JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF INFORMATICS AND INNOVATIVE SYSTEMS

UNIVERSITY EXAMINATION FOR THE DEGREE OF COMPUTER SECURITY AND FORENSICS

2nd YEAR 1st SEMESTER 2021/2022 ACADEMIC YEAR

MAIN CAMPUS

COURSE CODE: ICB 1207

COURSE TITLE: Network Design and Implementation

DATE: **TIME:**

TIME:

Instructions:

1. Answer ALL questions in Section A and B and ANY other TWO questions in Section C
2. Tick the most correct alternative in Section A
3. Answers to Questions in Section B and C must be written in the spaces provided on the question paper.
4. Candidates must ensure they submit their work by clicking "finish and submit attempt" button at the end.

SECTION A: 30 Marks (Each question carries 1 mark)

1. Which of the following network devices are "dumb"—that is, purely electrical devices with no electronic intelligence?
   A. Hubs
   B. Switches
   C. Routers
   D. Bridges

2. Which of the following statements about switches and routers are true? (Choose all correct answers.)
   A. Routers operate at the network layer, whereas switches operate at the data link layer.
   B. All of the devices connected to a switch are part of a single broadcast domain, whereas the networks connected to a router form separate broadcast domains.
   C. Routers can communicate with each other and share information, but switches cannot.
   D. Switches forward packets based on their hardware addresses, whereas routers forward packets based on their IP addresses.

3. VLANs create the administrative boundaries on a switched that are otherwise provided by which of the following devices?
   A. Hubs
   B. Routers
   C. Firewalls
   D. Bridges

4. Which of the following statements about the Spanning Tree Protocol (STP) is not true?
   A. STP operates at the data link layer of the OSI model.
   B. STP is implemented in switches.
   C. STP prevents traffic from circulating endless around a network.
   D. STP compiles a database containing the IP addresses of connected devices.

5. Which of the following switch types immediately forwards frames after looking at only the destination address?
   A. Cut-through
   B. Source route
   C. Store-and-forward
   D. Destination switch

6. Which two of the following devices perform essentially the same function? (Choose two correct answers.)
   A. Hubs
   B. Bridges
   C. Switches
   D. Routers

7. Which of the following problems is the Spanning Tree Protocol (STP) intended to prevent? (Choose all correct answers.)
   A. Broadcast storms
   B. Late collisions
   C. Bridging loops
   D. Crosstalk

8. Which of the following devices can also be described as a multiport repeater?
   A. Hub
   B. Bridge
   C. Switch
   D. Router

9. Alice has a network that consists of three virtual LANs (VLANs) defined on all of the network's switches. VLAN 10 is the Sales VLAN, VLAN 20 is the Marketing VLAN, and VLAN 30 is the Accounting VLAN. Users are reporting that they can't communicate with anyone outside of their own VLAN. What is the problem, and what must Alice do?
   A. The problem is a faulty VLAN configuration on one of the switches. Alice needs to re-create the VLANs and configure each VLAN for routing.
   B. One of the VLANs is configured to filter all other VLAN traffic for security purposes. Alice needs to change the filter on this VLAN.
   C. VLANs are limited to data link layer communication only. To allow communication between VLANs, Alice must add a router or a layer 3 switch to the network and configure it to route traffic between the VLANs.

10. Which of the following cable types are typically used in newly constructed local area network (LAN) installations? (Choose all correct answers.)
    A. Single-mode fiber optic
    B. Multimode fiber optic
    C. Coaxial
    D. Unshielded twisted pair

11. Ed has been hired to install network cabling for a small private company with 15 employees who need to share files and printers. All of the employees are physically located within the same Building in two separate office spaces directly adjacent to each other, sharing a common wall and door for access. Both offices have drop ceilings. The client wants a simple Gigabit Ethernet Installation that's easy to troubleshoot. In addition, Ed's client wants to keep installation costs to a minimum. Which of the following combinations of topology, cable type, and installation method would best meet the needs of Ed's client?

