENCE, BACHELOR OF INFORMATICS	
QUALIFICATION CODE: 07BACS, 07BAIF	LEVEL: 7
COURSE NAME: DATA NETWORK	COURSE CODE: DTN611S
DATE: JULY 2025	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 80
SECOND/SUPPLEMENTARY OPPORTUNITY EXAMINATION QUESTION PAPER	
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THIS QUESTION PAPER CONSISTS OF 6 PAGES (Including this front page)

INSTRUCTIONS

- 1) Answer ALL the questions on the answer scripts provided.
- 2) Write clearly and neatly.
- 3) Be guided by the number of marks allocated when answering the questions.
- 4) Show all your calculations.
- 5) Number your questions clearly.

Permissible Material

1. Calculators.

Question 1: Multiple Choice, True or False and short questions

[20 Marks]

(1 mark each)

1. What is the binary equivalence of 222.1.3.27?
 - a) 11011111.00000001.00000011.00011100
 - b) 11000000. 10100100. 00000010.00011000
 - c) 01100000. 11101000. 00000010.00011000
 - d) 11000000. 10101000. 00000011.00011000

2. Which network techniques enable devices on a private network to access the internet by using a single public IP address.
 - a) Adress Translation Protocol (ATP)
 - b) Domain Name System (DNS)
 - c) Port Address Translation (PAT)
 - d) Network Address Translation (NAT)

3. Which of the following layer's primary functions is to transmit/move data from one node to another adjacent node over a single communication link?
 - a) Network Layer
 - b) Session Layer
 - c) Physical Layer
 - d) Data Link Layer

4. The Three-way handshake messages *establish* and *terminate* a connection in which sequence.
 - a) SYN, ACK, SYN-ACK, ACK-FIN
 - b) SYN, SYN-ACK, ACK, FIN-ACK
 - c) SYN, SYN-ACK, ACK, FIN-FIN
 - d) SYN, SYN-ACK, FIN, ACK-FIN

5. What is the process of wrapping packets with the necessary header/protocol information before the packet is transmitted to the next layer of OSI.
 - a. Encapsulation
 - b. Encoding
 - c. Decapsulation
 - d. Decoding

6. Which layer of the OSI model performs flow control
 - a) Network and Transport Layers
 - b) Application and Data Link Layers
 - c) Session and Application
 - d) Transport and Datalink Layers

7. The default subnet mask for Class A IP address is:
- a) /18
 - b) /9
 - c) /16
 - d) /8
8. What is the main purpose of a wireless access point (AP)?
- a) To extend wired network signals
 - b) To provide internet to end devices on the networks
 - c) Connect Wi-Fi- devices to a wired network using wireless signals.
 - d) To store network data
9. LTE is primarily designed for which type of network communication?
- a) Long -range metropolitan networks
 - b) Long-range cellular networks
 - c) Local area networks only
 - d) Satellite communication
10. What is the advantage of satellite communication?
- a) Low data latency
 - b) Low power consumption
 - c) Wide area coverage
 - d) Increased data security
11. What is the requirement for infrared communication to work?
- a) A direct line of sight
 - b) A radio tower
 - c) A cloud server
 - d) Satellite link
12. What is the binary representation of this Hexadecimal value FEB24?
- a) 1111 1011 0010 0100
 - b) 1111 1110 0100 1010
 - c) 1111 1011 0101 0100
 - d) 1111 1110 0010 0100
13. Identify the network application protocol responsible for performing the following actions. No abbreviations are allowed.
- (a) Fetching a web document from a web server:
 - (b) Uploading a document onto a File server:

- (c) Configuring your office router from a remote location:
- (d) Resolving the IP address of a specified domain
- (e) Accessing electronic mail from the client's mail server on any of the client's devices.
- (f) Downloading the recipient e-mail to the client's device and erase it from the mail server.

14. The physical medium can take many shapes and forms and does not have to be of the same type for each transmitter-receiver pair along the path.

- a) True
- b) False

15. Every application using UDP should always establish a three-way handshake before it. Can transmit data.

- (a) True
- (b) False

Question 2

[10 marks]

James was recently hired as an IT Technician at Young Tech CC. The company purchased 200 new laptops for its employees. The IT Manager tasked James with configuring the devices so that they could connect to the company's internal network and access the Internet.

- a) List and explain the settings that James will MOST LIKELY need to configure on each laptop to achieve this goal. (4)
- b) To configure all 200 laptops efficiently, James decides to configure the DHCP server. what are the 2 primary benefits of using DHCP in this situation? (2)
- c) Assuming that there is a single DHCP server on the network, what would happen if this DHCP server goes offline? (2)
- d) After setting up the network, a user came to James complaining that they can access the company's website and download files from the local servers, but they cannot access the Internet. What are the two possible causes of this issue? (2)

QUESTION 3

[22 Marks]

