DIPLOMA IN COMPUTER NETWORKS AND SYSTEMS ADMINISTRATION (DCNSA)

LEVEL III

NETWORK TROUBLESHOOTING

WEDNESDAY: 3 December 2025. Morning Paper.   **Time Allowed: 3 hours.**

This paper has two (2) sections. SECTION I has twenty (20) short response questions of two (2) marks each. SECTION II has three (3) practical questions of sixty (60) marks. Answer ALL questions. Marks allocated to each question are indicated in the question.

Required Resources:
- **A Windows or Linux PC**
- **Internet connection**
- **Wireshark**
- **Packet tracer/GNS3**

SECTION I (40 MARKS)

1. State the technology that enables Internet Service Providers (ISPs) to manage multiple customers sharing the same Internet connection resources efficiently using private Internet Protocol. (2 marks)

2. Simon, a Network Engineer, wants to measure the time it takes for packets to travel between a client and a server. Which command-line utility provides round-trip time measurements and packet loss statistics that he should use? (2 marks)

3. An administrator suspects that an end user device cannot resolve hostnames due to misconfigured DNS settings. Which command should they use to display the current DNS server configuration? (2 marks)

4. A system administrator wants to verify which services are listening on specific ports of a server. Which command can list all active network connections and their associated processes? (2 marks)

5. While troubleshooting network issues, a device shows repeated packet retransmissions and delayed acknowledgments. Minor port wear is observed, but errors persist. The OSI layer is primarily responsible for managing these end-to-end transmission issues is known as _____. (2 marks)

6. An IT technician identifies a conflict between a computer's static IP address and another device on the network. If the technician changes the computer's IP address but the conflict continues, what might be causing the issue? (2 marks)

7. After upgrading a switch, devices in the same VLAN cannot communicate with devices in other VLANs. Which device or configuration should the administrator inspect to resolve inter-VLAN communication issues? (2 marks)

8. A network switch in an office frequently loses connectivity with several connected devices. The IT technician suspects that a faulty port or a failing cable might be causing the issue. Which device or tool can help pinpoint the problematic port or cable? (2 marks)

9. A Network Administrator wants to check the IP addresses currently associated with devices on the local subnet. Which command-line tool displays the ARP table? (2 marks)

10. DHCP clients are failing to obtain IP addresses in a subnet. Which network device should be examined to confirm that DHCP requests are correctly routed? (2 marks)

11. An Incident Responder needs a lightweight tool to inspect incoming network traffic and test connections to specific ports in real time. Which tool can be used for simple packet inspection and network troubleshooting? (2 marks)

12. The component of an organisation's IT setup encompasses all the networking hardware, software, connections and facilities that enable data communication, resource sharing and the overall operation of critical systems is known as _____. (2 marks)

13. Keeping an accurate record of all network devices helps with management and troubleshooting. Which type of documentation lists every device along with details like IP addresses, subnet masks, gateways and other configuration information? (2 marks)

14. Troubleshooting hardware issues often involves checking the power and status of connected devices. Which indicator on a network switch port allows a technician to determine whether the port is receiving adequate power for devices? (2 marks)

15. The use of consistent network diagrams and documentation tools that improve teamwork among IT personnel and ensure adherence to industry standards is referred to as _____. (2 marks)

16. A System Administrator suspects that a security breach is affecting system performance. To investigate, they decide to observe real-time details of running processes, CPU utilisation and memory usage on the server. Which system utility can be used to monitor such activities for troubleshooting and performance analysis? (2 marks)

17. A Network Engineer suspects there may be a routing or firewall issue between a user's computer and a remote server. To verify the network path and identify where packets may be delayed or dropped, the engineer decides to use a diagnostic command. Which command allows tracing the route that packets take from the local device to the destination host? (2 marks)

18. Regular monitoring of user activities helps ensure compliance with security policies and prevents insider threats. Which routine administrative task involves examining logs of user logins and file access to identify any suspicious behavior? (2 marks)

19. System reliability depends on identifying and resolving hardware or software errors reported in system logs. Which computer file contains messages specifically related to authentication events, such as successful and failed login attempts?

20. The command used to query Domain Name System (DNS) servers to obtain the IP address of a domain name or the domain name of an IP address is known as _____. (2 marks)

21.   Create a Word processor document named "Question 21" and use the document to save solution to questions (a) to (e) below.

Company LAN-192.168.0.0/24
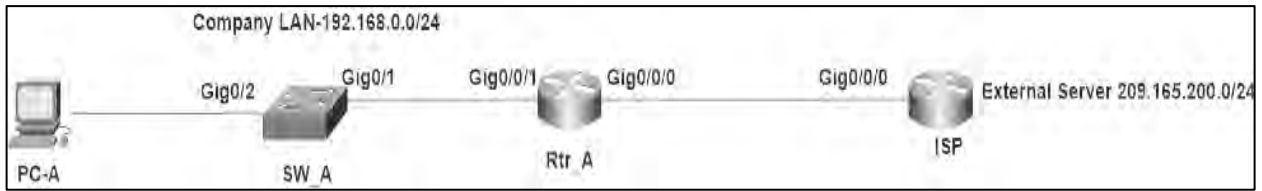
Device	Interface	IP Address	Subnet Mask	Default Gateway
Rtr_A	G0/0/0/1	192.168.0.1	255.255.255.0	N/A
	G0/0/0	10.1.1.1	255.255.255.252	N/A
ISP	G0/0/0	10.1.1.2	255.255.255.252	N/A
	Lo0	209.165.200.1	255.255.255.0	N/A
SW_A	VLAN 1	192.168.0.2	255.255.255.0	192.168.0.1
PC-A	NIC	192.168.0.3	255.255.255.0	192.168.0.1

(a)   Using a suitable network simulator, design and implement the network topology provided in the diagram above. Ensure that all devices are correctly interconnected and configured with the appropriate interface settings   (2 marks)

(b)   Using the topology you created in (a), assign IPv4 addresses and subnet masks to every interface. Display the Logical settings of the following devices:

    (i)   ISP   (2 marks)

    (ii)   Rtr_A   (2 marks)

    (iii)   SWA   (2 marks)

(c)   Using a suitable diagnostic tool, test the latency between Rtr_A and ISP.   (2 marks)

(d)   On SW_A, configure a secure password to protect access to privileged EXEC mode.   (4 marks)

(e)   Configure Rtr_A to allow secure remote access through SSH.   (6 marks)

Save Question 21 document and upload.   **(Total: 20 marks)**

22.   Create a word processor document named "Question 22" and use the topology in Question 21 to save solution to questions (a) to (d) below.

(a)   Local users in the company LAN wanted the router to reach the switch for forwarding traffic across multiple VLANs. Configure and use a suitable command line interface utility to display configuration that ensures a switch is able to forward traffic across multiple VLANs.   (4 marks)

(b)   The network engineers at the ISP want to know the TCP/IP internet layer address together with their physical address. Use a suitable command utility to display the information.   (4 marks)

(c)   Configure a suitable dynamic routing protocol on all Layer 3 devices in your topology. Provide both the configuration commands and verification output.   (8 marks)

(d)   From PC-A, trace the path to the external server. Use a suitable diagnostic tool. Capture the output explain each hop observed.   (4 marks)

Save "Question 22" document and upload.   **(Total: 20 marks)**

23. Create a word processor document named "Question 23" and use the document to save solution to questions (a) to (e) below.

Using your appropriate command utility on your Windows or Linux computer answer the following questions:

(a) In troubleshooting network connectivity, it is often necessary to determine the actual IP address of a hostname before performing further diagnostics. How would you resolve the IP address of www.gmail.com prior to sending ICMP echo requests to the target? (4 marks)

(b) When diagnosing network faults, verifying the local device's network configuration can reveal misconfigured interfaces, incorrect addressing or missing parameters. Which command would you use to display your complete network configuration details? (4 marks)

(c) Analysing the routing table provides insights into how a system forwards packets and helps identify misrouted or unreachable destinations. How would you display the current routing table on your system? (4 marks)

(d) In troubleshooting end-to-end connectivity, tracing the route to a destination can expose delays, routing loops or failed intermediate nodes. Which command utility would you employ to trace the route from your computer to the Google DNS server (IPv4), specifying the target destination? (4 marks)

(e) To troubleshoot Windows network name resolution issues, you need to determine whether NetBIOS services are running on your local or remote system and to verify the NetBIOS name of a device. Which command would you use to query NetBIOS names and check NetBIOS over TCP/IP status on your network? (4 marks)

Save "Question 23" document and upload. **(Total: 20 marks)**

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DIPLOMA IN COMPUTER NETWORKS AND SYSTEMS ADMINISTRATION (DCNSA)

LEVEL III

NETWORK TROUBLESHOOTING

MONDAY: 18 August 2025. Morning Paper.   **Time Allowed: 3 hours.**

Answer ALL questions. This paper has two (2) sections. SECTION I has twenty (20) short response questions of two (2) marks each. SECTION II has three (3) practical questions of sixty (60) marks. Marks allocated to each question are indicated in the question.