    A. Star topology, fiber-optic cabling, and internal installation
    B. Bus topology, coaxial cabling, and external installation
    C. Bus topology, twisted pair cabling, and internal installation
    D. Star topology, coaxial cabling, and external installation
    E. Star topology, twisted pair cabling, and external installation

12. In the punch down process for unshielded twisted pair (UTP) cable, which of the following is the last step that you perform when connecting bulk cables to jacks in wall plates and patch panels?
    A. Cut off the excess wire that protrudes past the contacts.
    B. Press the bare wire down between the two metal contacts that hold it in place.
    C. Strip some of the insulating sheath off the cable end to expose the wires.
    D. Insert the wires into the appropriate contacts in the jack.
    E. Strip a small amount of insulation off each wire.
    F. Separate the twisted wire pairs at the ends.

13. A maintenance worker, while replacing a light fixture in an office building, accidentally severs a network cable in the drop ceiling. The tenants use a variety of local area network (LAN) technologies throughout the structure, but on that particular floor there are three separate LANs: a 10-node Thin Ethernet LAN using coaxial cable in a bus topology, a 25-node Gigabit Ethernet LAN using twisted pair cable in a star topology, and a 5-node Fiber Distributed Data Interface (FDDI) LAN using multimode fiber optic cable in a double ring topology. Without knowing which of the LANs the severed cable belongs to, what is the maximum number of computers that could be directly affected by the cable break?
    A. 0
    B. 1
    C. 5
    D. 10

14. Alice has been hired by a corporation to design the cabling for their network. The corporation just moved in to two different floors of an older building, a retail space on the ground floor and an office space on the 43rd floor. The building has existing Category 5 (CAT5) unshielded twisted pair (UTP) cable. Alice's client wants two separate local area networks (LANs), one on each of the two floors, with a backbone network connecting them. They want a 1 gigabit per second (Gbps) data rate for each LAN but plan on migrating to 10 Gbps in the future. The two networks are approximately 200 meters apart. Which of the following solutions best meets the client's needs?
    A. Install Category 6 (CAT6) or Category 6a (CAT6a) UTP cable for the LANs. These cables run at 1 Gbps and provide a migration path to 10 Gbps. Use twisted pair cable for the backbone network.
    B. Use the existing CAT5 cabling for the LANs since CAT5 runs at 1 Gbps. Use thick coaxial cable for the backbone network.
    C. Install CAT6 or CAT6a UTP cable for the LANs. These cables run at 1 Gbps and provide a migration path to 10 Gbps. Use multimode fiber-optic cable for the backbone network.
    D. Install CAT6 or CAT6a UTP cable for the LANs. These cables run at 1 Gbps and provide a migration path to 10 Gbps. Use the existing CAT5 cable for the backbone network.

15. Ralph has been hired by a client to install cabling to connect two existing networks. The two networks are in different buildings approximately 1,000 feet apart. The cable type must support Gigabit Ethernet data rates of 1,000 megabits per second (Mbps) and provide a high level of resistance to electromagnetic interference (EMI). Your client wants the most economical cabling solution that meets their needs. Which of the following cable type's best meets the needs of this client?
    A. Multimode fiber-optic cable
    B. Shielded twisted pair (STP) cable
    C. Unshielded twisted pair (UTP) cable
    D. Thin coaxial cable
    E. Single-mode fiber-optic cable

16. Which of the following statements about single-mode and multimode fiber-optic cables are true? (Choose all correct answers.)
    A. Single-mode cables can span longer distances than multimode cables.
    B. Single-mode cables are more resistant to electromagnetic interference than multimode cables.
    C. Single-mode cables are more difficult to install than multimode cables.
    D. Single-mode cables have a much larger core diameter than multimode cables.

17. In an internal UTP cable installation, each horizontal cable run connects a wall plate in the work area to a centralized cabling nexus in a telecommunications room. Which of the following is the correct term for this cabling nexus?
    A. Telepole
    B. Demarc
    C. Backbone
    D. Patch panel

18. Which of the following types of cable, when installed, sometimes employed a device called a vampire tap?
    A. Unshielded twisted pair
    B. Shielded twisted pair
    C. Multimode fiber optic
    D. Single-mode fiber optic
    E. Coaxial

19. Which of the following tools do cable installers use to add connectors such as RJ-45 and RJ-11 to twisted pair cabling?
    A. A crimper
    B. A splicer
    C. A pigtail
    D. A patch

20. Which of the following statements explains the purpose of the twists in twisted pair cabling?
    A. The twists prevent collisions.
    B. The twists completely eliminate crosstalk and electromagnetic interference (EMI) in adjacent wire pairs.
    C. The twists prevent crosstalk in adjacent wire pairs and limit the effects of EMI on the signals carried over the cable.
    D. The twists extend the bend radius allowance of the cable.

