CISSE ADVANCED LEVEL

ELECTIVE II

NETWORKING AND TELECOMMUNICATIONS

TUESDAY: 20 August 2024. Morning Paper. **Time Allowed: 3 hours.**

Answer ALL questions. This paper has two sections. SECTION I has twenty (20) short response questions of forty (40) 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**
- **Simulator (Packet tracer/GNS 3)**
- **Wireshark**

SECTION I (40 MARKS)

1. State the type of data transmission used in chatrooms, video conferencing, telephone conversations and face to face interactions. (2 marks)

2. In the context of OSI Model, which layer is responsible for routing and forwarding data? (2 marks)

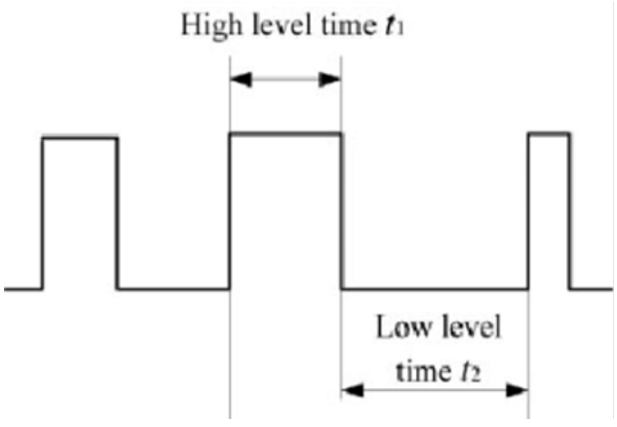
3. A Voice over Internet Protocol (VoIP) self-service option that lets customers direct their own calls by responding to pre-recorded call menus via touch tone or by speaking their answers directly into the phone is known as _____. (2 marks)

4. The random movement of electrons in a conductor that produces noise is known as _____. (2 marks)

5. The process that involves mapping a continuous signal's infinite range of potential values to a finite collection of discrete values and is used in digital systems where continuous data is simplified by reducing the number of bits used to represent it is referred to as _____. (2 marks)

6. State the communication technology that offers faster connection speeds over traditional telephone lines than what is provided by dial-up internet. (2 marks)

7. Basing on the diagram below, name the type of waveform that alternates between two levels with a steep transition between them. (2 marks)



8. Name the type of optic fiber that has a uniform refractive index within the core and a sharp decrease in refractive index at the core-cladding interface. (2 marks)

9. In telecommunication, what is defined as "a waveform that is modulated with an information-bearing signal for the purpose of conveying information"? (2 marks)

10. Which is the encoding method that is used mainly in communications and computing to achieve improved audio quality in comparison to file size ratio? (2 marks)

11. A modulation technique whose carrier wave is a high-frequency electromagnetic wave modulated with an input signal for transmission is referred to as _____. (2 marks)

12. State the electronic device that receives a single input signal and selectively routes it to one of multiple output lines. (2 marks)

13. The characteristic of electromagnetic radiation or acoustic where wave propagation waves can only travel directly in a visual path from the source to the receiver without encountering obstacles is known as _____. (2 marks)

14. What is the name of the most common type of fiber optic connector used today and designed to be simple to use and inexpensive to produce? (2 marks)

15. The connectionless service that does not require any dedicated path between the sender and receiver is known as _____. (2 marks)

16. Which type of fiber optic cable is **BEST** suited for long-distance transmission with a small core diameter? (2 marks)

17. The technology that allows you to securely encrypt VoIP communications in order to protect your privacy and prevent eavesdropping is known as _____. (2 marks)

18. What types of phase shifts are commonly used in Binary Phase Shift Keying (BPSK)? (2 marks)

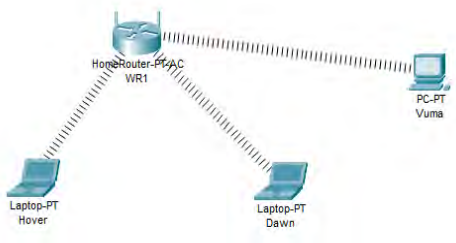
19. Which algorithm is most typically used to implement the Fast Fourier Transform (FFT)? (2 marks)

20. The modulation method that is widely used in various communication systems, including wireless networks and satellite transmissions to enable efficient data transfer and reliable signal reception is referred to as _____. (2 marks)

SECTION II (60 MARKS)

21. Create a word processing document named "WLANA24" and use it to save your solutions to questions (a) to (c).

Using appropriate simulator, set up a wireless local area network as shown below:



Device	Network IP Address	Subnet Mask
WR1	192.168.0.1	255.255.255.0

(a) Configure WR1 to act as a DHCP server. Assign names to the computers as shown. Capture screenshots showing:

(i) Topology. (5 marks)

(ii) Allocated IP address for Hover. (4 marks)

(iii) Allocated IP address for Vuma. (4 marks)

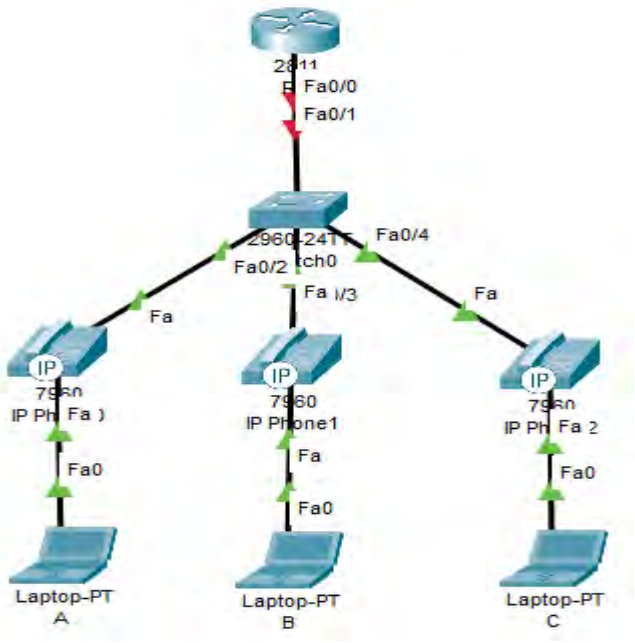
(b) Use the appropriate command to show connectivity between Hover and Vuma. Capture the resulting screenshot. (3 marks)