Required Resources:
- **A Windows or Linux PC**
- **Internet connection**
- **Wireshark**
- **Packet tracer/GNS3**

SECTION I (40 MARKS)

1.   An IT support intern is learning the fundamentals of network troubleshooting. Which command utility will he use to obtain the output as given below: (2 marks)

```
Tracing route to google.com [142.250.181.174]
over a maximum of 30 hops:

  1     1 ms     1 ms     1 ms   192.168.1.1
  2    10 ms     8 ms     8 ms   isp-gateway.net
  3    21 ms    22 ms    21 ms   google.com [142.250.181.174]
```

2.   Which is the command-line tool that displays active network connections, routing tables and other network interface information?   (2 marks)

3.   Which is the command that is used to order a DHCP client to renegotiate an IP address lease and request a new one from the DHCP Server?   (2 marks)

4.   John Paul was using his office's local area network. On this particular day, he switched on his personal computer and it immediately displayed the message: "The network adapter is not working properly." He also noticed a yellow exclamation mark on the network adapter. Identify the possible cause of the aforementioned network problem.
                  (2 marks)

5.   You suspect that a Windows computer is experiencing DNS issues due to outdated cache entries. Which command would you use to clear the local DNS cache?   (2 marks)

6.   The time taken for data or a request to go from the source to the destination in a network is referred to as _____.   (2 marks)

7.   How would you describe a problem where a network device works fine most of the time but fails unexpectedly at intervals?   (2 marks)

8. A system administrator restores the configuration backup after replacing a faulty switch with a new one. However, devices on different VLANs are still unable to communicate. What misconfigured component is **MOST** likely causing this issue? (2 marks)

9. A _____ is an IP address assigned to a device (such as a router or server) that is accessible over the internet.

(2 marks)

10. An unexpected power outage disrupted online services in a retail company's data center. Which network infrastructure device should be installed to ensure a continuous power supply to critical equipment and prevent such disruptions in the future? (2 marks)

11. You have just been hired as an entry-level network technician. During network troubleshooting, which metric would you use to measure the data transfer capacity of a network? (2 marks)

12. Mary Magdaline, a newly recruited intern, is troubleshooting connectivity issues in a network. Which visual indicator on a switch port should she check to verify whether the port is active and connected to a device? (2 marks)

13. In network troubleshooting, the process of monitoring event data, identifying signs of failure or abnormal behaviour and then triggering alarms based on predefined conditions is known as _____. (2 marks)

14. A Network Consultant recently installed a DHCP server to automatically assign IP addresses to client devices. However, the clients are still not receiving IP configurations. Which network device should be checked to ensure it is properly forwarding DHCP requests? (2 marks)

15. The IT manager was requested to produce documentation of every IP address and related device in use during a security audit. In which document would this information normally be found? (2 marks)

16. The term given to all the required components, including routers, switches, cabling, software and cloud-based elements that form the backbone of network operations is _____. (2 marks)

17. An administrator wants to investigate unauthorised access and failed login attempts on a Windows Server. Which built-in Windows tool should they use to review security-related system logs? (2 marks)

18. What kind of network problem occurs when there is an excess of data traffic, leading to slowdowns and potential bottlenecks in performance? (2 marks)

