



**NAMIBIA UNIVERSITY  
OF SCIENCE AND TECHNOLOGY**

**FACULTY OF COMPUTING AND INFORMATICS  
DEPARTMENT OF COMPUTER SCIENCE**

<b>QUALIFICATION: BACHELOR OF COMPUTER SCIENCE, BACHELOR OF INFORMATICS</b>	
<b>QUALIFICATION CODE: 07BACS, 07BAIF</b>	<b>LEVEL: 7</b>
<b>COURSE NAME: DATA NETWORKS</b>	<b>COURSE CODE: DTN611S</b>
<b>DATE: JUNE 2022</b>	<b>PAPER: THEORY</b>
<b>DURATION: 2 HOURS</b>	<b>MARKS: 70 (100%)</b>

<b>FIRST OPPORTUNITY EXAMINATION QUESTION PAPER</b>	
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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) Be guided by the number of marks allocated when answering the questions.
- 3) Write clearly and neatly.
- 4) Show all your calculations.
- 5) Number your questions clearly.

**Question 1:** Write down the question number and correct answer next to it. Where you are asked to fill in, use full words, not abbreviations.

1. The path through which data travels from the sender to the receiver on the network is called:
  - a) Protocols
  - b) Standard
  - c) Transmission Media
  - d) Signals
  
2. Which of the following correctly defines the function for the DHCP server on the network?
  - a) To assign IP address automatically to devices on the network.
  - b) To translate IP addresses into domain names.
  - c) To act as an intermediary between clients and remote servers.
  - d) To host websites.
  
3. One of the disadvantages of a Star topology is:
  - a) Devices are managed centrally in the topology.
  - b) If the central 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. A MAN network could easily be described as the network that spans:
  - a) A country
  - b) A city
  - c) A building
  - d) A house
  
5. Which layer of the OSI model ensures that data is received in its usable format?
  - a) Physical
  - b) Presentation
  - c) Application
  - d) Data Link
  
6. Which port is used by FTP to transfer data?
  - a) Port 80
  - b) Port 21
  - c) Port 20
  - d) Port 25
  
7. The default subnet mask for IP address 128.128.45.4 is:

- a) /18
- b) /17
- c) /16
- d) /8

8. \_\_\_\_\_ are a set of rules aimed at governing computer network products made by different manufacturers to ensure that they can communicate.
9. The default TCP max segment size is \_\_\_\_\_
10. Using HTTP, the \_\_\_\_\_ method is sent to append a web page.
11. In HTTP, code \_\_\_\_\_ indicates redirection.
12. Each network interface card comes embedded with a unique address from the a manufacturer called \_\_\_\_\_.
13. Routers are only used in WAN.
- a) True
  - b) False
14. Wireless transmission can be done via radio waves only.
- a) True
  - b) False
15. A session must be terminated at the end of each packet sent.
- a) True
  - b) False

[15 Marks]

## Question 2

Maria would like to send an email to Tom. To achieve this, she must use her mail agent to compose the e-mail. For this e-mail to reach Tom 's mailbox successfully and for Tom to access it from any of his devices connected to the network, there are two main protocols involved.

- 2.1 Identify two application layer protocols that are responsible for sending and delivering the email from Maria's mail agent to Tom's mailbox and explain their function. (4)
- 2.2. For the message to reach its designated recipient, the use of a DNS server is crucial in the process. Explain the function of the DSN Server when sending e-mails. (2)
- 2.3 DNS and DHCP servers are a few examples of network servers. Write down the generic names of the following network servers. (3)