(c) Trace the Path from Dawn to Vuma. Capture the resulting screenshot. (4 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 the topology as shown below:



Device	Network Address	Subnet Mask
R1	192.168.11.1	255.255.255.0

Required:
Capture screenshots showing the results of the following tasks:

(a) Configure the router with the IP address shown. (3 marks)

(b) Configure DHCP server on the Router. (3 marks)

(c) Using the router, configure call manager express telephony service. (4 marks)

(d) Configure voice vlan on the switch. (4 marks)

(e) Using the Router, configure the phone directory for the three IP phones with the required numbers. (6 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 Wireshark, answer the following questions. Create screenshots showing the results of the following tasks:

(a) Display a three-way handshake for a connection to www.gmail.com. (4 marks)

(b) Display the TCP source and destination port number of the first flag. (4 marks)

(c) From the output given in (b) above, how would you classify the source port number? (2 marks)

(d) Filter HTTPS traffic through port 443 for https://accounts.google.com/ using your username and password. (6 marks)

(e) Display the encrypted application data. (2 marks)

(f) Describe the format of the application data. (2 marks)

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

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CISSE ADVANCED LEVEL

ELECTIVE II

NETWORKING AND TELECOMMUNICATIONS

TUESDAY: 23 April 2024. Morning Paper. **Time Allowed: 3 hours.**

Answer ALL questions. This paper has two sections. SECTION I has twenty (20) short response questions of forty (40) 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:

- **A computer**
- **Simulator (Packet tracer/GNS 3)**
- **Wireshark**

SECTION I (40 MARKS)

1. Which modulation method is most frequently applied to broadband internet access through Digital Subscriber Line (DSL)? (2 marks)

2. When a channel is impaired, which modulation technique is susceptible to phase shifts? (2 marks)

3. In networking, what function does the Preamble and Start Frame Delimiter (SFD) serve in the Physical layer of the OSI Model? (2 marks)

4. Which type of mathematical tool is typically used to represent a frequency domain signal? (2 marks)

5. A type of modulation that involves changing the frequency of the carrier signal based on the input signal is known as: (2 marks)

6. Which characteristic of a wave describes the separation in phase between two successive points? (2 marks)

7. In the context of telecommunication, which model provides a framework for understanding and designing network architectures? (2 marks)

8. In the context of Public Switched Telephone Network (PSTN), name the device in charge of call routing between various phone exchanges? (2 marks)

9. Which type of signaling is usually used for call setup and control in Integrated Services Digital Network (ISDN)? (2 marks)

10. Which Amplitude Modulation (AM) signal component contains data that is being transmitted? (2 marks)

11. Telephone communication is a method of communication that involves the transmission of audio signals between two or more parties over a distance using telecommunication devices. Which mode of data transmission is commonly used in telephone communication? (2 marks)

12. What is the name given to the transmission of radio signals in the shortwave frequency range covering frequencies from 1.6 to 30 MHz? (2 marks)

13. Which parameter in phase modulation indicates how strong the modulating signal is? (2 marks)

14. Which type of encoding technique is frequently used when sending data using radio waves? (2 marks)

15. In the context of digital modulation, a graphical representation of signal phases and amplitudes is known as: (2 marks)

16. Which multiple access technique allocates a specific time slot for transmission to each station based on the division of the available bandwidth? (2 marks)

17. What is the highest speed at which a typical USB 3.0 cable can transport data? (2 marks)

18. In the context of physical layer, which term is given to the number of bits transmitted per second? (2 marks)

19. In the context of packet switching, which term is given to the entire data packet received before being forwarded? (2 marks)

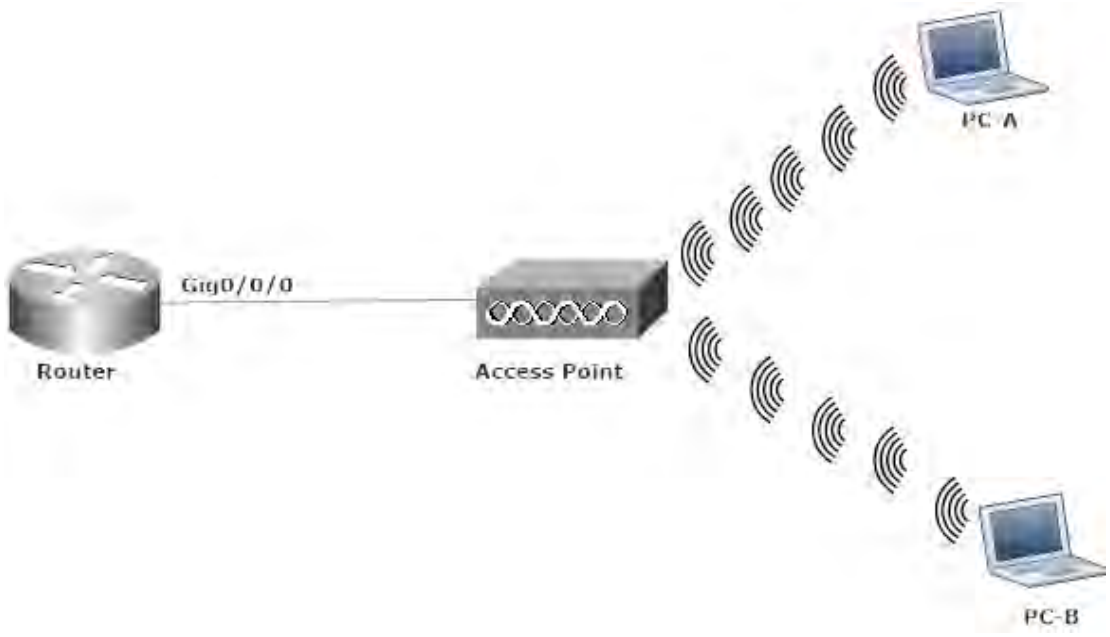
20. In Voice over Internet Protocol(VoIP), what is used to transform analog voice impulses into digital data for transmission? (2 marks)

