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SUBJECT/EXAM: COMPUTER NETWORKS

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Figure 1 shows a 2D grid of hexagonal cells, representing a hexagonal lattice. The grid is labeled "2D" in the top right corner. The cells are arranged in a staggered pattern, with each cell having a unique coordinate pair (x, y) indicated in the top right corner of the cell. The x-axis ranges from 0 to 9, and the y-axis ranges from 0 to 9. The grid is composed of 100 cells, arranged in a 10x10 pattern.

QUESTIONS	1	2	3	4
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QUESTIONS	11	12	13	14	15	16	17	18	19
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TSS NATIONAL EXAMINATIONS, LEVEL 5, 2023-2024

INSTRUCTIONS TO CANDIDATES (ANSWER BOOKLET)

1. A candidate should fill in the actual names and the Index number on the cover of this questions and answer booklet on the provided place.
2. It is illegal for a candidate to write any of names, Index number or school name inside the answer booklet.
3. No candidate should remove or tear any pages or part of it in the answer booklet.
4. A candidate should answer in the language in which the examination is set.
5. A candidate should sign on the sitting plan when submitting the answer booklet. He/she has also to check if the answer booklet is well sealed.
6. No extra paper is allowed in the examinations room. If a candidate is caught with it his/her results will be nullified.
7. No candidate is allowed to write answers not related to the subject being sat for, otherwise it will be considered as a cheating case.
8. Write your answers on the 16 lined pages (From page 7 to page 22).
9. Use the last non-lined pages as draft.
10. Results for any candidate who is caught in examination malpractices are nullified. The cheating can be recognized during examinations administration, marking exercise or even thereafter.

- N.B:** 1) After results publication, there is no remarking and no candidate is given his/her answer booklet for review. This answer booklet is a property of NESAs.
- 2) Claims are only received online within 30 days after results publication. A link will be provided after results publication.

TSS NATIONAL EXAMINATIONS, LEVEL 5, 2023-2024

OPTION/TRADE: SOFTWARE PROGRAMMING AND EMBEDDED SYSTEM (SPE)

SUBJECT/EXAM: COMPUTER NETWORKS

DURATION: 3 HOURS

INSTRUCTIONS TO CANDIDATES (QUESTION PAPER)

This Exam paper is composed of Three Sections (A, B, and C). Follow the instructions given below, and answer the indicated questions for a total of 100 marks

Section **A**: Fourteen (14) questions, all **Compulsory** **55 marks**

Section **B**: Among the five (5) questions, attempt any three (3) **30 marks**

Section **C**: Among the two (2) questions, attempt any one (1) **15 marks**

Allowed materials:

- Ruler
- Blue or black pen
- Calculator

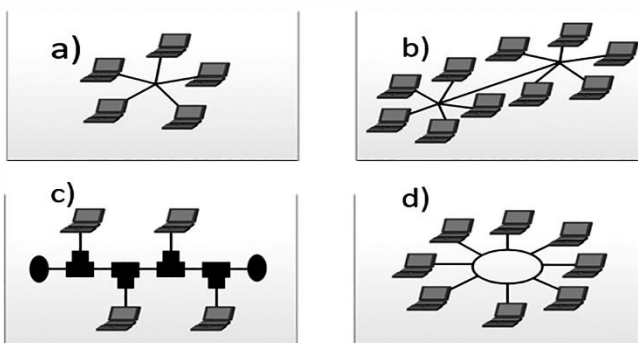
Note:

Every candidate is required to carefully comply with the provided assessment instructions.

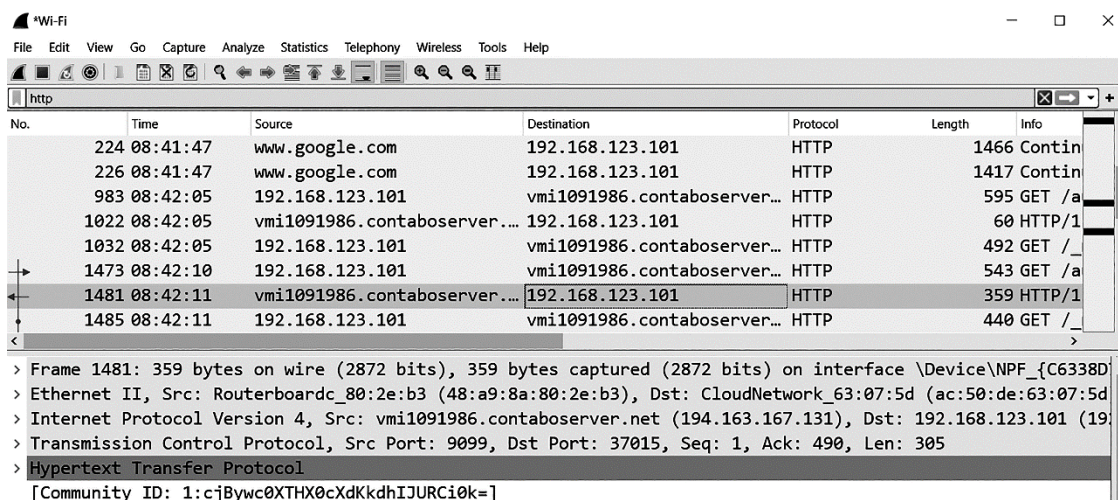
SECTION A: Attempt all questions

(55 marks)