19. A network troubleshooting technician issues a command that displays the following output:

```
Pinging DESKTOP-APJN908 [::1] with 32 bytes of data:
Reply from ::1: time<1ms
Reply from ::1: time<1ms
Reply from ::1: time<1ms
Reply from ::1: time<1ms

Ping statistics for ::1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Identify the command used by the technician. (2 marks)

20. An IT Support Specialist is troubleshooting a workstation that cannot access internal or external network resources, suggesting a possible misconfiguration. After verifying the physical cable connection, which layer of the OSI model should be examined next to check the IP addressing and default gateway settings? (2 marks)

21. Create a word-processor document named "Question 21" and use the document to save solution to questions (a) to (e) below.

Consider the network topology shown below:

Device	Interface	IP Address	Subnet Mask
Router_X	Gig0/0	10.0.0.1	255.255.255.0
Router_Y	Gig0/0	10.0.0.2	255.255.255.0

(a) Design the network topology as shown above using an appropriate simulator. (2 marks)

(b) Your company has deployed two routers; Router_X and Router_Y to connect two office departments. You are tasked with configuring IP addresses on both routers to enable basic Layer 3 connectivity. Using the IP addresses provided, assign the correct addresses to each router interface to complete the setup. (4 marks)

(c) Router_X and Router_Y are connected and should communicate at Layer 3. Using an appropriate Layer 3 diagnostic tool, test the latency between the two routers. (4 marks)

(d) It has been discovered that user passwords stored in the configuration file of your routers are in clear text format. This has been flagged as a security risk. As part of the router hardening process, configure the routers to encrypt all clear-text passwords using appropriate IOS commands. (4 marks)

(e) An IT technician is trying to access Router_X remotely from Router_Y, but the connection is failing. Configure Router_X to enable SSH access from Router_Y. (6 marks)

Save "Question 21" document and upload. **(Total: 20 marks)**

22. Create a word-processor document named "Question 22" and use the document to save the solution to questions (a) to (e) below.

Consider the network topology below:

Device	Interface	IP Address	Subnet mask
Switch_X	VLAN	172.16.10.1	255.255.255.0
Switch_Y	VLAN	172.16.10.2	255.255.255.0
PC_A	NIC	172.16.10.3	255.255.255.0
PC_B	NIC	172.16.10.4	255.255.255.0

(a) Design the network topology as shown above using an appropriate simulator. (4 marks)

(b) Using the IP addresses provided, assign the correct IP addresses to each switch's VLAN interface to complete the setup. (4 marks)

(c) Intermittent data transfer issues have been observed between the two switches. Investigation reveals a mismatch in duplex and speed settings on the connecting interfaces. Configure the switch interfaces for full-duplex operation and set the appropriate speed based on interface capability. (6 marks)

(d) You have been assigned to verify connectivity and discover neighbouring devices between two newly configured switches; Switch_X and Switch_Y. The switches are interconnected through a network cable. From Switch_X, use an appropriate Layer 2 discovery tool to identify and document connectivity details for Switch_Y. (4 marks)

(e) PC-A and PC-B are connected to their respective switches and are configured on the same subnet. You have been tasked with verifying whether the two computers can communicate with each other over the network. Use an appropriate command-line tool to test the connectivity between PC-A and PC-B. (2 marks)

Save "Question 22" document and upload. **(Total: 20 marks)**

23. Create a word-processor document named "Question 23" and use the document to save the solution to questions (a) to (e) below.

DNS is crucial for troubleshooting as it helps in network connectivity and application access, making it essential and useful in troubleshooting. Use an appropriate diagnostic tool on your Windows or Linux computer to answer the following questions.

(a) Clear DNS resolver cache on your local computer. (4 marks)

(b) Release the current IP address and related network settings assigned to a network adapter. (4 marks)

(c) Request a new IP address lease from a DHCP server. (4 marks)

(d) Resolve IP address associated with domain name x.com. (4 marks)

(e) Identify mail servers associated with x.com. (4 marks)

Save "Question 23" document and upload. **(Total: 20 marks)**

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DIPLOMA IN COMPUTER NETWORKS AND SYSTEMS ADMINISTRATION (DCNSA)

LEVEL III

NETWORK TROUBLESHOOTING

MONDAY: 2 December 2024. Morning Paper.   **Time Allowed: 3 hours.**

Answer ALL questions. This paper has two (2) sections. SECTION I has twenty (20) short response questions. Each question is allocated two (2) marks. SECTION II has three (3) practical questions of sixty (60) marks. Marks allocated to each question are indicated in the question.

Required Resources:
- **A computer**
- **Internet connection**
- **Wireshark**
- **Packet tracer/GNS3**

SECTION I (40 MARKS)

1.   What is the name of a program or tool that captures information over a network?   (2 marks)

2.   Network issues can occur for several reasons. What term is used to check physical components to determine if connections are loose or devices are malfunctioning?   (2 marks)

3.   The written charts, drawings, records and instructions of networking procedures, layouts and information on the installed network are all referred to as _____.   (2 marks)

4.   You are troubleshooting an issue where users cannot access a specific website on their network while other websites work well. To determine whether the problem is due to the website's server being down or a network issue, which command would you use to check if the website server is reachable by sending packets and waiting for a response?   (2 marks)

5.   Network troubleshooting involves identifying and resolving issues that affect network functionality. Which system component is examined to find error messages, warnings and events that could help diagnose the problem?   (2 marks)

6.   An instrument that displays the variation of a signal strength against the frequency is called _____.   (2 marks)

7.   In network troubleshooting, which method is used to methodically test and assess each component in order to detect flaws and ensure appropriate function?   (2 marks)

8.   System malfunction refers to any unexpected or abnormal behaviour in a system. Which approach involves continuously monitoring system metrics such as CPU usage, memory usage, disk I/O and network activity to detect and diagnose faults?   (2 marks)

9.   In the context of fault management, which approach entails categorising problems based on their severity and urgency in order to prioritise resolution efforts?   (2 marks)

10. You are examining a critical system failure where users have reported intermittent issues with a business application. These crashes occurred after recent software updates and during periods of high network traffic. To address this system failure, which step involves determining whether the problem stems from user error, a system malfunction or external factors? (2 marks)

11. The term for the process of systematically assessing how a network handles different types of data traffic to ensure it meets specified performance criteria is referred as _____. (2 marks)

12. Which tool is used to assess the performance of components and identify any faults or inefficiencies in system testing? (2 marks)

13. As the person responsible for managing the company's network and preparing for an upcoming system upgrade, it is essential to ensure that, in the event of a failure or misconfiguration during the upgrade, the network can be quickly restored to its previous state without losing critical configurations. In this context, what action involves creating backups of network configurations to prevent data loss and enable rapid recovery in case of failure? (2 marks)

14. When performing network maintenance, which routine task helps to guarantee that network devices are operating with the most recent firmware and software updates, thereby enhancing performance and security? (2 marks)

15. Which command utility helps in DNS resolution by retrieving information about domain names and their IP addresses? (2 marks)

16. Which is the troubleshooting internet control message protocol (ICMP) based tool that shows where the ICMP packet stopped in the network? (2 marks)

17. A network engineer schedules regular inspections to ensure that backup operations are functioning correctly and that essential data is securely saved. What is the main routine task crucial for maintaining data integrity and ensuring recovery? (2 marks)

18. A network support specialist performs monthly audits to review network access policies and ensure that only authorised users have the appropriate permissions. What is the routine task that helps to manage and secure network access effectively? (2 marks)

19. When troubleshooting network issues where devices are not communicating properly within a local area network, which network component is responsible for connecting these devices and managing data traffic between them? (2 marks)

20. Sharon Kenton, a newly recruited intern, was troubleshooting a network issue where data packets were not reaching their intended destinations. After inspecting cables and connections, she suspected that the problem might be related to routing. Which network device directs data packets to their intended destinations using IP addresses and routing tables? (2 marks)

SECTION II (60 MARKS)

21. Create a word processing document named "Question 21" and use the document to save solutions to questions (a) to (e) below.

You are a network administrator in Holi Farm Dairies Ltd. Your farm manager requires you to simulate the desired network between the sales outlet and your office. Use any available simulator to set up the network as shown in Figure 1 below:
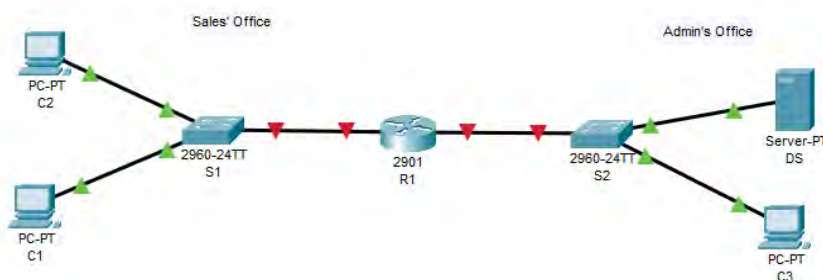
Figure 1

The details of the devices are as shown in the table below:

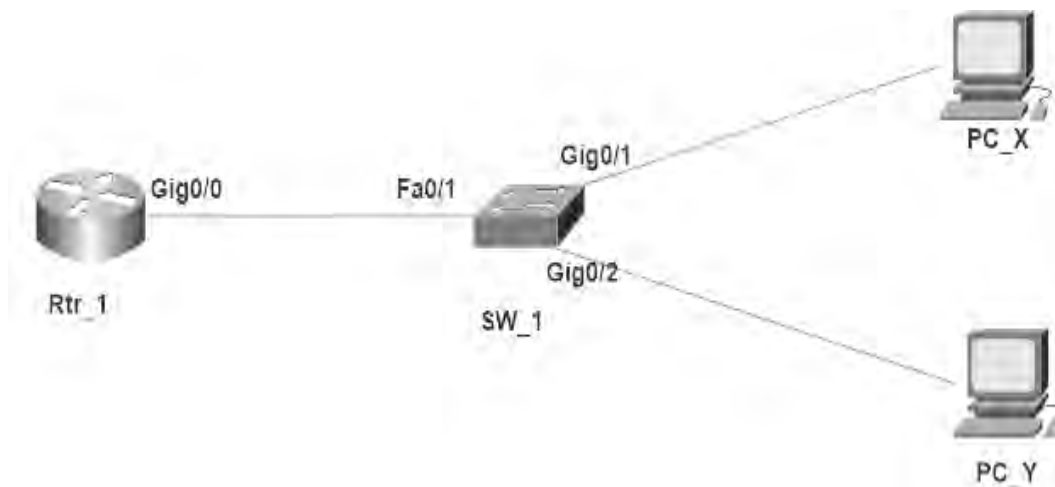| Device	Interface	IP Address	Subnet Mask	Gateway
C1	Ethernet	192.168.10.2	255.255.255.0	192.168.10.1
C2	Ethernet	192.168.10.3	255.255.255.0	192.168.10.1
S1	VLAN	192.168.10.4	255.255.255.0	192.168.10.1