SECTION II (60 MARKS)

Recommended Equipment:

- **A Windows/Linux computer with wired and /or wireless network cards installed**
- **Simulator (Packet tracer or GNS3)**
- **Wireshark latest version**
- **Internet connectivity**

21. Create a word processor document called "Question 21" and use it to save captured screenshots of your findings to questions (a) to (e) below:



Device	Network Address	Subnet Mask
Router	192.168.0.0	255.255.255.0

(a) Using an appropriate network simulator, set up the topology given above. Set the router such that it serves as a DHCP server for the laptops using the provided IP Address. (6 marks)

(b) Use appropriate command utility to display configurations on the following Laptops:

(i) PC-A (2 marks)

(ii) PC-B (2 marks)

(c) Use appropriate command utility to display Dynamic Host Configuration Protocol (DHCP) bindings on the router. (4 marks)

(d) Use appropriate command utility to display mapping between IP addresses and MAC addresses on network 192.168.0.0/24. (4 marks)

(e) Highlight **TWO** main advantages of Dynamic Host Control Protocol (DHCP). (2 marks)

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

22. Create a word processor document called "Question 22" and use it to save captured screenshots of your solutions to questions (a) to (e) below:

A Network Interface Card (NIC), also known as a network adapter or LAN adapter, is a hardware component that enables computers or other devices to connect to a local area network (LAN) or a wide area network (WAN).

Required:

(a) (i) Using your computer, list the NICs that are installed. (3 marks)

(ii) Using the command line interface show the configurations of all configured NICs. (3 marks)

(b) Using the command prompt, display your NIC Physical/Mac-address. (4 marks)

(c) Using your computer, display NIC adapter drivers. (4 marks)

(d) Using your computer, display data transfer speed of your NIC. (4 marks)

(e) List the top **TWO** NIC-related problems that are frequently encountered and can cause network connectivity issues. (2 marks)

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

23. Create a word processor document called "Question 23" and use it to save captured screenshots of your solutions to questions (a) to (e) below:

When higher layer protocols communicate with each other, data goes down the OSI layers and is packaged into a Layer 2 frame.

(a) Using Wireshark, apply an appropriate filter to capture packets generated by ping command utility being issued from your PC to its default gateway. (6 marks)

(b) Display the frame type, source and destination mac address. (3 marks)

(c) Display the frame type, source and destination logical address. (3 marks)

(d) Display endpoint statistics for Layer II and Layer III of the OSI reference model. (6 marks)

(e) Explain the rationale of broadcast address. (2 marks)

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

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CISSE ADVANCED LEVEL

ELECTIVE II

NETWORKING AND TELECOMMUNICATIONS

TUESDAY: 5 December 2023. Morning Paper. **Time Allowed: 3 hours.**

Answer ALL questions. This paper has two sections. SECTION I has twenty (20) short response questions of forty (40) 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**
- **Simulator (Packet tracer/GNS 3)**
- **Wireshark**

SECTION I (40 MARKS)

1. Asynchronous Data Link Layer protocol that allows reliable communication between two directly connected nodes is known as: (2 marks)

2. Which technologies are referred to as "last-mile" technologies on account of connecting a user's home or company to the service provider's central office or data centre? (2 marks)

3. A mode of data transmission in modern communication systems such as telephone networks and Ethernet-based networks that allow the sender and receiver to transmit and receive data at the same time is known as: (2 marks)

4. There are critical components in fiber optic communication systems that are used to terminate and connect optical fibers. Which type of connector is commonly used in laboratory test equipment and telecommunications?(2 marks)

5. What is the name of high-speed internet access technologies that provide faster and more efficient data transmission than typical dial-up connections? (2 marks)

6. What is the name of the modulation scheme that separates a high-speed data stream into several subcarriers with varying frequencies and phases? (2 marks)

7. Encoding and modulation methods are used to represent digital data in a format suitable for transmission or storage. What is the name of an encoding method that represents binary data with three voltage levels? (2 marks)

8. The process where several communication channels or transmission lines concurrently transfer data for communication efficiency in computer networks, wireless communication, and satellite communication is referred to as:

9. What is the name of a high-speed standard that is used in storage area networks (SANs) to allow high-speed data transfer via fiber optic cables while supporting numerous protocols? (2 marks)

10. A wireless networking protocol that is defined by IEEE 802.11 standards and uses radio waves for data transmission is known as: (2 marks)

11. In relation to computer networks and telecommunications, what is the name given to the time delay between the transmission of a data packet from the source to its reception at the destination? (2 marks)

12. The OSI (Open Systems Interconnection) model is a conceptual framework used to understand and describe how different networking protocols and technologies work together in a networked environment. Which layer is responsible for voltage levels, cable types, and physical connectors? (2 marks)

13. What is the general term given to combination of frequencies and technologies used to offer wireless voice and data transmission to mobile devices, including 2G (GSM), 3G (UMTS), 4G (LTE), and 5G? (2 marks)

14. A standardised telecommunications protocol that provides a high-speed, dependable, and efficient method of transmitting data through optical fiber networks is known as: (2 marks)

15. Which packet switching principle is used by network intermediary devices to find the best path for each packet to reach a given destination? (2 marks)

16. Which mechanism is used to prioritise particular types of traffic in order to ensure that critical data, such as voice or video, receives higher priority and the shortest possible delay? (2 marks)

17. What is the name of a network technology that combines Integrated Services Digital Network (ISDN) principles with high-speed broadband capabilities? (2 marks)

18. Wireless media enables the transmission of data, information, or signals without the use of physical cables or wires. Which wireless media types are employed in long-distance communication lines and terrestrial communication systems? (2 marks)

19. Which technology encompasses numerous components, protocols and network elements that collaborate to permit voice communication? (2 marks)

20. What is the name of the multiplexing approach often used in cellular networks in which each mobile device communicates over the same frequency band using a unique code? (2 marks)

SECTION II (60 MARKS)

Recommended Equipment:

- **A Windows/Linux computer with wired and /or wireless network cards installed**
- **Simulator (Packet tracer or GNS3)**
- **Wireshark latest version**
- **Internet connectivity**

21. Create a word processing document named "Question 21" and use the word processor document to save your answers to questions (a) and (b).