21. Which of the following cable types is typically configured in a star topology, uses eight copper conductors arranged in four pairs, and uses RJ-45 connectors?
    A. RG-8
    B. Twisted pair
    C. RG-58
    D. Fiber optic

22. Which of the following is not a type of fiber-optic connector?
    A. SC
    B. MTRJ
    C. ST
    D. BNC

23. Which of the following signal types is carried by copper cable?
    A. Fiber optic
    B. Microwave
    C. Infrared
    D. Electrical

24. On an Ethernet network using the star topology, which of the following devices can function as the cabling nexus that forms the figurative center of the star? (Choose all correct answers.)
    A. Hub
    B. Router
    C. Switch
    D. All of the above

25. Which of the following best describes the function of the network medium?
    A. The network medium provides the physical connection between networked computers.
    B. The network medium provides the protocol used to transmit data between end systems.
    C. The network medium passes data between two routers.
    D. The network medium processes electrical or light signals and converts them to data.

26. Which type of network is typically confined to a small area, such as a single room, floor, or building?
    A. WAN
    B. LAN
    C. MAN
    D. CAN

27. Ralph has been contracted to consult for a company that wants to update its legacy Ethernet network to Gigabit Ethernet. On examining the site, he discovers that the network is still using coaxial-based Thin Ethernet. What change in network topology must occur to upgrade the existing network to Gigabit Ethernet using unshielded twisted pair (UTP) cable?
    A. Bus to ring
    B. Ring to star
    C. Star to bus
    D. Bus to star
    E. Star to ring

28. An electrician installing a new light fixture accidentally severs one of the LAN cables running through the dropped ceiling space. With which topology would the severed cable cause the greatest amount of disturbance to the network?
    A. Bus
    B. Star
    C. Logical ring
    D. Mesh

29. Which of the following statements about a wired local area network (LAN) is true?
    A. Wired LANs support only the star topology.
    B. Wired LANs support only the star and bus topologies.
    C. Wired LANs support only the star and ring topologies.
    D. Wired LANs can support ring, bus, or star topologies.

30. Alice has constructed a five-node failover cluster in which all five servers are connected to a hard disk array using a dedicated Fibre Channel network. Which of the following terms describes this network arrangement?
    A. SAN
    B. PAN
    C. WAN
    D. MAN

SECTION B: 20 Marks

1. Distinguish between Centralized Computing and Distributed Computing and give relevant example
   (4marks)
2. Explain how a bridge provides network segmentation and how a switch can be used to increase the network performance (4marks)
3. What role does a repeater and a hub play in network? (4marks)

4. Distinguish between Connection-Oriented Protocols and Connectionless Protocols (4 marks)
5. Briefly explain how they three way handshake works (4marks)

SECTION C: 20 Marks (Choose any two)

QUESTION 1

 a. State and explain two types of media interference can adversely affect data transmissions over a cabled network media **(4marks)**
 b. State the several instances as to when a switch would be forced to broadcast **(4marks)**
 c. Explain why a switch is considered an intelligent device **(2marks)**

QUESTION 2

 a) By the use of a diagram explain how Network Address Translation Works **(4marks)**
 b) Explain the functions of the following command **(4marks)**

   i. Traceroute.
   ii. Nslookup
   iii. Netstat
   iv. ifconfig
 c) Distinguish between a public IP and Private IP **(2marks)**

QUESTION 3

 a) Which connector is commonly used with fiber cabling?
 b) What term describes the loss of signal strength as a signal travels through a particular medium?
 c) What kind of cable would you associate with an F-type connector?
 d) A user calls to report that he is experiencing periodic problems connecting to the network. Upon investigation, you find that the cable connecting the user's PC to the switch is close to a fluorescent light fitting. What condition is most likely causing the problem?
 e) Given the following connectors (**MT-RJ**, **SC**, **BNC** and **LC**) which is not a type of fiber-optic connector used in network implementations?
 f) Which Broadband over Power Lines standard exists for high-speed communication devices?
 g) In a crossover cable, which wire is wire 1 crossed with?
 h) What device acts as a translator between the LAN data format and the WAN data format?
 i) TCP is an example of what kind of transport protocol?
 j) What is the function of ARP?