



PAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF COMPUTING AND INFORMATICS
DEPARTMENT OF COMPUTER SCIENCE

QUALIFICATION: BACHELOR OF COMPUTER SCIENCE, BACHELOR OF INFORMATICS	
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COURSE NAME: DATA NETWORKS	COURSE CODE: DTN611S
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DURATION: 2 HOURS	MARKS: 70 (100%)

SECOND OPPORTUNITY/SUPPLEMENTARY EXAMINATION QUESTION PAPER	
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THIS QUESTION PAPER CONSISTS OF 5 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.

Question 1:

[20 Marks]

1. The Transport layer takes the packets from which of the layers below and encapsulates them into segments.
 - a) Network layer
 - b) Physical layer
 - c) Transport layer
 - d) Application layer

2. Which method is used in HTTP to upload content on the web?
 - a) GET
 - b) PUT
 - c) POST
 - d) HEAD

3. One of the advantages of a Star topology is:
 - a) Devices are managed centrally in the topology.
 - b) If the center device becomes faulty, all devices will be affected.
 - c) It is very expensive to set up as devices are connected to each other
 - d) Devices are connected in a circle; if one device becomes faulty, the whole topology is affected.

4. An WAN network could easily be described as a network that spans
 - a) A country
 - b) A city
 - c) A building
 - d) A house

5. To re-transmit missing data at the destination, UDP uses the following technique
 - a) Flow control
 - b) Automatic Repeat Request
 - c) Checksum
 - d) None of the above

6. Which port is SMTP used to send mail over the network?
 - a) Port 80
 - b) Port 21
 - c) Port 20
 - d) Port 25

7. The default subnet mask for Class B IP address is:
 - a) /18
 - b) /17
 - c) /16
 - d) /24

8. State the correct network type, which maps the identification below.
 - a) A privately owned network that operates within a single building or is limited by a short distance, like an office, factory, or campus.
 - b) A network that connects electronic devices within a user's immediate area.
 - c) A network that covers a city or connects multiple office branches.

9. Telnet is an application protocol used to access remote devices on the network.
10. The Hybrid network topology gives the network users the greatest fault tolerance.
11. Encapsulation is adding layer-specific information to the packet header during transmission.
12. Each network interface card comes embedded with a unique address from the manufacturer is called Media Access Control.
13. The FIN packet packets in TCP flag that there is no more data from the sender.

14. The physical layer converts a binary sequence of frames into signals and transmits it over the media.
 - a) True
 - b) False

15. Wired medium is also regarded as a guided medium.
 - a) True
 - b) False
16. Routing is performed based on the IP address and subnet mask.
 - a) True
 - b) False
17. Data transmitted by satellites is in the form of an electrical pulse
 - a) True
 - b) False

Question 2

[19 Marks]

2.1 Coastal Technologies is an IT consultation company in Swakopmund. They provide networking services to clients all over Namibia. A new company (Modus Traveling Agency) approached them requesting the setup of a fault-tolerant and robust network due to the nature of their operation. You were recently hired as a junior network engineer.

- a) Your first project entails designing the company network's physical topology. Your boss suggests that you use a bus topology; however, you strongly oppose his idea and suggest that instead, the Mesh topology will be suitable. Convince your boss about your choice. (3)
- b) The client further requested e-mail services, where e-mails may be accessible to employees from anywhere. List and explain two main protocols to be configured on this client's mail server. (4)
- c) The same company purchased 1500 networking devices for its employees; you are requested to set up the devices and ensure they all have access to the network/internet. Which IP address assignment method will be appropriate in this environment and why? (4)
- d) List and explain four servers you need to configure in the network to ensure that the host/devices above are assigned network configuration information, all devices can access the internet, users can send and receive e-mails, and the company (Modus Travel Agency) website is accessible. (8)

Question 3

[10 Marks]

Examine the output of a packet sniffing tool below and answer the following questions:

```
> Frame 45: 438 bytes on wire (3504 bits), 438 bytes captured (3504 bits) on interface \Device\NPF_{92BC6A41-E3E0-4DB2-85C8-71246CC14D54}, id 0
> Ethernet II, Src: HonHaiPr_08:3a:49 (44:1c:a8:08:3a:49), Dst: AVMAudio_7e:5d:33 (dc:15:c8:7e:5d:33)
> Internet Protocol Version 4, Src: 192.168.178.24, Dst: 128.119.245.12
> Transmission Control Protocol, Src Port: 63414, Dst Port: 80, Seq: 1, Ack: 1, Len: 384
v Hypertext Transfer Protocol
  > GET /wireshark-labs/wireshark-traces.zip HTTP/1.1\r\n
    Host: gaia.cs.umass.edu\r\n
    User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64; rv:99.0) Gecko/20100101 Firefox/99.0\r\n
    Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,*/*;q=0.8\r\n
    Accept-Language: en-US,en;q=0.5\r\n
    Accept-Encoding: gzip, deflate\r\n
    Connection: keep-alive\r\n
    Upgrade-Insecure-Requests: 1\r\n
    \r\n
    [Full request URI: http://gaia.cs.umass.edu/wireshark-labs/wireshark-traces.zip]
    [HTTP request 1/1]
```

- a) What type of captured traffic is accepted? (1)
- b) Is this an HTTP request or response packet? (1)
- c) What languages (if any) does your browser indicate that it can accept? (1)

- d) Which underlying protocol was used to access this packet? Justify your answer. (2)
- e) What is the MAC address of the device that requested this packet? (1)
- f) Identify any two OSI layer 3 and 4 information on the packet captured. (4)

Question 4

[10 Marks]

1. Examine the output of the screenshot below to answer the questions that follow.

```
C:\Users\Virtua>tracert www.unam.na

Tracing route to www.unam.edu.na [41.205.129.157]
over a maximum of 30 hops:

  1    1 ms    1 ms    1 ms  fritz.box [192.168.178.1]
  2   70 ms   57 ms   51 ms  41.205.152.230
  3   36 ms   40 ms   44 ms  ADSL-41-205-134-241.ipb.na [41.205.134.241]
  4   32 ms   52 ms   42 ms  ADSL-41-205-129-57.ipb.na [41.205.129.57]
  5   12 ms   13 ms    8 ms  ADSL-41-205-129-58.ipb.na [41.205.129.58]
  6   42 ms   45 ms   45 ms  ADSL-41-205-129-157.ipb.na [41.205.129.157]
  7   44 ms   30 ms   35 ms  ADSL-41-205-129-157.ipb.na [41.205.129.157]
  8   47 ms   74 ms  1376 ms ADSL-41-205-129-157.ipb.na [41.205.129.157]

Trace complete.
```

- a) What is the name and purpose of the tool used to generate the output in Figure 1? (2)
- b) What is the default gateway of the device this screenshot was taken from? (1)
- c) What is the IP address of the UNAM web server? (1)
- d) Explain the first 4 columns of the output on the screenshot. (3)
- e) If you used the same tool from a different network, would you get the same output? Justify your answers (2)
- f) Which other command can one use to determine the domain name, given the IP address? (1)

Question 5

[11 Marks]

- 1. Use the IP address 128.12.3.64 /16 to answer the following question. Show all your work.
 - a) Calculate the Network Number (4)
 - b) Write down the subnet mask in dotted decimal notation. (1)
 - c) How many bits represent the network bits and host bits (2)
 - d) Calculate the broadcast address. (4)

Exam Ends
Total:70 Marks