(a) Ethernet cables can be wired as straight through or crossover. The straight through is used to connect computers to hubs or switches. Crossover Ethernet cable is used to connect a computer to a computer.

Use the colour code scheme standards to illustrate the pin arrangement of the following cables.

(i) Crossover cable. (6 marks)

(ii) Straight through cable. (4 marks)

(b) Optical fiber is primarily used as backbone cabling for high-traffic, point-to-point connections between data distribution facilities. Compare and contrast between UTP and Fiber-optic cabling. (10 marks)

No.	Implementation Issues	UTP Cabling	Fiber-Optic cabling
1.	Bandwidth supported		
2.	Immunity to EMI		
3.	Media & Connector costs		
4.	Installation skills Required		
5.	Safety Precautions		

Upload Question 21.

(Total: 20 marks)

22. Create a word processing document named "Question 22" and use the word processor document to save your captured screenshot of your findings to questions (a) to (c) below.

DNS is a critical protocol responsible for translating domain names into IP addresses. Monitoring DNS traffic can help optimise network performance in a Wireless Local Area Network (WLAN).

Required:

(a) Open command prompt on your computer and enter the command necessary to clear DNS cache. (4 marks)

(b) Using the appropriate command utility in interactive mode to access www.gmail.com as the domain name to record the information in Wireshark. (6 marks)

(c) Explore DNS traffic that contains the standard query for the domain captured in Wireshark. Display the following:

(i) DNS filter. (4 marks)

(ii) Source and Destination Mac-address . (2 marks)

(iii) Source and Destination IP address. (2 marks)

(iv) Destination port. (2 marks)

Upload Question 22.

(Total: 20 marks)

23. Create a word processing document named "Question 23" and use the word processor document to save your captured screenshot of your findings to questions (a) to (c).

The DHCP (Dynamic Host Configuration Protocol) protocol frequently handles IP address management, which is a crucial component of WLANs. Using appropriate simulator, configure the topology as shown below and use it to answer the question that follow.

Device	Network Address	Subnet Mask	Default Gateway
Wireless router	172.30.10.0	255.255.255.0	172.16.10.1

(a) Set up the wireless router to assign IP addresses to the end devices based on the provided network address. (6 marks)

(b) Verify the IP address configuration of the following devices:

(i) Laptop A. (2 marks)

(ii) Laptop B. (2 marks)

(iii) Laptop C . (2 marks)

(iv) Laptop D. (2 marks)

(c) Set up the WPA2 Enterprise security protocol using the shared secret "Neb!123" and the Radius server's IP address of 172.30.10.254. (6 marks)

Upload Question 23.

(Total: 20 marks)

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CISSE ADVANCED LEVEL

ELECTIVE II

NETWORKING AND TELECOMMUNICATIONS

TUESDAY: 22 August 2023. Morning Paper. **Time Allowed: 3 hours.**

Answer ALL questions. This paper has two sections. SECTION I has twenty (20) short response questions of forty (40) 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:

- A computer
- Simulator (Packet tracer/GNS 3)
- Wireshark

SECTION I (40 MARKS)

1. State the term given to a technique of multiplexing multiple optical carrier signals through a single optical fiber channel by varying the wavelengths of laser lights. (2 marks)

2. Analog signals generated by source and has to be digitised needs to be discretised in time. State the name given to discretisation of analog signal. (2 marks)

3. The time delay experienced in transmitting data over a network often measured in milliseconds (ms) and represents the time taken for a data packet to travel from the source to the destination is called. (2 marks)

4. A mathematical technique used to analyse the frequency content of a signal or function and has several key properties that makes it a powerful tool in signal processing and analysis is known as: (2 marks)

5. State the term given to the ratio of the fundamental component amplitude of the line-to-neutral inverter output voltage to one-half of the available DC bus voltage. (2 marks)

6. State the theorem that states that for a continuous-time signal to be accurately represented and reconstructed from its samples, the sampling rate must be at least twice the highest frequency present in the signal. (2 marks)

7. The technology that facilitates fast data transmission at a high bandwidth on existing copper wire telephone lines to homes and businesses is referred to as: (2 marks)

8. Which is the technique used in telecommunications to transmit multiple signals simultaneously over a shared transmission medium, such as a cable or a wireless channel by dividing the available frequency spectrum into multiple non-overlapping frequency bands, with each band dedicated to carrying a different signal? (2 marks)

9. The digital technology that enables voice communication and multimedia sessions over the internet alternative to traditional telephone services that rely on circuit-switched networks is referred to as? (2 marks)

10. Which protocol allows carrier transmission in 802.11 networks and minimises the potential of a collision occurring when two or more stations send their signals over a data link layer? (2 marks)

11. What is the name given to the approximate frequency of the (quasi-)periodic structure of voiced speech signals? (2 marks)

12. What is the name given to a network method designed to detect errors in the data and information transmitted over the network? (2 marks)

13. Which type of communication service enables data to be transferred between network endpoints? (2 marks)

14. Reference models give a conceptual framework that standardises communication between heterogeneous networks. Which layer is responsible for taking an IP packet and preparing it for transmission over the communications medium? (2 marks)

15. The process of selecting the best path for data to travel from the source to the destination in a network is called? (2 marks)

16. Which method is used to transmit radio signals by rapidly changing the carrier frequency among many frequencies occupying a large spectral band? (2 marks)

17. Standards ensure interoperability between devices that are made by different manufacturers. Which IEEE 802.15 WPAN standard uses a device-pairing process to communicate? (2 marks)