01. Define the following terms: (3 marks)
 - a) Computer network
 - b) Internetworking devices
 - c) Transmission Medium in networking system
02. List any three (3) components of a computer network and explain their respective roles in facilitating communication and data transfer. (3 marks)
03. What are the three (3) types of ports that exist in Spanning Tree Protocol (STP)? (3 marks)
04. Provide any five (5) factors considered when selecting a server operating system. (5 marks)
05. What are any four (4) main purposes of configuring VLAN in a computer network? (4 marks)
06. Define three (3) types of file permissions in Linux (3 marks)
07. Give the name of each network topology shown in the figures below (4 marks)



08. List any three (3) features of the network operating system. (3 marks)
09. Wireshark is a powerful and versatile network protocol analyzer, widely recognized for its capability to capture and analyze network traffic in real time. Consider the below Wireshark interface and answer the provided questions. (5 marks)



- a) What is the layer 2 source address of the selected packet?

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- b) Apply filter commands for displaying only packets that have been sent using the **POST** method.
- c) Apply the filter command to display only the **HTTP** packets.

10. List any three (3) protocols that can help you to share information securely. **(3 marks)**

11. You have subnetted a class C network with a subnet mask of 255.255.255.192, Net ID of 201.138.2.0 **(5 marks)**

- a) How many number of networks?
- b) How many number of hosts per subnet?
- c) Identify the first and last addresses of the subnet (use the table below)
- d) What is the broadcast ID of each subnet? (use the table below)

No	Network Address	Usable Host Range (first and last addresses)	Broadcast ID
1			
2			
3			
4			

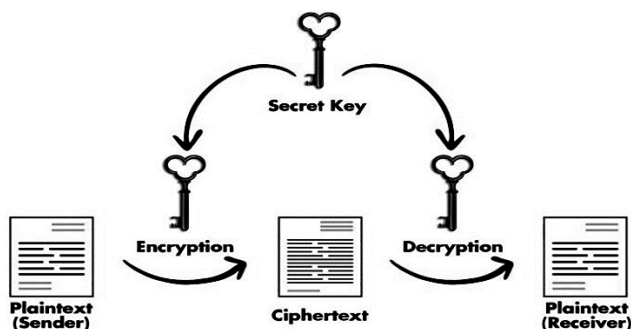
12. The needs of physical security are multifaceted and vary depending on the specific context and requirements of an organization or environment. Provide any five (5) security majors that can be implemented to secure physical access. **(5 marks)**

13. You are a cybersecurity analyst working for a financial institution that handles sensitive customer information. The organization is looking to enhance its security measures by implementing hashing and cryptography techniques to protect data integrity and confidentiality. **(4 marks)**

Compare hashing and encryption as mentioned in the table below.

Comparison criterion	Hashing	Encryption
Purpose		
Output		

14. Analyze the diagram below and answer the related questions: **(5 marks)**

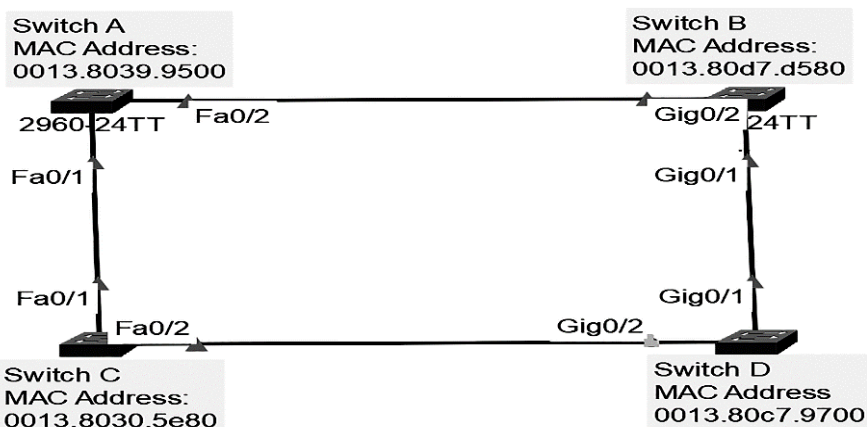


- a) Identify the possible types of cryptography indicated by the above diagram.
- b) Give any two (2) examples of the cryptographic algorithm in the identified cryptography type on sub-question (a).