R1	Gg0/0	192.168.10.1	255.255.255.0	N/A
	Gg0/1	192.168.20.130	255.255.255.0	N/A
S2	VLAN	192.168.20.131	255.255.255.0	192.168.20.130
DS	Ethernet	192.168.20.132	255.255.255.0	192.168.20.130
C3	Ethernet	192.168.20.133	255.255.255.0	192.168.20.130

(a)   Configure the devices and capture screenshots for C1, R1 and DS.   (6 marks)

(b)   Capture a screenshot of the network diagram from the simulator after configuring the devices.   (3 marks)

(c)   Capture a screenshot showing the communication between computers C2 in the Sales Office and C3 in the Administrator's office.   (4 marks)

(d)   Use the appropriate command to show connectivity between computer C1 and server DS.   (4 marks)

(e)   Capture a screen shot showing the global settings of switch S2 in the administrator's office.   (3 marks)

Save "Question 21" document and upload.   **(Total: 20 marks)**

22.   Create a word processor document named "Question 22" and use the document to save solutions to questions (a) to (e) below.

Using GNS3 or packet tracer, configure a network topology as shown below:

Device	Interface	IP Address	Subnet Mask
Rtr_1	Gig0/0	192.168.10.1	255.255.255.0
SW_1	VLAN	192.168.10.2	255.255.255.224
PC_X	NIC	192.168.20.3	255.255.255.0
PC_Y	NIC	192.168.30.4	255.255.255.0

(a) The topology diagram above contains incorrect IP addresses for the intermediary and end devices. Configure the correct logical addresses and then display the addresses for the following devices:

      (i) Router. (4 marks)

      (ii) Switch. (4 marks)

(b) From PC-X test connectivity to PC-Y. (2 marks)

(c) Disable and verify DNS lookup to prevent the router from attempting to translate incorrectly entered commands as though they were host names. (4 marks)

(d) Set up and validate the router's security password settings to ensure a minimum length of 8 characters. (4 marks)

(e) Display the current configuration that is active and running on the device. (2 marks)

Save "Question 22" document and upload. **(Total: 20 marks)**

23. Create a word processor document named "Question 23" and use the document to save solutions to questions (a) to (e) below.

Using GNS3 or packet tracer, configure the topology as shown below:

Device	Interface	IPv6 Address	Subnet Mask
SW_1	VLAN	172.16.10.1	255.255.255.0
SW_2	VLAN	172.16.10.2	255.255.255.0
Admin_PC	NIC	172.16.10.3	255.255.255.0
Staff_PC	NIC	172.16.10.4	255.255.255.0

(a) Based on the provided topology and IP addressing scheme, assign IP addresses to the relevant interfaces and then display the connection information:

      (i) From Admin_PC access SW_2. (3 marks)

      (ii) From Staff_PC access SW_1. (3 marks)

(b)   Display terminal lines information.   (3 marks)

(c)   From SW-2, display comprehensive details about the neighbouring devices that have been detected.
                                                     (3 marks)

(d)   On SW_1, Secure the console and virtual access lines to log out after five minutes of inactivity.   (4 marks)

(e)   A network inventory typically serves as the essential document for efficient network management. Use the appropriate command utility to determine the following information from the switch.

        (i)   Switch model.   (2 marks)

        (ii)   Configuration register.   (2 marks)

Save "Question 23" document and upload.   **(Total: 20 marks)**

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DIPLOMA IN COMPUTER NETWORKS AND SYSTEMS ADMINISTRATION (DCNSA)

LEVEL III

NETWORK TROUBLESHOOTING

MONDAY: 19 August 2024. Morning Paper.   **Time Allowed: 3 hours.**

Answer ALL questions. This paper has two (2) sections. SECTION I has twenty (20) short response questions. Each question is allocated two (2) marks. SECTION II has three (3) practical questions of sixty (60) marks. Marks allocated to each question are indicated in the question.

Required Resources:
- **Computer**
- **Network simulation tool such as GNS3/packet tracer**

SECTION I (40 MARKS)

1.   Which network feature prioritises crucial traffic and ensures that important data packets receive the highest priority? (2 marks)

2.   In the context of Ipconfig results during network troubleshooting, what does an Internet Protocol (IP) address of 0.0.0.0 signify? (2 marks)

3.   You are troubleshooting a network that only users using wireless devices are experiencing connectivity issues. What is the first thing to look at first? (2 marks)

4.   The Ping command is a fundamental tool used to test the reachability of a host on an Internet Protocol (IP) network. What is the result if a Ping command shows 100% packet loss? (2 marks)

5.   The time taken for a packet to travel from a source to a destination and back during the network troubleshooting is known as _____. (2 marks)

6.   The type of networking hardware that uses multiple ports to communicate between devices in the local area network (LAN) is known as _____. (2 marks)

7.   Network traffic refers to the data moving across a computer network at any given time. Which feature uniformly distributes network traffic among multiple servers or links? (2 marks)

8.   Which security feature in modern operating systems entails a routine task of managing user accounts, permissions and access rights in a network? (2 marks)

9.   During a routine network check, a technician discovers multiple Internet Protocol (IP) addresses recorded in the network logs that are not listed in the company's inventory. None of the devices have wireless network cards. Which feature would be used to prevent unauthorised devices from gaining access to computer resources? (2 marks)

10.   The command that can be used to troubleshoot static routing problems in a network is known as _____.
(2 marks)

11.   Fault classification offers an organised approach to analysing, diagnosing, and resolving problems in complex systems or processes. What is the name for temporary defects that arise intermittently and spontaneously as a result of intermittent connections, noise or temporary software errors? (2 marks)

12.   Which method in network configuration involves fine-tuning network settings, optimising bandwidth utilisation and applying measures to guarantee the network functions smoothly and efficiently? (2 marks)

13.   Which document is required for troubleshooting and future network upgrades? (2 marks)

14.   Which routine task entails regularly observing and analysing various aspects of a computer network to ensure its smooth operation, detect anomalies and address security threats promptly? (2 marks)

15.   An Internet Protocol (IP) address is used to identify the host or network interface and provide location of the host in the network. Which command is useful for troubleshooting IP address conflicts or refreshing (Dynamic Host Control Protocol (DHCP) leases? (2 marks)

16.   In modern networks, which device is used to filter and forward data to specific devices, reducing collisions and increasing network efficiency? (2 marks)

17.   Tracert command is useful because it traces the path packets take from the source to the destination, showing each hop along the route and the time taken for each hop. What can multiple responses from a single hop in traceroute command suggest? (2 marks)

18.   Which command-line utility that uses the telnet protocol to connect and manage remote machines? (2 marks)

19.   Identify the network issue that occurs when data packets being transmitted over a network get lost or dropped during transit and fail to reach their destination. (2 marks)

20.   The process of depleting the pool of unallocated IPv4 addresses is known as _____. (2 marks)

SECTION II (60 MARKS)

21.   Create a word processing document named "Question 21" and use it to save your solutions to questions (a) to (e).

(a)   Using an appropriate simulator, set up the "DualStar" topology as shown below, configuring the IP addresses and other parameters for all the devices as shown in the table below: (6 marks)
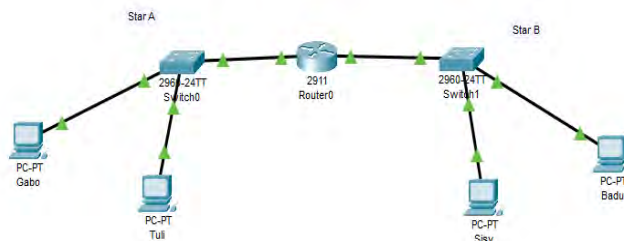
Device	Interface	IP Address	Subnet Mask	Gateway
Tuli		172.16.10.1	255.255.0.0	172.16.10.5
Gabo		172.16.10.2	255.255.0.0	172.16.10.5
Router0	G0/0	172.16.10.5	255.255.0.0	N/A
	G0/1	192.168.10.30	255.255.255.0	N/A
Sisy		192.168.10.10	255.255.255.0	192.168.10.30
Badu		192.168.10.20	255.255.255.0	192.168.10.30

(b)   Capture and save the screenshots for Tuli and Router0.   (4 marks)

(c)   Capture and save the screenshot showing connectivity between the following devices:

        (i)   Tuli to Gabo.   (2 marks)

        (ii)   Sisy to Badu.   (2 marks)

        (iii)   Gabo and Badu.   (2 marks)

(d)   Use appropriate command utility, capture and save the screenshot to display the routing table of the "Router0".   (2 marks)

(e)   Use appropriate command utility to display System hardware and software status and capture the screen displayed.   (2 marks)

Save "Question 21" document and upload.   **(Total: 20 marks)**

22.   Create a word processing document named "Question 22" and use it to save your solutions to questions (a) to (c). Refer to the "DualStar" created in Question 21.

        (a)   Use appropriate command utilities to verify the following:

                (i)   Capture and save the screenshots for the steps to show the configuration details of your personal computer.   (4 marks)

                (ii)   Capture and save the screenshots for the steps to show how to diagnose the connectivity issues from Tuli to Sisy.   (4 marks)

                (iii)   Capture and save the screenshot showing the steps taken by packets between the Tuli and Badu computers.   (4 marks)

        (b)   Using Switch0 display the management IP address a user can see to access the switch remotely from Gabo. Capture and save the step by step screenshots.   (4 marks)

        (c)   Assume StarA end devices are correctly configured, but the users are not able to see the external server. Use an appropriate command on the Router0 that will enable users be able to communicate with the extremal server?   (4 marks)

Save "Question 22" document and upload.   **(Total: 20 marks)**

23.   Create a word processor document named "Question 23" and use the document to save solution to questions (a) to (g) below.

        (a)   Using GNS3 or packet tracer, configure the topology as shown below. Capture and save the screenshot of the architecture.   (4 marks)

Device	Interface	IPv6 Address	Subnet Mask
R1	Gig0/0	172.30.10.1	255.255.255.252