18. The mode of data transmission where data can flow in both directions, but not simultaneously and communication alternates between the sender and receiver, but only one party can transmit at a time is called? (2 marks)

19. Internet is regarded as a global computer network providing a variety of information and communication facilities, consisting of interconnected networks using standardised communication protocols. Which type of telecommunication technology can be used to provide Internet access to vessels at sea? (2 marks)

20. State the type of connection that provides redundancy and increases network availability when used in a wide area network. (2 marks)

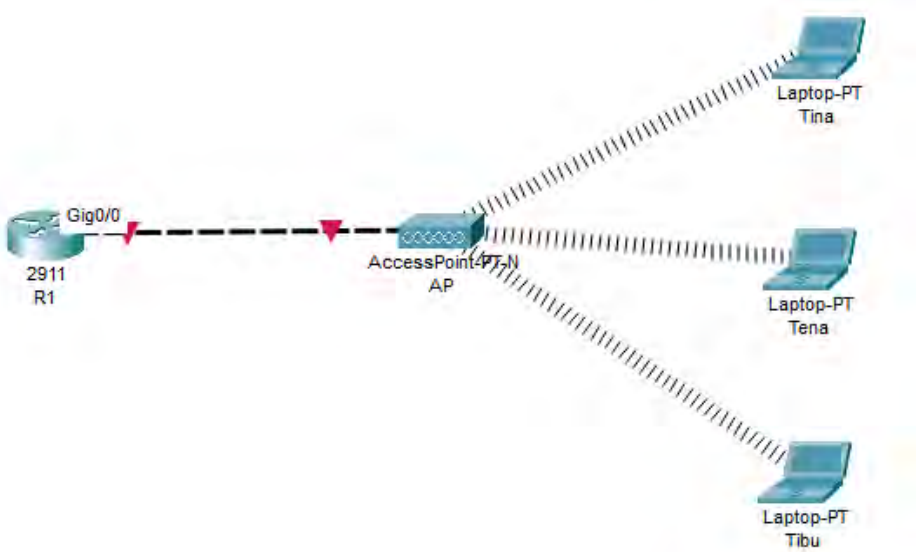
SECTION II (60 MARKS)

Create a word document called "Practical_NT" and use it to save solutions to questions (21) to (23).

Recommended Resources:

- A Windows/Linux computer with wired and /or wireless network cards installed
- Simulator: Packet tracer/GNS 3
- Wireshark latest version

21. Using appropriate simulator, configure the topology as shown below. Capture and save the screenshot in the word document.



Device	Interface	Network Address	Subnet Mask	Default Gateway
R1	G0/0/0	192.168.10.32	255.255.255.240	172.16.10.9

(a) Configure R1 to act as a DHCP server to populate the laptops with unicast address based on the network address given. (14 marks)

(b) Verify the IP address configuration from Laptop Tena. (3 marks)

(c) Trace the Path from R1 to Laptop Tibu. (3 marks)

Save Practical – NT document and upload.

(Total: 20 marks)

22. Use the topology created in Question 21 to answer the following questions. Capture and save the screenshots of your configurations in the "Practical_NT" word document.

(a) Using appropriate command utility, display the type of data transmission used by the interface connected to R1. (6 marks)

(b) Using an appropriate command utility, display dynamic host configuration protocol (DHCP) settings from Random Access Memory. (6 marks)

(c) Enable access point to have WPA2 authentication with password phrase of Kasneb_2023. (8 marks)

Save practical – NT document and upload.

(Total: 20 marks)

23. Using wireshark, capture the following:

(a) Details of Network layer communication between your computer and its gateway. (6 marks)

(b) Details of Data link layer between your computer and its gateway. (6 marks)

(c) Details of Frame type value of Address Resolution Protocol (ARP). (4 marks)

(d) NIC serial number of the source. (4 marks)

(Total: 20 marks)

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CISSE ADVANCED LEVEL

ELECTIVE II

NETWORKING AND TELECOMMUNICATIONS

TUESDAY: 25 April 2023. Morning Paper. **Time Allowed: 3 hours.**

Answer ALL questions. This paper has two sections. SECTION I has twenty (20) short response questions carrying forty (40) marks. SECTION II has three practical questions carrying sixty (60) marks. Marks allocated to each question are shown at the end of the question (s).

Required Resource:

- A computer
- Simulator (Packet tracer/GNS 3)

SECTION I (40 MARKS)

1. State the name of the process in which a signal is sampled, and the magnitude of each sample with respect to a fixed reference is quantised and converted by coding to a digital signal. (2 marks)

2. Duplex systems are normally employed in many communications networks to allow simultaneous communication in both directions between two connected parties. What is the name given to application of time-division multiplexing that separates outward and return signals? (2 marks)

3. A VoIP architecture consists of many components. The most important components are the Session Border Controller (SBC), Media Server, Application Server, Database Services, SIP services, IP PBX, Endpoint devices (phone), and the _____? (2 marks)

4. What is the name given to a modulation scheme that conveys data by changing two different phases of the carrier wave? (2 marks)

5. The mode of transmission, where bits are sent one after another without start or stop bits or gaps and it is the responsibility of the receiver to group the bits is called: (2 marks)

6. The amplitude of each pulse in the digitisation process is but one in an infinite range of possible amplitudes. It is required to evaluate the voltage levels of the individual pulses, based upon a standardised scale. State the name of the above process. (2 marks)

7. Frame relay is commonly used to connect two or more LAN bridges over large distances. The guaranteed rate of throughput when using frame-relay is known as: (2 marks)

8. What name is given to the component that provides termination for the digital signal and ensures connection integrity through error correction and line monitoring as used in digital lines such as T1 or T3 carrier lines? (2 marks)

9. Which network technology ensures fibre and coaxial cables are used in different portions of a network to carry all the data or its content? (2 marks)

10. Which channel access technique in multiple access protocols is used by Walkie talkies and mobile networks for closed user groups shown below? (2 marks)