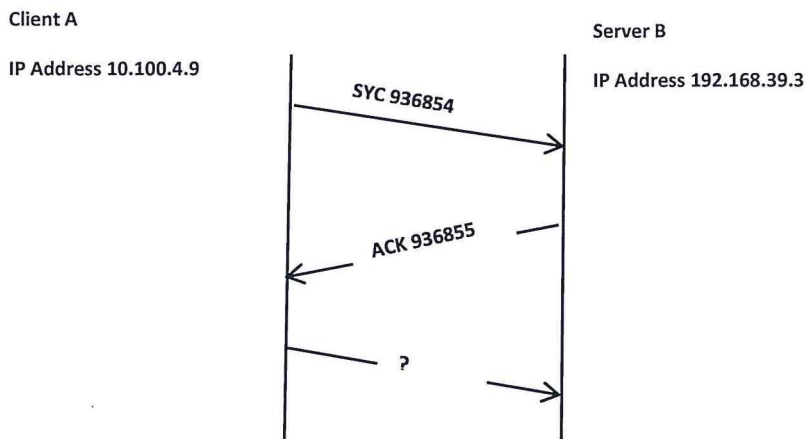
a) Server storing web pages:

- b) Server storing electronic mails:
- c) Server storing your course materials:

2.4 Below are some of the basic commands that Network administrators use in their daily routines and troubleshooting. Explain the purpose of each command listed below. (4)

- (a) ipconfig /all
- (b) traceroute
- (c) nslookup
- (d) ARP:

2.5 The following diagram illustrates a TCP connection between Client A and Server B.



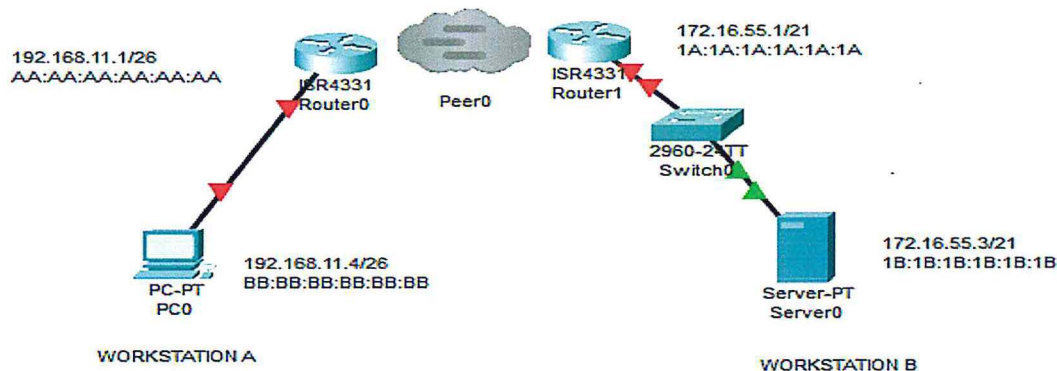
- (a) Determine the source and destination IP addresses of datagrams sent from Server B to Client A. (2)
- (b) Fill in the missing segment information. (1)
- (c) In an event where the segment you specified above fails to arrive at Server B, can Client A continue sending the next segment? Motivate your answer. (4)
- (d) Outline any three (3) attributes of TCP that make it a reliable protocol. (3)

[23 Marks]

### Question 3

3.1 Consider the network topology below to answer the questions.





- Write the subnet mask of workstation A. Show all your calculations. (4)
- Write the subnet mask of workstation B? Show all your calculations. (4)
- Calculate the network number of workstation A. Show your calculations. (4)
- Calculate the broadcast address for workstation A. show your calculations (4)
- What will be the default gateway for workstations A and B (2)

[18 Marks]

### Question 3

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

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> Frame 45: 438 bytes on wire (3504 bits), 438 bytes captured (3504 bits) on interface \Device\NPF_{92BC6A41-E3E0-4DB2-85C8-71246CC14054}, 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]

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- What type of captured traffic is accepted? (1)

- b) Is this an HTTP request or the 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) Which browser was used by the client to request this packet? (1)
- g) What is the domain name for IP address 128.119.245.12? (1)
- h) Identify and write down specific information that relates to layer 2,3 and 4 of the OSI model. (6)

[14 Marks]

[Total marks: 70]

*Paper ends*