	Loopback 1	10.1.0.1	255.255.255.0
R2	Gig0/0	172.30.10.2	255.255.255.252
	Loopback 1	10.2.0.1	255.255.255.0

(b)   Capture and save the screenshot to display the routing table of the following devices:

      (i)   R1.   (2 marks)

      (ii)   R2.   (2 marks)

(c)   Capture and save the screenshot to display technology package license information of R1.   (2 marks)

(d)   Display the IOS image of R2.   (2 marks)

(e)   Disable DNS lookup to prevent the router from attempting to translate incorrectly entered commands as though they were host names.   (2 marks)

(f)   Configure the system to require a minimum 12-character password.   (2 marks)

(g)   Configure the username admin with an encrypted password of Bempowered!!2024.   (2 marks)

(h)   Generate a set of crypto keys with a 1024-bit modulus with domain name set to ICT.   (2 marks)

Save "Question 23" document and upload.   **(Total: 20 marks)**

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DIPLOMA IN COMPUTER NETWORKS AND SYSTEMS ADMINISTRATION (DCNSA)

LEVEL III

NETWORK TROUBLESHOOTING

MONDAY: 22 April 2024. Morning Paper.   **Time Allowed: 3 hours.**

Answer ALL questions. This paper has two (2) sections. SECTION I has twenty (20) short response questions. Each question is allocated two (2) marks. SECTION II has three (3) practical questions of sixty (60) marks. Marks allocated to each question are shown at the end of the question.

Required Resources:
- **Computer**
- **Network simulation tool such as GNS3/packet tracer**

SECTION I (40 MARKS)

1.   What command can you use to test the connectivity between two hosts using ICMP echo request packets and continuously display the results?   (2 marks)

2.   Which is the hardware tool that verifies if a signal is transmitted by a given cable and is used to find out whether the cables in the network are functioning properly when diagnosing connectivity issues?   (2 marks)

3.   Which tool captures all network traffic regardless of destination when conducting a packet capture for network diagnostics?   (2 marks)

4.   A virtual or physical tool that can be used for troubleshooting network transmission issues and can be used by utilising a special connector that redirects the electrical signal back to the transmitting system is known as _____.   (2 marks)

5.   What is the name of the standard reference point for normal network behaviour during the diagnosis of a network problem?   (2 marks)

6.   The statement "the process of identifying the cause of faults in the network", refers to which computer troubleshooting terminology?   (2 marks)

7.   Network problems that occur sporadically arising unpredictably and causing temporary disruptions or inconsistencies in network performance are referred to as _____.   (2 marks)

8.   When releasing the IP address currently assigned to a network interface, which ipconfig switch is used? (2 marks)

9.   Which is the network issue where there is a time delay in the sending data packets over a network connection and is often caused by network congestion and sometimes route changes?   (2 marks)

10.   The process of identifying, acquiring, testing and applying updates to software applications and operating systems in order to address vulnerabilities, fix bugs and improve overall performance is known as _____.
                                                                        (2 marks)

11.   Which network utility combines the functionalities of two other commands to provide more detailed information about the network path between your computer and a specified destination?   (2 marks)

12. Which network troubleshooting command gives statistics on each active or open network interface?   (2 marks)

13. In the context of maintenance, which term is used to illustrate improvement of network performance and efficiency?   (2 marks)

14. A standalone application that is used to analyse traffic on the network, figure out which ports are open and identify network vulnerabilities is known as _____.   (2 marks)

15. Which command is frequently used to track the path packets follow on a network as they travel from one host to another?   (2 marks)

16. A standalone application that integrates diagnostic and reporting capabilities to provide a comprehensive view of an organisation's network and can be used to troubleshoot network problems and detect intrusions is known as _____.   (2 marks)

17. Which tool is commonly used to find networks, scan ports and identify operating systems?   (2 marks)

18. What message indicates that your computer did not receive a response from the remote host within the timeout period that is caused by network congestion, firewall rules blocking the traffic or the remote host being offline?   (2 marks)

19. The network reconnaissance technique used to discover open ports on a target system involving systematically probing a range of TCP or UDP ports on a remote host to determine which ports are listening and accepting connections.   (2 marks)

20. A structure that is designed specifically to house technical equipment including routers, switches, hubs and servers and makes it possible to securely hold multiple pieces of equipment in one area is known as _____.   (2 marks)
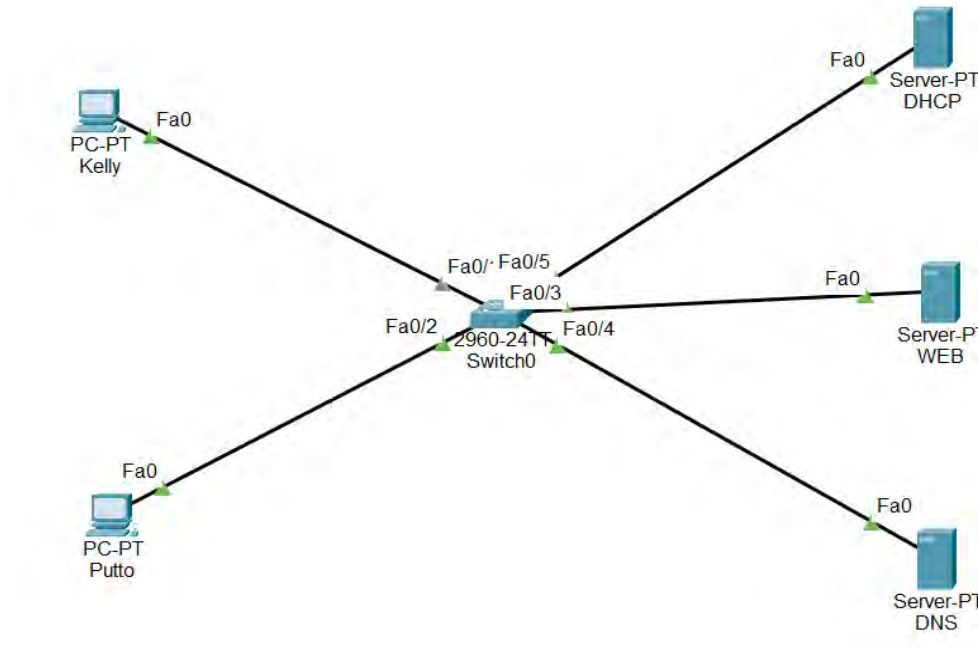
Required Resources:
- Computer
- Simulator such as GNS3/packet tracer

Create a word processing document named "Question 21" and use it to save your solutions to questions (a) to (e)

21. Configure the topology diagram as shown below to answer the following questions.

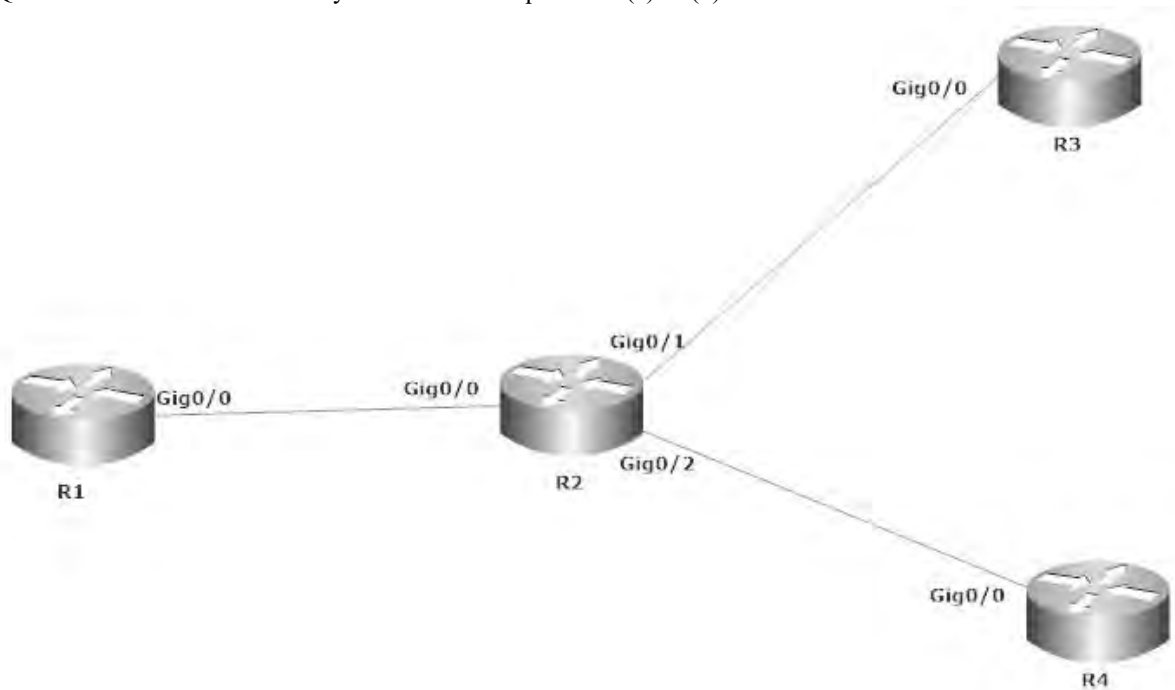| Device	IP Address	Subnet Mask	Default Gateway
DHCP Server	192.168.1.1	255.255.255.0	192.168.1.1
DNS Server	192.168.1.2	255.255.255.0	192.168.1.1
WEB Server	192.168.1.3	255.255.255.0	192.168.1.1
Kelly	DHCP	DHCP	DHCP
Putto	DHCP	DHCP	DHCP

Required:

(a) Configure and assign IP address for the topology as shown and capture a screenshot for the following devices:

    (i) DHCP Server.   (2 marks)

    (ii) DNS Server.   (2 marks)

    (iii) WEB Server.   (2 marks)

(b) Configure DHCP server to assign IP address automatically to Kelly and Putto PC.   (4 marks)

(c) Using Kelly PC, display DHCP Configuration.   (2 marks)

(d) Using Putto PC test connectivity to Kelly's PC.   (2 marks)

(e) Using Kelly's PC browser access www.xyz.co.ke.   (6 marks)

Save "Question 21" and upload.

(Total: 20 marks)

22. Configure and assign IP address for the topology shown below. Create a word processing document named "Question 22" and use it to save your solutions to questions (a) to (d).

Device	Interface	IP Address	Subnet Mask
R1	Gig0/0	192.168.0.1	255.255.255.248
	Gig0/0	192.168.0.2	255.255.255.248
	Gig0/1	192.168.0.9	255.255.255.248
R2	Gig0/2	192.168.0.17	255.255.255.248
R3	Gig0/0	192.168.0.10	255.255.255.248
R4	Gig0/0	192.168.0.18	255.255.255.248

(a) Configure the logical address as shown above and use appropriate command utility to display the networks connected to R2. (6 marks)

(b) Display the broadcast address of the logical address connected on Gig0/0 of R1. (4 marks)

(c) Use appropriate command to display information about the flow of traffic through the network on R3. (4 marks)

(d) Test connectivity between the following:

   (i) R1 to R2. (2 marks)

   (ii) R2 to R3. (2 marks)

   (iii) R3 to R4. (2 marks)

Save "Question 22" and upload.

(Total: 20 marks)

23. Use the topology in Question 22 and answer the following questions. Save solutions to questions (a) to (c) below in a document called "Question 23".

    (a)   Configure the following devices to be accessed remotely from each other using Secure Shell using appropriate username and password.

        (i)   R1 to R2.   (4 marks)

        (ii)   R2 to R3.   (4 marks)

        (iii)   R4 to R2.   (4 marks)

    (b)   Configure the routers using appropriate routing protocols so that R1 displays external networks.   (6 marks)

    (c)   Highlight **TWO** functions of Routing Protocols.   (2 marks)

Save "Question 23" and upload.

(Total: 20 marks)

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DIPLOMA IN COMPUTER NETWORKS AND SYSTEMS ADMINISTRATION (DCNSA)

LEVEL III

NETWORK TROUBLESHOOTING

MONDAY: 4 December 2023. Morning Paper.   **Time Allowed: 3 hours.**

Answer ALL questions. This paper has two (2) sections. SECTION I has twenty (20) short response questions. Each question is allocated two (2) marks. SECTION II has three (3) practical questions of sixty (60) marks. Marks allocated to each question are shown at the end of the question.

Required Resources:
- **Computer**
- **Network simulation tool such as GNS3/packet tracer**

SECTION I (40 MARKS)

1. The technique used to encapsulate one network protocol within another, to allow data from one network to be transmitted over another network by wrapping the original data in a format compatible with the intermediate network is known as: (2 marks)

2. The fundamental networking concept in network troubleshooting and network design that translates private IP addresses to share a single public IP address for outgoing traffic is known as: (2 marks)

3. Jane, a technician, is investigating a network in which it is suspected that a faulty node in the network path is causing packets to be dropped. The technician just has the IP address of the end point device and no information about the intermediary devices. Which command could the technician use to locate the faulty node?   (2 marks)

4. The Internet Control Message Protocol (ICMP) is an integral part of the Internet Protocol (IP) suite and is used for various network-related communication tasks. Which command utility uses ICMP?   (2 marks)

5. What is the name of a command that network administrators and troubleshooters commonly use to confirm that DNS setups are working properly?   (2 marks)

6. A network user needed to know if his computer's connection to a webserver was successful. To build a connection-oriented session, which transport layer feature is used?   (2 marks)

7. The computer networking model that provides a structured way to understand and isolate network issues by categorising them into specific layers is called _____model?   (2 marks)

8. The 192.168.10.0/24 network is subnetted into subnets using /26 masks by a network administrator. How many subnets of equal size are formed?   (2 marks)

9. Based on the output below of a routing table entry. What indicates device is directly attached to a network?   (2 marks)