11. The network protocol that enables multiple devices to share the same physical communication channel, allowing them to transmit and receive data over a network is known as: (2 marks)

12. Aloha is a packet switching system. The time interval required to transmit one packet is called a slot? Which random access mode allows users to transmit at any time? (2 marks)

13. The wireless system is connected to the wired telephony network, the Public Switched Telephone Network, PSTN through _____? (2 marks)

14. During _____information is converted from its original form into an acceptable form for transmission? (2 marks)

15. In voice communication, we often hear another conversation going on in the background. This can be caused by severe disruption of the data transfer. It can also be caused by overlapping of bands in a multiplexed system or by poor shielding of cables running close to one another. What is the term given to the above communication error? (2 marks)

16. Which component of message timing is responsible for managing transmission rate of data from source to destination? (2 marks)

17. What is the name given to a number that identifies the logical circuit between the router and the frame-relay switch? (2 marks)

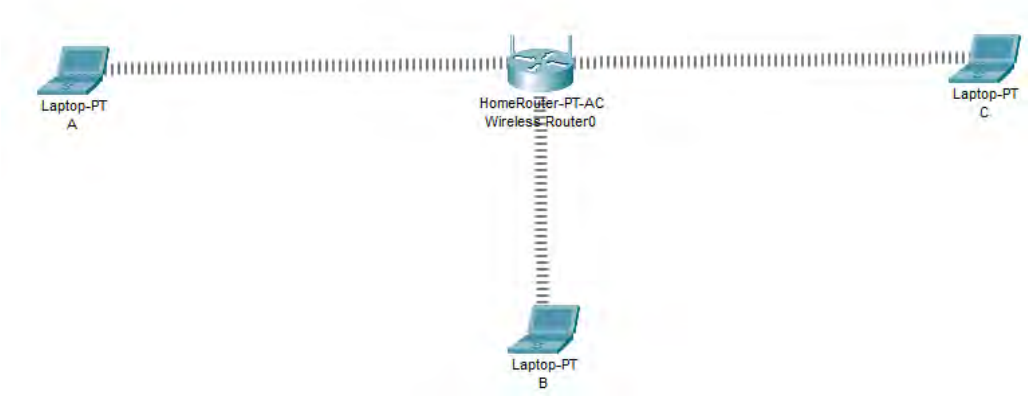
18. The connection-oriented technology that establishes a virtual circuit between the source and destination devices before transmitting data, voice, and video over telecommunications networks is known as: (2 marks)

19. What is the name given to a transmission technology used in Wireless LAN(WLAN) transmission where a data signal at the sending station is combined with a higher data-rate bit sequence? (2 marks)

20. What is the name given to a signaling protocol used for initiating, maintaining, and terminating communication sessions that include voice, video and messaging applications? (2 marks)

SECTION II (60 MARKS)

21. Using an appropriate simulator, configure the topology as shown below. Capture the screenshot in a word document to answer the questions provided:



Required:

(a) Using the Network address 192.168.0.0/29 configure Laptop A, B and C to take unicast address from the router. (6 marks)

(b) Display the configuration of Domain Name System (DNS) as 8.8.4.4. (4 marks)

(c) Display the configuration of DNS. (2 marks)

(d) Test connectivity between Laptop B and C (2 marks)

(e) From Laptop C, access the URL of the router using the browser (6 marks)

(Total: 20 marks)

22. Using the topology in Question 21, capture your screenshots and save it in word document.
Configure Internet connection type to be as follows:

(a) Static Internet address of 172.16.10.1 (6 marks)

(b) Wireless access point (4 marks)

(c) Wireless media Bridge. (4 marks)

(d) Point to point over ethernet with username: Organisation Password:org@2023 (6 marks)

(Total: 20 marks)

23. Connect to the internet using wireshark and capture screenshot of the following in your word document.

(a) Details of ARP and ICMP communication between your computer and its gateway. (6 marks)

(b) Source and destination Layer 2 address of your computer and its gateway. (4 marks)

(c) Source and destination Layer 3 address of your computer and its gateway. (4 marks)

(d) TCP three-way handshake. (6 marks)

(Total: 20 marks)

CISSE ADVANCED LEVEL

ELECTIVE II

NETWORKING AND TELECOMMUNICATIONS

TUESDAY: 6 December 2022. Morning Paper. **Time Allowed: 3 hours.**

Answer ALL questions. This paper has two sections. SECTION I has twenty (20) short response questions of forty (40) marks. SECTION II has three practical questions of sixty (60) marks. Marks allocated to each question are shown at the end of the question(s).

Required Resource:
- A computer
- Simulator (Packet tracer/GNS 3)

SECTION I

1. Data transmission is the transfer of data from one digital device to another. Which mode of transmission allows data in both directions on a signal carrier, but not at the same time? (2 marks)

2. Which algorithm determines Discrete Fourier Transform of an input significantly faster than computing it directly? (2 marks)

3. Which of the following is a digital modulation scheme that conveys data by changing, or modulating, two different phases of the carrier wave. (2 marks)

4. What is the name given to an Integrated Services Digital Network (ISDN) configuration intended primarily for use in subscriber lines similar to those that have long been used for voice-grade telephone service? (2 marks)

5. Which encoding technique ensures the signal level is checked twice for every bit time, both initially and in the middle ensuring the clock has double transfer rate? (2 marks)

6. A hardware device that allows your computer to communicate with an Internet service provider over a landline connection by converting an analog signal to a digital signal for the purpose of granting access to broadband Internet is known as? (2 marks)

7. What is the name given to a value that represents the number of bits in a transmission message used by Information Technology (IT) professionals to detect high-level errors within data transmissions? (2 marks)

8. The network layer is the part of the Internet communications process where these connections occur, by sending packets of data back and forth between different networks. The largest frame or packet that can be transmitted across a data link is referred to as? (2 marks)

9. Open system Interconnection(OSI) Model is a conceptual framework used to describe the functions of a networking system. What is the name given to a layer responsible for taking an IP packet and preparing it for transmission over the communications medium? (2 marks)