Section B: Attempt any three (3) questions

(30 marks)

15. Refer to the below network diagram. Each of these four switches has been configured with a hostname, as well as being configured to run Rapid Spanning Tree Protocol. No other configuration changes have been made. (10 marks)



- What is the role of STP configure in Layer 2 network?
 - Identify the root bridge in the above network, and justify your answer.
 - Describe the port role for each switch (root, designated or non-designated).
16. IPv4 and IPv6 are both Internet Protocol standards used to identify and route network traffic, but they differ in several aspects. (10 marks)
- Differentiate IPV4 from IPV6 based on the below criteria:

Comparison criteria	IPv4	IPv6
Address length/space		
Address Notation/representation		

- Explain why is IPv6 considered the successor to IPv4.
 - Considering that you have this IPv6 address 2000:0000:0000:000A:0000:0001:1100:A00A, rewrite this address in shortened mode.
17. Last time, taxpayers attempted to pay their taxes; however, the system was inaccessible due to unidentified issues. (10 marks)
- Based on this scenario:
- Explain the CIA triad principle that has been violated.
 - Explain the type of attack that was launched against the system.
 - Provide any two (2) recommendations to the system's administrator.

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18. Analyze the configuration commands shown below and answer the related questions. (10 marks)

```
CiscoVille# configure terminal
CiscoVille(config)# interface gig0/0
CiscoVille(config-if)# no ip address
CiscoVille(config-if)# interface gig0/0.10
CiscoVille(config-subif)# encapsulation dot1q 10
CiscoVille(config-subif)# ip address 192.168.10.254 255.255.255.0
CiscoVille(config-subif)# interface gig0/0.20
CiscoVille(config-subif)# ip address 192.168.20.254 255.255.255.0

% Configuring IP routing on a LAN subinterface is only allowed if
that subinterface is already configured as part of an IEEE
802.10, IEEE 802.1Q, or ISL VLAN.
```

- a) How many VLANs are configured on CiscoVile router?
 - b) If sub-interfaces are created using the VLAN IDs, what are the VLANs being inter-connected by the router?
 - c) What is the network IP addresses for each of those VLANs?
 - d) What is the cause of the error that is displayed in the configuration of inter-VLAN routing on router CiscoVille?
 - e) Which command is missing to make the sub-interfaces active? Where should be placed (after which command)?
19. Suppose that you have been given a network 192.168.20.0/24, As a Network administrator, you are requested to divide that network into 4 subnets. (10 marks)
- a) Describe the new subnet mask from the above scenario.
 - b) What is the number of hosts per subnet?
 - c) What is the range of addresses for each subnet?

Section C: Attempt only one (1) question

(15 marks)

20. You are a cybersecurity analyst working for a tech company that has experienced a security breach. The attacker has established a reverse shell connection using Netcat, allowing them to execute commands remotely and exfiltrate sensitive data from the server. As part of the incident response team, you are tasked with investigating the breach and mitigating the threat posed by the attacker. (15 marks)
- a) What is a reverse shell, and how does it differ from a regular shell connection?
 - b) Write Netcat code that was embedded in the application run on the victim server. Considering that the IP address of the hacker is 192.168.10.100, the port used is 2233, and the operating system of the victim server is Windows.
 - c) Write Netcat commands that the hacker has run to listen to the victim's connection.

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- d) What measures should the incident response team take to mitigate the threat posed by the attacker? Give any two (2) immediate measures and any one (1) for future prevention measures.
21. Establishing the connection between different routers, requires a routing protocol configured on both routers. consider the network diagram below and answer the provided questions.



- a) Give any two (2) examples of classless dynamic routing protocol.
- b) Configure the router name as follows: R1 to Main_router and R2 to Secondary_router.

Change router name on R1	Change router name on R2
R1(config)#.....	R2(config)#.....
R1(config)#exit	R2(config)#exit

- c) Configure the interfaces on Router R1.

R1(config)#.....
R1(config-if)#.....
R1(config-if)#.....
R1(config-if)#exit
R1(config)#.....
R1(config-if)#.....
R1(config-if)#.....

- d) Provide the EIGRP configuration on both routers.

EIGRP configuration on R1	EIGRP Configuration on R2
R1(config)#.....	R2(config)#.....
R1(config-router)#.....	R2(config-router)#.....
R1(config-router)#.....	R1(config-router)#.....
R1(config-router)#exit	R1(config-router)#exit

- e) Provide a command that can be used for verifying the configured routing protocol on the router.

END OF ASSESSMENT