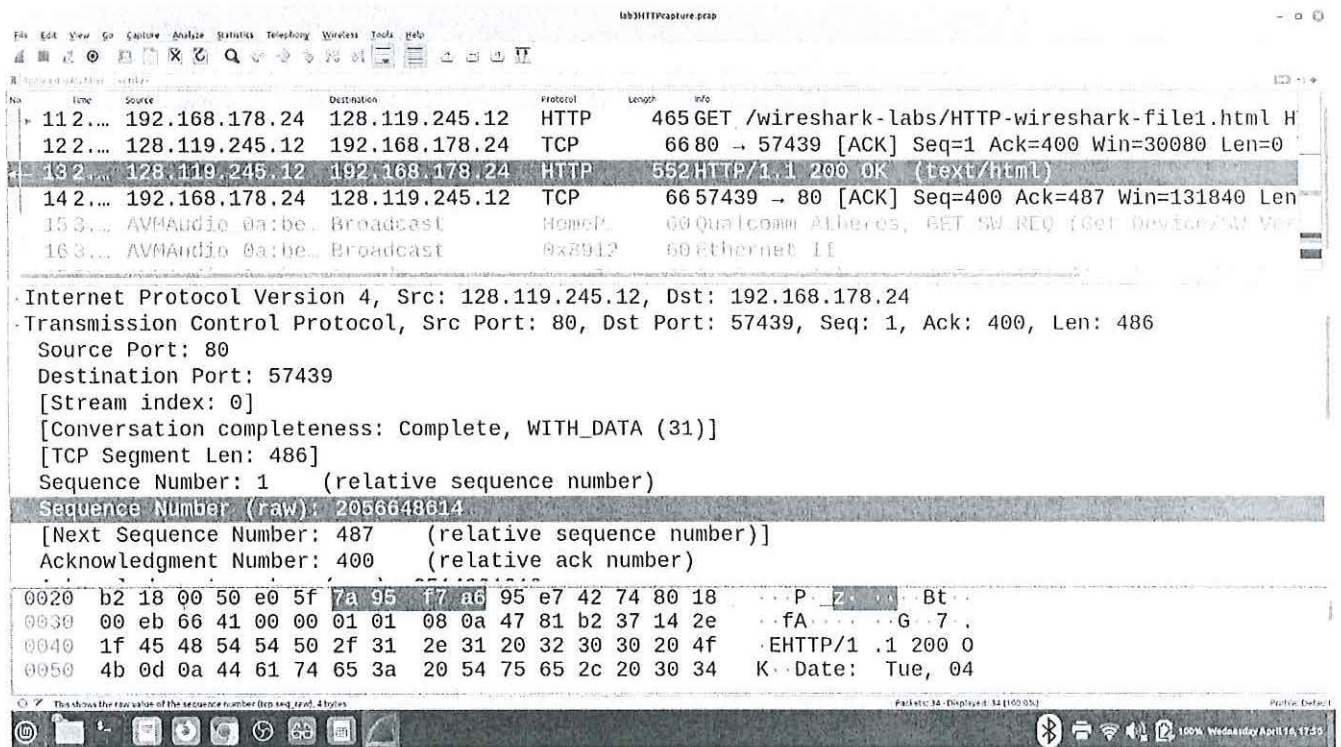
- a) Explain the importance of the 3-way handshake in TCP reliable data transmission. (2)
- b) List and explain the three steps of the TCP 3-way handshake. (6)
- c) In the 3-way handshake process, the client sends the initial packet with a sequence number of 1000. The server responds with a packet recognizing the initial packet it received and begins its own sequence starting at 5000.
- d) what would be the next sequence number in the ACK packet? (2)
- e) What will be the sequence number of the packet that the client sends to the server to establish the connection? (2)

- f) What will be the sequence number of the first **request packet** sent by the client to the server (2)?
- g) If the final packet sent by the client to the server in establishing a 3-way handshake gets lost in the process, how will TCP handle this situation? (2)
- h) Explain the role of the FIN and ACK flags in the TCP. (4)

Question 4

[20 marks]

1. Refer to the Wireshark screenshot below when answering the questions.



- e) Identify the IP address of the client and HTTP server. (2)
- f) Based on the capture, how did you determine the server from the client? (2)
- g) Who is the owner of source port 80 as indicated in the figure? (1)
- h) Which type of sever is this? (1)
- i) The port number (second line, 57439): is it a dynamic or static port, justify your answer? (2)
- j) Identify OSI layer 3 and 4 information from the capture. (2)

2. You run *ping www.google.com* and receive the following result:

```
Pinging www.google.com [142.251.47.132] with 32 bytes of data:  
Reply from 142.251.47.132: bytes=32 time=538ms TTL=58  
Reply from 142.251.47.132: bytes=32 time=1142ms TTL=58  
Reply from 142.251.47.132: bytes=32 time=354ms TTL=58  
Reply from 142.251.47.132: bytes=32 time=856ms TTL=58
```

- (a) Explain what each part of the result means. (4)
- (b) Refer to the screenshot below when answering the questions. Explain the possible cause of this resulting after pinging IP address 192.168.10.10 (3)

```
C:\> ping 192.168.10.10  
Reply from 192.168.1.1: Destination host unreachable.
```

- (c) List any 3 possible causes of this error. (3)

Question 5

[10 Marks]

Given the following IP address numbers and subnets makes, show all your calculation to determine the following for each IP address:

- a) Network Number (4)
b) Broadcast Address (4)
c) Address class (2)



IP 142.64.11.159
mask 255.255.192.0

Figure 1



IP 212.64.11.159
mask 255.255.255.192

Figure 2

Total Marks:80