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**KIRIRI WOMEN'S UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**UNIVERSITY EXAMINATION, 2024/2025 ACADEMIC YEAR**  
**FIRST YEAR, SECOND SEMESTER EXAMINATION**  
**FOR THE BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY**  
**KIT 2106 SYSTEM ADMINISTRATION**

Date: 15<sup>TH</sup> AUGUST 2024  
Time: 11:30AM – 1:30PM

**INSTRUCTIONS TO CANDIDATES**

**ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS**

**QUESTION ONE (30 MARKS)**

- a) System administration focuses on servers and computer systems, while network administrators work more specifically with network-related tasks and equipment, like setting up routing, IP addresses, and maintaining Local Area Networks (LAN).
- i) List four key skills a systems Administrator must possess **(4 Marks)**
  - ii) List and elaborate on any two network devices **(4 Marks)**
  - iii) Highlight any two characteristics of a LAN **(2 Marks)**
- b) An Internet Protocol (IP) address is the unique identifying number assigned to every device connected to the internet. An IP address definition is a numeric label assigned to devices that use the internet to communicate.
- i) Differentiate between a Public IP and Private IP as applied in a network **(4 Marks)**
  - ii) Distinguish between a static IP and a dynamic IP address **(4 Marks)**
  - iii) Given an IP address 192.168.0.1/16, compute the subnet mask **(2 Marks)**
  - iv) You are troubleshooting a computer on the network that is unable to access network resources, upon the ipconfig command, you realize the device has an IP address that starts with 169.254.x.x. What's likely the issue **(2 Marks)**
- c) A virtual private network (VPN) is a mechanism for creating a secure connection between a computing device and a computer network, or between two networks, using an insecure communication medium such as the public Internet. A VPN can extend access to a private network (one that disallows or restricts public access) to users who do not have direct access to it, such as an office network allowing secure access from off-site over the Internet. The benefits of a VPN include security, reduced costs for dedicated communication lines, and greater flexibility for remote workers. Discuss four scenarios when you should use a VPN. **(4 Marks)**
- d) Sending data over a network is complex because various hardware and software technologies must work cohesively across geographical and political boundaries. Highlight significance of the framework/standard. **(4 Marks)**

**QUESTION TWO (20 MARKS)**

- a) Network models refer to the structured representation of how different devices and systems communicate and interact with each other within a network. These models help in organizing and streamlining the flow of data, ensuring efficient communication and resource sharing. Elaborate on the following network models with advantages and disadvantages of each.
- i) Client/Server **(5 Marks)**
  - ii) Peer-to-peer **(5 Marks)**
  - iii) Mainframe/terminal **(5 Marks)**

- b) Linux is a family of open-source Unix-like operating systems based on the Linux kernel, an operating system kernel first released on September 17, 1991, by Linus Torvalds. Highlight 5 types of file systems developed for Linux. **(5 Marks)**

### **QUESTION THREE (20 MARKS)**

- a) There are several types of network security through which we can make our network more secure, your network and data are shielded from breaches, invasions, and other dangers by network security. Expound on any four types of Network Security. **(8 Marks)**
- b) The class of IP address is used to determine the bits used for network ID and host ID and the number of total networks and hosts possible in that particular class. Each ISP or network administrator assigns an IP address to each device that is connected to its network. Discuss when we should use each of the following classes, the IP address range and the classful subnet masks.
- i) CLASS A **(4 Marks)**
  - ii) CLASS B **(4 Marks)**
  - iii) CLASS C **(4 Marks)**

### **QUESTION FOUR (20 MARKS)**

- a) The CIA model is the most popular way of visualizing security methods for modern networks. This model is the basis for defense-in-depth, which means defending connected assets across all network layers. "CIA" refers to the initials of the model's core principles. Expound on the three principles of the CIA triad. **(6 Marks)**
- b) File Permissions. File permissions control what user is permitted to perform which actions on a file. File permissions form a crucial part of a resistance strategy. On public systems, only part of the system is public. The system files, at least, need to be protected from wanton modification by attackers. Discuss four types of permissions that can be associated with a file/folder. **(8 Marks)**
- c) Core Network Services such as Internet access, mainframe access, DHCP services, DNS services, Proxy services, Business Partner Access, etc. Both configurations enable the Client to connect two (E-LINE) or more (E-LAN) Sites using the Virtual Private LAN Service Component of the Core Network Services. Discuss the core network services provided by directory services, DNS and DHCP on a Network. **(6 Marks)**

### **QUESTION FIVE (20 MARKS)**

- a) Network Security is vital in protecting client data and information, keeping shared data secure and ensuring reliable access and network performance as well as protection from cyber threats. A well-designed network security solution reduces overhead expenses and safeguards organizations from costly losses that occur from a data breach or other security incident. Outline three Network Security control levels. **(6 Marks)**
- b) In computing, a file system -- sometimes written filesystem -- is a logical and physical system for organizing, managing and accessing the files and directories on a device's solid-state drive (SSD), hard-disk drive (HDD) or other media. Without a file system, the operating system (OS) would see only large chunks of data without any way to distinguish one file from the next. As data capacities increase, the efficient organization and accessibility of individual files becomes even more important in data storage. Discuss four core features of NTFS file system over FAT. **(8 Marks)**
- c) With billions of accounts globally accessing sensitive data and systems, user accounts have become a prime target for cyber-attacks. Protecting them is key to protecting digital infrastructure and assets. By following recommended guidelines for user account creation, management, monitoring, and control, organizations can strengthen their security posture and reduce account-based risks. Expound on three types of user accounts and their uses. **(6 Marks)**