```
C     192.168.1.0/24 is directly connected, GigabitEthernet0/0
S     10.0.0.0/8 [1/0] via 192.168.1.1
C     10.1.1.0/24 is directly connected, Loopback0
S*    0.0.0.0/0 [1/0] via 192.168.1.1
```

10. A network technician was tasked with designing a network that can support 30 usable addresses from the 192.168.10.0/24 network. What is the network address going to be? (2 marks)

11. The network technology that allows the logical segmentation of a network, providing isolation and flexibility without the need for physical network changes is called? (2 marks)

12. The variation in the delay of received packets on a network is common issue in data communication and can negatively impact the quality of real-time applications, such as VoIP calls, video conferencing, online gaming, and streaming. What is the name given to this type of networking issue as used in network troubleshooting? (2 marks)

13. According to company policy, the most secure solution must be used to protect access to the router's privileged exec and configuration modes. Which router command is most likely to achieve the maximum level of security? (2 marks)

14. Mr. John has just joined the IT team and is eager to familiarize himself with the current network setup. As his colleague, what command-line utility would you recommend he employ to gain an understanding of the network configuration? (2 marks)

15. Which command utility will display a list of entries in the ARP cache as shown below? (2 marks)

```
Interface: 192.168.1.100 --- 0x4
  Internet Address      Physical Address      Type
  192.168.1.1           00-11-22-33-44-55     dynamic
  192.168.1.2           00-66-77-88-99-aa     dynamic
  192.168.1.10          00-bb-cc-dd-ee-ff     dynamic
```

16. Which message is part of Internet Control Message Protocol (ICMP) error-reporting mechanism that assists network administrators and devices in understanding why certain packets are not arriving at their destination and provides hints about probable network or configuration issues? (2 marks)

17. When troubleshooting network problems, which layer of the OSI model, will a network administrator most likely encounter issues related to routing, ip addressing, and connectivity between different network segments? (2 marks)

18. Network infrastructure relates to the underlying hardware and software components that enable the functioning of a network. Which aspect of network infrastructure troubleshooting comprises inspecting network devices such as switches, routers, and network interface cards for defects? (2 marks)

19. Which component serves as a significant reference for network troubleshooting by offering a detailed overview of the network's setup and design? (2 marks)

20. When undertaking troubleshooting and protocol analysis, what is the name of a packet capture and analysis tool that allows a network administrator to collect and analyse network traffic on a specified network interface? (2 marks)

21. Study the topology and configuration details shown below. Use the diagrams to answer questions (a) and (b) and save solutions in a word document called "Question 21".
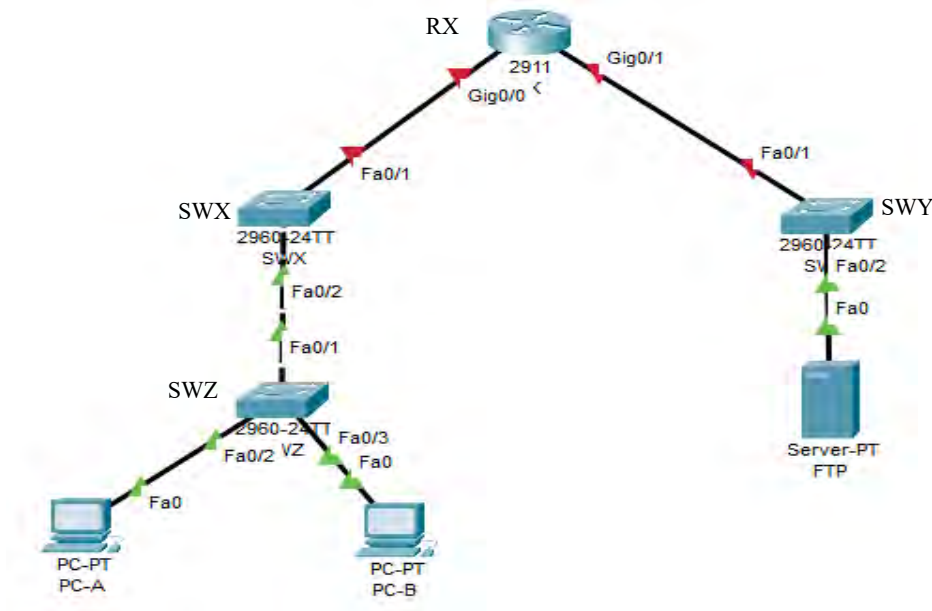
Device	Interface	IP Address	Subnet Mask	Default Gateway
RX	G0/0	192.168.10.1	255.255.255.128	N/A
	G0/1	192.168.10.129	255.255.255.128	N/A
SWX	VLAN 1	192.168.10.2	255.255.255.128	192.168.10.1
SWY	VLAN 1	192.168.10.130	255.255.255.128	192.168.10.129
SWZ	VLAN 1	192.168.10.3	255.255.255.128	192.168.10.1
PC-A	NIC	192.168.10.4	255.255.255.128	192.168.10.1
PC-B	NIC	192.168.10.5	255.255.255.128	192.168.10.1
FTP	NIC	192.168.10.131	255.255.255.128	192.168.10.129

Required:

(a) Configure and assign IP address for the topology as shown and capture the screenshot. (5 marks)

(b) Calculate the Classless Inter-Domain Routing (CIDR) notation for the IP addresses specified in the topology? (3 marks)

(c) Display connectivity between the following devices:

    (i) PC-A to gateway (2 marks)

    (ii) PC-B to FTP (2 marks)

    (iii) SWX to SWY (2 marks)

(d)   Use appropriate command utility to display the routing table on RX   (3 marks)

(e)   Use appropriate command utility to display System hardware and software status.   (3 marks)

Save question 21 and upload.

(Total: 20 marks)

22.   Use the topology in Question 21 to answer Questions (a) to (d) below. Save the solutions in a word document named "Question 22".

     (a)   A user reports intermittent connectivity issues between PC-A and PC-B. Which command utility will you use to verify the following:

         (i)   Configuration details the computer.   (2 marks)

         (ii)   Diagnose the connectivity issues.   (2 marks)

         (iii)   Identify the path taken by packets between the two computers.   (3 marks)

     (b)   Using SW-X display the management IP address a user can see to access the switch remotely from PC-A.   (4 marks)

     (c)   A network user wanted to know how Ethernet frames were forwarded within a local area network (LAN). Which command utility may be used on SW-Z to ensure efficient Ethernet frame forwarding?   (3 marks)

     (d)   Your immediate supervisor wants to know if Ethernet networks have a loop-free topology. Using a suitable command utility display the protocol used to prevent loops from SW-Y?   (6 marks)

Save question 22 and upload.

(Total: 20 marks)

23.   Use the topology in Question 21 to answer Questions (a) to (c) below. Save the solutions in a word document named "Question 23".

     (a)   Configure the following devices to be accessed remotely from each other using Secure Shell using appropriate username and password.

         (i)   RX from PC-A   (4 marks)

         (ii)   SW-Y from PC-B   (4 marks)

         (iii)   SW-X FROM SW-Z   (4 marks)

         (iv)   Configure the FTP server to be accessed remotely from PC-B   (6 marks)

     (b)   Name two types of network documentation.   (2 marks)

Save question 23 and upload.

(Total: 20 marks)

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DIPLOMA IN COMPUTER NETWORKS AND SYSTEMS ADMINISTRATION (DCNSA)

LEVEL III

NETWORK TROUBLESHOOTING

MONDAY: 21 August 2023. Morning Paper.   **Time Allowed: 3 hours.**

Answer ALL questions. This paper has two (2) sections. SECTION I has twenty (20) short response questions. Each question is allocated two (2) marks. SECTION II has three (3) practical questions of sixty (60) marks. Marks allocated to each question are shown at the end of the question.

Required Resources:
- **Computer**
- **Network simulation tool such as GNS3/packet tracer**

SECTION I (40 MARKS)

1. Default gateway in a computer network is used to forward the packets from the client to another network. Which command utility can be used to display the default gateway configured on a host computer?   (2 marks)

2. The output below can be retrieved using which command utility?   (2 marks)