10. What is the name given to data transmitted between network points as a unit complete with addressing and necessary protocol control information? (2 marks)

11. Fiber patch cords are required for interconnecting infrastructure devices. Which type of patch code is shown in the diagram below? (2 marks)

12. Optical fiber are mostly used for communication over short distances. The fiber that consists of a larger core that uses LED emitters to send light pulses at different angles is known as? (2 marks)

13. What is the name given to the number that identifies the logical circuit between the router and the frame relay switch? (2 marks)

14. Which wireless network type uses transmitters to provide wireless service over a larger geographic area such as a city or specific district? (2 marks)

15. What is the name given to a standalone device, like a home router, where the entire Wireless Local Area Network (WLAN) configuration resides on the device? (2 marks)

16. What is the name of a spread-spectrum modulation technique primarily used to reduce overall signal interference in telecommunications? (2 marks)

17. Frequency channel is regarded as the band used by one customer, among the given total frequency spectrum. What is the name of the modulation technique that rapidly switches a signal among frequency channels? (2 marks)

18. Which technology allows one to make voice calls using a broadband Internet connection instead of a regular (or analog) phone line. (2 marks)

19. Which terminology refers to fiber-optic infrastructure that is not yet put into use by a service provider which requires the customer rather than the service provider to maintain and operate the equipment for use to access the Internet and communications? (2 marks)

20. What is an end-to-end protection scheme used in connection oriented circuits in different network architectures to protect against inevitable failures on service providers' network that might affect the services offered to end customers? (2 marks)

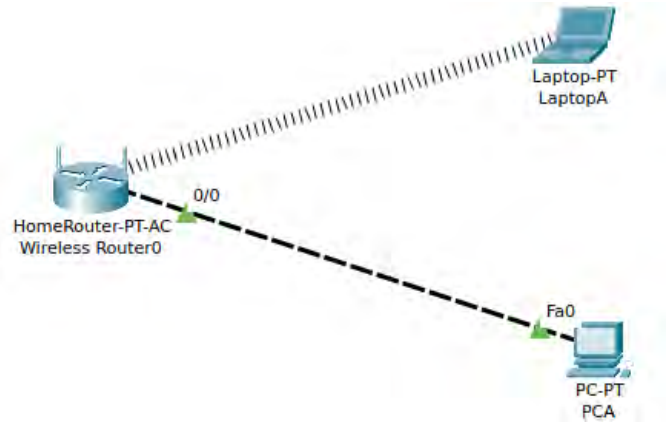
SECTION II

21. Create a word processor document named Question 21 and use it to save screenshots to demonstrate how you perform task (i) to (v) below:

Required resources:

- Windows/Linux computer.
- Simulator (Packet Tracer/GNS3)

Using the provided simulator, setup a wireless Local Area Network topology as shown below:



Access the Graphical User interface of the Router and perform the following:

(i) Change network mode to display legacy. (Capture a screenshot of the configuration). (4 marks)

(ii) Configure the SSID to display as JumbaNet. (Capture a screenshot of the configuration). (4 marks)

(iii) Configure the standard channel to be 6 but within 2.4gz (Capture a screenshot of the configuration). (4 marks)

(iv) Configure the security mode to be WPA2 personal with advanced encryption standard (AES) (Capture a screenshot of the configuration). (4 marks)

(v) Configure the passphrase to be Talent2@22 (Capture a screenshot of the configuration). (4 marks)

Upload Question 21 document.

(Total: 20 marks)

22. Create a word processor document named Question 22 and use it to save screenshots demonstrating how you perform task (i) to (v) below:

From the scenario given in question 21 above, perform the following tasks:

(i) Enable guest profile with default SSID on 2.4 GHz. (4 marks)

(ii) Prevent listed hosts on a network from accessing the wireless network. (3 marks)

(iii) Display mac address filter list. (3 marks)

(iv) Enable beamforming to the PC and the Laptop. (6 marks)

(v) Display web and remote access configuration settings. (4 marks)

Upload Question 22 document.

(Total: 20 marks)

23. Create a word processor document named Question 23 and save screenshots demonstrating how you perform task (i) to (v) below:

From the scenario given in Question 21 above, perform the following tasks:

(i) Configure private Network Address of 172.16.0.0/24 dynamically. (6 marks)

(ii) Capture screenshots showing configuration settings of the PC and the laptop. (4 marks)

(iii) Create a connection between the PC and the router. (2 marks)

(iv) Trace the path between the laptop and router. (2 marks)

(v) Create an Internet connection type as point to point Protocol over Ethernet (PPPoE) with username admin and password admin. (6 marks)

Upload Question 23 document.

(Total: 20 marks)

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CISSE ADVANCED LEVEL

ELECTIVE II

NETWORKING AND TELECOMMUNICATIONS

TUESDAY: 2 August 2022. Morning paper. **Time Allowed: 3 hours.**

This paper has two sections. SECTION I has twenty (20) short response questions of forty (40) marks. SECTION II has three practical questions of sixty (60) marks. All questions are compulsory. Marks allocated to each question are shown at the end of the question.

SECTION I

1. _____multiplexing uses available bandwidth of communication channel to be shared among multiple users by frequency by translating or modulating each of the individual users to different carrier frequency. (2 marks)

2. What is the media access control (MAC) method used in Ethernet Technology for Local Area networking to mediate media Contention? (2 marks)

3. Which Multiplexing technique allows each device same time slot to transmit data over the link irrespective of the device status on data transmission? (2 marks)

4. _____is commonly used to convert a signal in the time spectrum to a frequency spectrum. (2 marks)

5. _____is a modulation pattern for conditioning communication signals for transmission**.** (2 marks)

6. What is the upper sub layer of the layer 2 of the OSI Model that acts as an interface between the network layer and the medium access control (MAC) sub layer?