```
Server:  UnKnown
Address:  192.168.0.1

Non-authoritative answer:
Name:    www.gmail.com
Addresses:  2a00:1450:401a:800::2005
            172.217.170.165
```

3. Mary, a network analyst wants to access the switch remotely through the network. Which type of address must be supplied to the switch virtual interface for it to be accessed remotely?   (2 marks)

4. Which command utility is used to verify Network layer connectivity?   (2 marks)

5. A Network technician was mandated to verify all the information of TCP/IP properties of a particular host in the network. Which command can the technician use to ascertain information about the network adapter?   (2 marks)

6. Which key combination from the keyboard can be used to interrupt the internetwork operating system (IOS) process such as ping or traceroute?   (2 marks)

7. Secure Shell (SSH) and Telnet are the preferred protocol for connecting to a device operating system over the network. Which terminal emulator can be used to make both SSH and Telnet connections?   (2 marks)

8. Which command utility is used to display a brief synopsis of the condition of the device interfaces?   (2 marks)

9. John wanted to encrypt all plaintext passwords in the intermediary devices in the network. Which Internetwork operating system (IOS) command would you advise him to use?   (2 marks)

10. Which command utility can be used by helpdesk technician to perform querying of registration record for a domain name or IP address specified in a window-based computer?   (2 marks)

11. During encapsulation, which address is added to the data link layer for a PC connected to an Ethernet network?

(2 marks)

12. What is the name given to the field in the IPv4 header that is used to limit the lifetime of a packet? (2 marks)

13. Sequence and Acknowledgment Numbers are two fields in the TCP header. What is the name given to the field used to determine the priority of each packet? (2 marks)

14. Which address when tested on a workstation verifies that the host Network Interface Card (NIC) drivers, and TCP/IP stack are functioning? (2 marks)

15. For computers to communicate with each in the network, they must know the logical and physical address based on source and destination PC. Which protocol is used to discover the MAC address of a host that belongs to the same network? (2 marks)

16. Which transport layer protocol is associated with the following features? (2 marks)

    (i)   Provides tracking of transmitted data segments.

    (ii)   Destination devices will acknowledge received data.

    (iii)   Source devices will retransmit unacknowledged data.

17. Which layer of the OSI Model is associated with the following common symptoms of network? (2 marks)

    (i)   Loss of connectivity.

    (ii)   Console error messages.

18. Which command utility will a network technician use to ensure the cache is populated with updated information? (2 marks)

19. Accurate and complete network documentation is required to effectively monitor and troubleshoot networks. Based on the diagram below, Identify the type of documentation illustrated. (2 marks)

Device	Model	Description	Location	IOS		License
Central	ISR 4321	Central Edge Router	Building A Rm: 137	Cisco IOS XE Software, Version 16.09.04 flash:isr4300-universalk9_ias.16.09.04.SPA.bin		ipbasek9 securityk9

Interface	Description	IPv4 Address	IPv6 Address	MAC Address	Routing
G0/0/0	Connects to SVR-1	10.0.0.1/30	2001:db8:acad:1::1/64	a03d.6fe1.e180	OSPF
G0/0/1	Connects to Branch-1	10.1.1.1/30	2001:db8:acad:a001::1/64	a03d.6fe1.e181	OSPFv3
G0/1/0	Connects to ISP	209.165.200.226/30	2001:db8:feed:1::2/64	a03d.6fc3.a132	Default
S0/1/1	Connects to Branch-2	10.1.1.2/24	2001:db8:acad:2::1/64	n/a	OSPFv3

20. Which troubleshooting method starts by collecting user experiences of the problem, document the symptoms and then, uses that information to make an informed guess as to which OSI layer to start your investigation? (2 marks)

21.   Study the topology and configuration details shown below. Use the diagrams to answer questions (a) and (b) and save solutions in a word document called "Question 21".
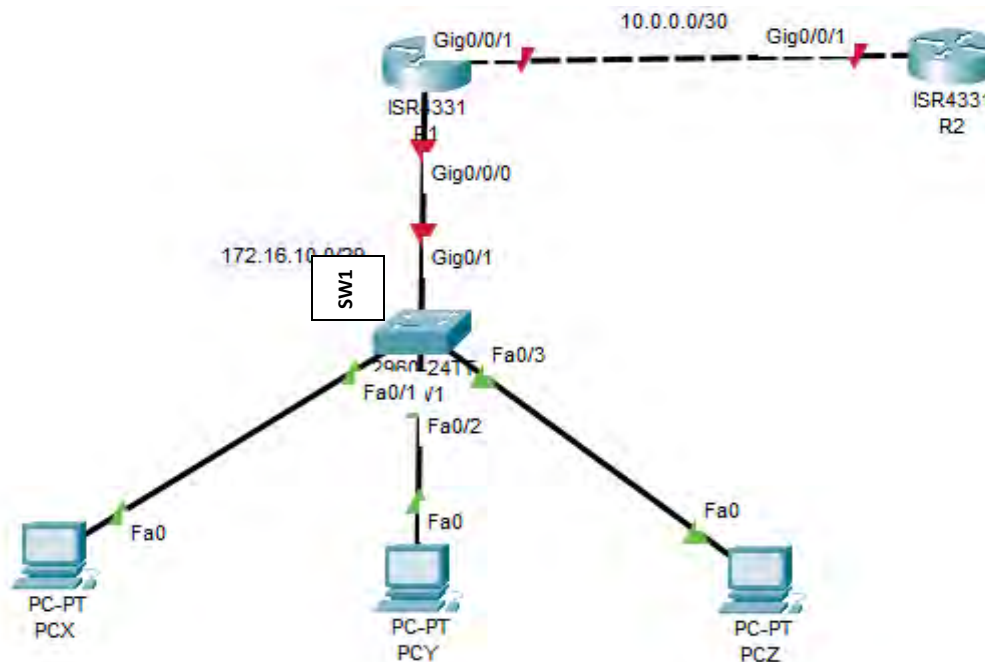
Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/0/0	172.16.10.9	255.255.255.249	172.16.10.9
	G0/0/1	10.0.0.5	255.255.255.252	N/A
R2	G0/0/1	10.0.0.6	255.255.255.252	N/A
SW1	VLAN 1	172.16.10.10	255.255.255.248	172.16.10.10
PC-X	NIC	172.16.10.11	255.255.255.248	172.16.10.10
PC-Y	NIC	172.16.10.12	255.255.255.248	172.16.10.10
PC-Z	NIC	172.16.10.13	255.255.255.248	172.16.10.10

Required:

(a)   The IP address set to the End user and intermediary devices are poorly configured. Find out the error and tabulate a table with correct IP address as envisioned in the topology diagram above.   (12 marks)

(b)   Configure the Correct IP address for the topology and capture screenshot of the following: **PCX, SW1, R1 and R2.**   (8 marks)

Save "Question 21" and upload.

(Total: 20 marks)

22.   Use the topology in Question 21 to answer Questions (a) to (d) below. Save the solutions in a word document named "Question 22".

(a)   Users in a company Local Area Network (LAN) wanted a router in order to reach the switch for forwarding traffic across multiple VLANs. Configure SW1 using the relevant commands in order to accomplish this task.   (4 marks)

(b)   The company LAN users were not able to connect to the external server. Configure a unicast address that should enable users connect to remote server on the end devices using PCY as an example.   (4 marks)

(c)   One of your supervisors wants to know whether the switch can be accessed remotely. Use appropriate command to display the unicast address that can achieve the objective from SW1.   (6 marks)

(d)   Display Layer II address together with the appropriate interface on R2.   (6 marks)

Save "Question 22" document and upload.

(Total: 20 marks)

23.   Use the topology in Question 21 to answer question (a) to (d) below. Save answers to the question in a word document named "Question 23".

(a)   Configure R1 to be Remotely accessed by the End devices using SSH as the application layer Protocol.   (10 marks)

(b)   Test Connectivity between PC-Z and the R1.   (2 marks)

(c)   Trace the path between PC-Y to R1.   (2 marks)

(d)   Access R1 remotely from PC-X using Secure Shell (SSH).   (6 marks)

Save "Question 23" and upload.

(Total: 20 marks)

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DIPLOMA IN COMPUTER NETWORKS AND SYSTEMS ADMINSTRATION (DCNSA)

LEVEL III

NETWORK TROUBLESHOOTING

MONDAY: Monday, 24 April 2023. Morning Paper.   **Time Allowed: 3 hours.**

Answer ALL questions. This paper has two sections. SECTION I has twenty (20) short response questions. Each question is allocated two (2) marks. SECTION II has three (3) practical questions of sixty (60) marks. Marks allocated to each question are shown at the end of the question.

Required Resources:
- **Computer**
- **Wireshark 32/64-bit Latest version**
- **Network simulation tool such as GNS3/packet tracer**

SECTION I (40 MARKS)

1.   The act of measuring and rating the performance of a network in real-time situations, that requires testing and reporting of the physical connectivity, normal network utilisation, protocol usage, peak network utilisation, and average throughput of the network usage is called?   (2 marks)

2.   Which command utility can be used by the network administrator to troubleshoot server connections such as guarding against phishing attacks where a domain name is altered?   (2 marks)

3.   Which command utility can be used to display information about the router's IOS version, memory and configuration register information?   (2 marks)

4.   An internet standard protocol which is used to monitor and manage network devices connected over an IP address is referred to as?   (2 marks)

5.   Network documentation is a technical record of the hardware, software, servers, directory structure and the way it all works together. Which type of documentation can be used when troubleshooting to refer to host information.

(2 marks)

6.   The virtual or physical tool that can be used for troubleshooting network transmission issues and is used by utilising a special connector that redirects the electrical signal back to the transmitting system is known as?   (2 marks)

7.   The OSI and TCP/IP models can be used by network administrator to isolate network problems when troubleshooting. Which layer does the network administrator focus when the symptoms suggest a physical connection problem?   (2 marks)

8.   A Linux or UNIX TCP/IP has utility that displays the current network interface configuration and enables you to assign an IP address to a network interface. Which command gives you vital information about the network and its status?   (2 marks)

9.   Which utility command is used for displaying Kernel IP Routing details in Windows, Linux, and macOS operating systems?   (2 marks)

10. A network diagnostic software that can be used to trace the path of a packet from source device to destination server, and monitor response times is called? (2 marks)

11. Which command is used in windows operating systems to clear the cached DNS (Domain Name System) resolver cache? (2 marks)

12. Structured troubleshooting method is used as a guideline through troubleshooting process. Which method should be used when a cabling problem is suspected? (2 marks)

13. A time-domain reflectometer (TDR) is a measuring tool that transmits an electrical pulse on a cable and measures the reflected signal. Which similar tool can be used for measuring fiber optic cables, that are common in modern networks? (2 marks)

14. Which command utility can be used to trace the round-trip path for IPv6 routed protocol? (2 marks)

15. Which command is used to show the IP and MAC address information of all the devices your PC has a connection with? (2 marks)

16. The technique used in network troubleshooting to identify which ports are open or closed on a network device, such as a computer or router is called? (2 marks)

17. Implementing a logging facility is an important part of network troubleshooting. Which protocol is used by computer systems to send event data logs to a central location for storage. (2 marks)

18. State the name given to the amount of data that can be transmitted over a network connection in a given amount of time. (2 marks)

19. Which layer of the OSI Model is attributed to the following symptoms when troubleshooting. (2 marks)
    a. Network Operating below baseline performance levels
    b. Excessive broadcasts
    c. Console messages

20. Based on the output below, identify the Default Gateway within the network. (2 marks)

```
C:\> tracert 172.16.1.100
Tracing route to 172.16.1.100 over a maximum of 30 hops:
  1      1 ms    <1 ms    <1 ms   10.1.10.1
  2      2 ms     2 ms     1 ms   192.168.1.2
  3      2 ms     2 ms     1 ms   192.168.1.6
  4      2 ms     2 ms     1 ms   172.16.1.100
Trace complete.
C:\>
```

SECTION II (60 MARKS)

21. Bidii Enterprises is experiencing problems with their Local Area Network (LAN). You are required to troubleshoot and resolve the network issues. Using appropriate simulator design, configure the topology as shown below. Capture screenshots of your configuration and save them in word document called "Question 21".
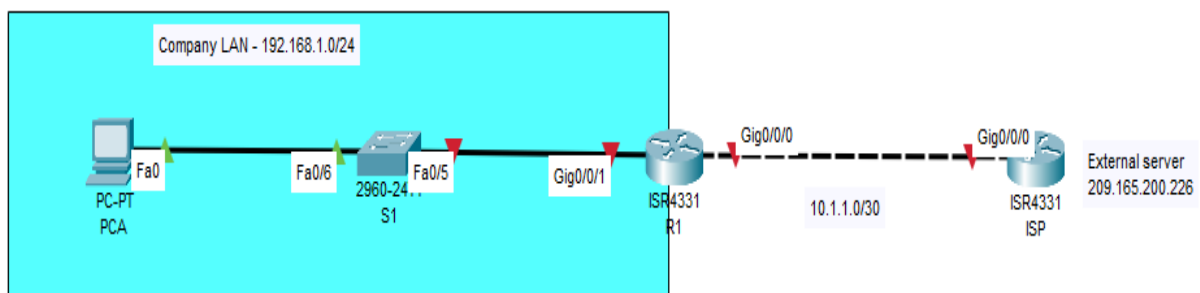
Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/0/0/1	192.168.1.1	255.255.255.0	N/A
	G0/0/0	10.1.1.1	255.255.255.252	N/A
ISP	G0/0/0	10.1.1.3	255.255.255.252	N/A
	Lo0	209.165.200.226	255.255.255.255	N/A
S1	VLAN 1	192.168.1.2	255.255.255.224	192.168.1.1
PC-A	NIC	192.168.2.10	255.255.255.248	192.168.1.1

Required:

(a)   The IP address configured to the end user and intermediary devices are poorly configured. You are required to find out the error and tabulate the table with correct IP address.   (8 marks)

(b)   Configure the correct IP address to the topology and capture screenshot of the following:

      (i)   PCA   (3 marks)

      (ii)   S1   (3 marks)

      (iii)   R1   (3 marks)

      (iv)   ISP   (3 marks)

Save "Question 21" document and upload.

(Total: 20 marks)

22.   Use the topology in Question 21 to answer the following questions. Capture screenshots of your configuration in word document called Question 22.

(a)   Local users in the company LAN wanted the router to be able to reach the switch for forwarding traffic across multiple VLANs. Use an appropriate command that will help to accomplish these on the switch.
                                                                                                          (4 marks)

(b)   The company LAN users were not able to connect to the external server. Configure a unicast address that should enable users connect to remote server on the end devices.   (4 marks)

(c)   One of the disgruntled users had set F0/5 interface of the switch to half duplex and speed set to 10. Use a command that will rectify the problem on the switch.   (6 marks)

(d)   Your supervisor wants to know the TCP/IP internet layer address together with their physical address. Display the command you will use to display the information.   (6 marks)

Save "Question 22" document and upload.

(Total: 20 marks)

23.   Use the topology in Question 21 to answer the following questions. Capture screenshots of your configuration in word document called Question 23.

(a)   Assuming the company's LAN end devices are correctly configured, but the users are not able to see the external server. Use an appropriate command in R1 that will enable users be able to communicate with the extremal server?   (8 marks)

(b)   Test Connectivity between PC-A and the external server.   (2 marks)

(c)   Trace the path between PC-A and the external server.   (2 marks)

(d)   Display the routing table from PC-A.   (2 marks)

(e)   Your immediate supervisor wants to connect remotely to R1 using PC-A securely. Configure the router to be accessed remotely using appropriate application layer protocol. Display the configuration.   (6 marks)

Save "Question 23" document and upload.

(Total: 20 marks)

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DIPLOMA IN COMPUTER NETWORKS AND SYSTEMS ADMINSTRATION (DCNSA)

LEVEL III

NETWORK TROUBLESHOOTING

MONDAY: 5 December 2022. Morning Paper.   **Time Allowed: 3 hours.**

Answer ALL questions. This paper has two sections. SECTION I has twenty (20) short response questions. Each question is allocated two (2) marks. SECTION II has three (3) practical questions of sixty (60) marks. Marks allocated to each question are shown at the end of the question.

Required Resources:
- Computer
- Simulator such as GNS3/packet tracer

SECTION I (40 MARKS)

1. IP Routing is a process that sends packets from a host on one network to another host on a different remote network. Which command utility can be used on a host to display IP Routing table? (2 marks)

2. Ayden a newly hired system administrator wanted to modify the name of a router in the network. Which network protocol can he use to securely access the router remotely over the network? (2 marks)

3. The TCP/IP Stack works just like the OSI model by establishing a set of rules and standards for communication in and between the different layers. Which component of the computer is believed to be functioning well when a user is able to ping the ip address of the localhost successfully? (2 marks)

4. Network statistics (netstat) command is a networking tool used for troubleshooting and configuration that can also serve as a monitoring tool for connections over the network. Which command option can be used to list TCP connections only? (2 marks)

5. Which command utility is used to test the ability of the source computer to reach a specified destination computer until stopped? (2 marks)

6. A command utility that is mostly in Linux operating system used to trace path from source to destination in an internetwork is called? (2 marks)

7. As a safety measure a network administrator has been mandated to ensure the guest computers for an upcoming conference cannot ping each other. Which settings can be used to accomplish this task? (2 marks)

8. Debug ip icmp command is used to display information about Internal Control Message Protocol (ICMP) transactions and allows you to monitor the ICMP messages sent and received by your router. What is the name of the command that can be used to stop the debug command on a router? (2 marks)

9. A user tried to access the internet using a computer and received an IP Address of 169.254.142.5. What is the name of the application layer protocol that failed? (2 marks)

10. Network latency is a term used to describe delays in communication over a network. What mechanism can be implemented in a small network to help minimize network latency for real-time streaming applications? (2 marks)

11. The command tool that is used to provide information about network latency and network loss at intermediate hops between a source and destination is known as? (2 marks)

12. ARP command is a TCP/IP utility used for viewing and modifying the local Address Resolution Protocol (ARP) cache that contains resolved MAC addresses of Internet Protocol (IP) hosts on the network. Which command utility is used to display computer's ARP table? (2 marks)

13. Ms-Dos command utility that enables a user to look up the IP address of a domain or host on a Network is referred to as? (2 marks)

14. Topology defines the structure of the network of the way components are interconnected to each other. Which element of scaling a network involves identifying the physical and logical topologies? (2 marks)

15. Which layer of the Open system Interconnection (OSI) model should be considered when troubleshooting mode of communication between two routers that are geographically far apart? (2 marks)

16. A user reported that she is unable to reach the website when typing http://www.kasneb.or.ke in a web browser, but can reach the same site by typing http://209.168.4.80. What could be the probable cause of the issue? (2 marks)

17. IP stack in network setup is considered to be initialized when an individual test connectivity to which type of IP address? (2 marks)

18. Which element of network design consideration will be best suited to a large corporation as compared to small medium enterprise type of business? (2 marks)

19. The performance metrics obtained by measuring the network for a particular time period is called? (2 marks)

20. The Internet record listing command that contains the details of who owns a domain name and how to get in touch with them is referred to as? (2 marks)

SECTION II (60 MARKS)

21. Commands can be very useful when documenting a network especially when a Network administrator wants to gather information directly from routers and switches. Below is a list of commands issued in an intermediary device, that is a router for data collection. Give the description of the commands listed:

S/No	Commands	Description
1	Show version	
2	Show ip int brief	
3	Show interface	
4	Show arp	
5	Show running-config	
6	Show vlan	
7	Show port	
8	Show ipv6 neighbors	
9	Show tech-support	
10	Show ip route	

(Total: 20 marks)

22.   Examine the flowchart below and answer the questions based on the following scenarios:
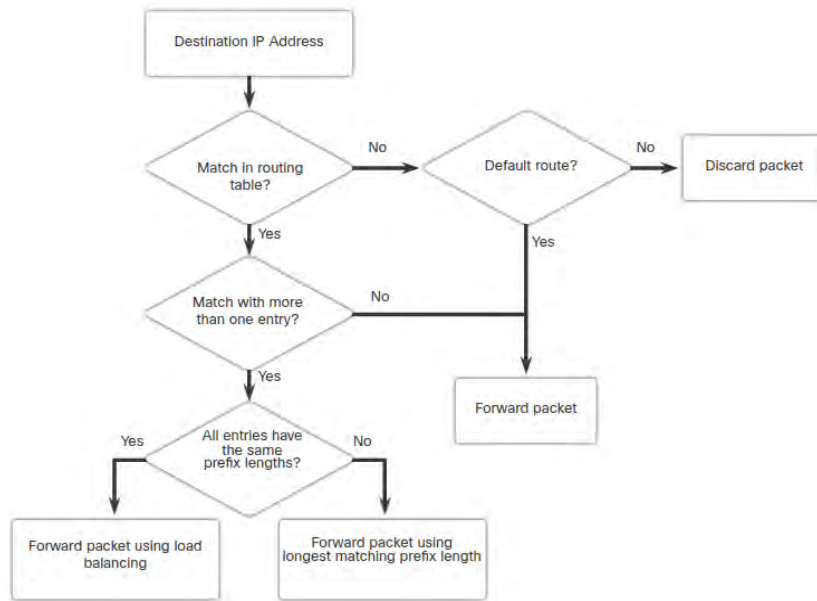

Describe what is **MOST** likely to happen if the destination address in the packet:

(i)   Does not match entry in the routing table.   (5 marks)

(ii)   Matches a single entry in the routing table.   (5 marks)

(iii)   Matches more than entry in the routing table and the routing entries have the same prefix length.   (5 marks)

(iv)   Matches more than entry in the routing table and the routing entries have different prefix length.   (5 marks)

(Total: 20 marks)

Create a word processing document named "Topology" and use it to save answers to questions (a) to (d)

23.   Using appropriate simulator, design the topology as shown below.
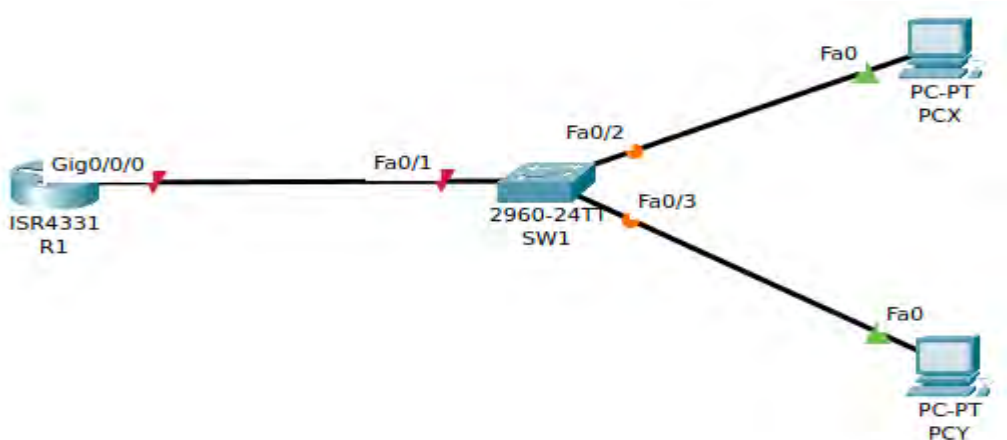
Device	Interface	IP Address	Subnet Mask
R1	Router's Interface	10.0.0.1	255.255.255.0
SW1	VLAN	10.0.0.2	255.255.255.0
PC-X	NIC	10.0.0.3	255.255.255.0
PC-Y	NIC	10.0.0.4	255.255.255.0

Required:

(a) Capture a screenshot displaying the Internet Protocol address of the intermediary devices. (6 marks)

(b) Capture a screenshot displaying connectivity between:

    (i) PC-X and PC-Y. (2 marks)

    (ii) RI and PC-X. (2 marks)

    (iii) SW1 and PC-Y. (2 marks)

(c) Capture a screenshot showing traceability from PC-X to RI. (4 marks)

(d) Capture a screenshot from RI displaying layer I and II of the OSI Model. (4 marks)

(Total: 20 marks)

Upload "Topology" document.

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