7. Which service discovery protocol is used for name-to-IP address resolution? (2 marks)

8. The wide-area network (WAN) technology mode for switching and transmission that efficiently and flexibly organises information into cells is known as_____ . (2 marks)

9. Which protocol manages the conversation between end devices and guarantees the reliable delivery of information? (2 marks)

10. Identify the fiber optic cable shown below.

11. What is the name given to a set of communication standards to transmit data, voice, and signaling using digital lines as copper? (2 marks)

12. What is the deviation such as amplitude or phase timing of signal pulses in a high frequency digital signal? (2 marks)

13. _____is used in enterprise deployments to manage groups of lightweight access points. (2 marks)

14. Which switched communication network is associated with the following characteristics? (2 marks)
    - It is capable of handling the data that is digital and the traffic because of voice signals.
    - The connection of the network allows transferring the 'electrical current' along with the voice signal.
    - It is a 'Connection-Oriented' process.

15. Which wireless standard is best suited for industrial and IoT environments due to its short-range and low data-rates? (2 marks)

16. An upcoming agribusiness enterprise sought tenancy in one of the tallest building in your vicinity. They got one isolated room at the top most floor of the building. After network testing is complete, the Network Administrator reports that the wireless LAN signal is occasionally affected by some type of interference. What is a possible cause of the signal distortion? (2 marks)

17. _____is a signaling protocol used for initiating, maintaining, and terminating real-time sessions that include voice, video and messaging applications? (2 marks)

18. Which protocol is a standard networking protocol that enables a central wireless LAN Access Controller (AC) to manage a collection of Wireless Termination Points? (2 marks)

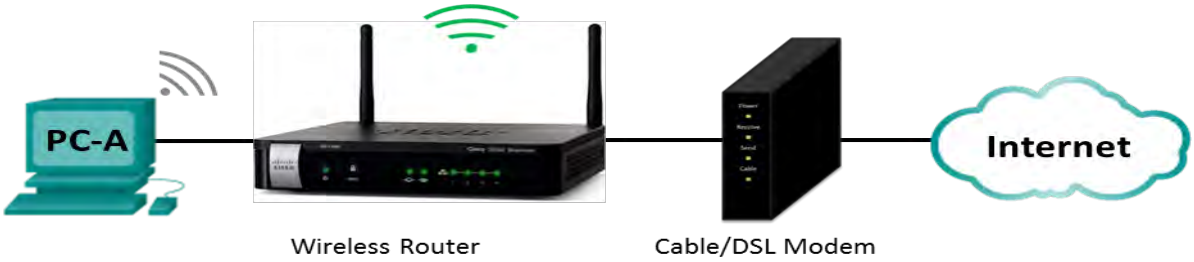
19. Modulation is the process by which information is encoded into electrical signals for transmission over a medium. What is the modulation technique used in 802.11ax standard? (2 marks)

20. In networking _____is an expression of how much time it takes for a data packet to travel from one designated point to another. (2 marks)

SECTION II

21. Create a word processor document named Question 21 and use it to save solutions to questions (i) to (iv) below. Save your solutions in form of screenshots.

Examine the diagram below and answer the questions that follow:



Wireless Router settings

Network Name (SSID)	JAMBO KENYA
Network Passphrase	jambo_kenya
Router Password	one@12345

Required:
In question 21 document, explain how you would perform the following tasks:

(i) Display the configuration for SSID (4 marks)

(ii) Display the configurations of wireless security password using WPA2 settings (6 marks)

(iii) Configure the router to use 192.168.10.0/27 as DHCP network address to end devices (6 marks)

(iv) Show configuration of starting and ending IP Addresses. (4 marks)

Upload question 21 document

(Total: 20 marks)

22. Create a word processor document named Question 22 and use it to save solutions to questions (i) to (v) below. Save your solutions in form of screenshots.

(i) From your computer, capture a screenshot showing the default gateway IP address of the router. (3 marks)

(ii) Capture a screenshot showing the physical address of your PC. (3 marks)

(iii) Capture a screenshot showing connectivity between your computer and www.familyradio316.com. (4 marks)

(iv) From the PC use appropriate command utility to trace the path to www.google.com. (4 marks)

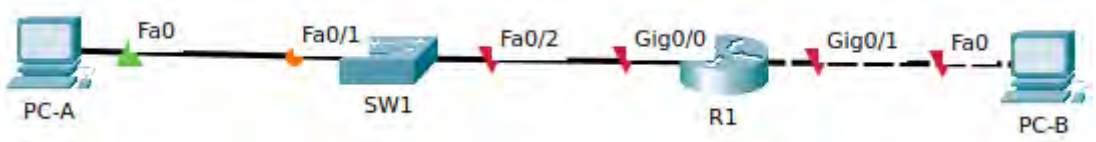
(v) Capture a screenshot displaying the host name of the computer you are using. (6 marks)

Upload question 22 document

(Total: 20 marks)

23. Create a word processor document named Question 23 and use it to save solutions to questions (i) to (v) below. Save your solutions in form of screenshots.

Using appropriate simulator, setup the topology as shown below:



Device	Interface	IPv6 Address	Prefix Length	Default gateway
R1	G0/0	2001:DB8:ACAD:1::1	64	N/A
	G0/1	2001:DB8:ACAD:A::1	64	N/A
SW1	VLAN 1	2001:DB8:ACAD:1::9	64	N/A
PC-A	NIC	2001:DB8:ACAD:1::3	64	FE80::1
PC-B	NIC	2001:DB8:ACAD:A::3	64	FE80::1

Required:

(i) Configure IPv6 to all the devices (6 marks)
Capture a screenshot of the output

(ii) Using appropriate command, assign the device name to the intermediary devices (4 marks)
Display the device names

(iii) Using appropriate command, prevent the router and switch from attempting to translate incorrectly entered Command as though they were hostnames.
Capture a screenshot of the commands (4 marks)

(iv) Assign Kenya@59 as the privileged EXEC encrypted password for both router and switch
Capture a screenshot of the encypted password (4 marks)

(v) Test connectivity between PC-A and PC-B (2 marks)

Upload question 23 document

(Total: 20 marks)

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