



Kasarani Campus  
Off Thika Road  
P. O. Box 49274, 00101  
NAIROBI  
Westlands Campus  
Pamstech House  
Woodvale Grove  
Tel. 4442212  
Fax: 4444175

**KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**UNIVERSITY EXAMINATIONS, 2024/2025 ACADEMIC YEAR**  
**SECOND YEAR, FIRST SEMESTER EXAMINATION**  
**FOR THE DEGREE OF BACHELOR OF SCIENCE (COMPUTER SCIENCE)**

**KCS 2201: DATA COMMUNICATION AND NETWORKS**

**DATE: 13<sup>TH</sup> DECEMBER, 2024**  
**TIME: 2:30PM-4:30PM**

**INSTRUCTIONS TO CANDIDATES**

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

**QUESTION ONE: COMPULSORY (30 MARKS)**

- a) Explain **THREE** circumstances under which unshielded twisted pair (UTP) cables are most appropriate in network installation. **(6 Marks)**
- b) An organization has its office in a 5<sup>th</sup> floor of a building. The office has 20 machines, one File server and 2 print servers. Draw a network design for the proposed network **(5 Marks)**
- c) Classify the following IP addresses in class A, B, C, D or E **(5 Marks)**
- i) 10.2.28.1
  - ii) 192.168.1.100
  - iii) 168.10.1.150
  - iv) 127.0.0.0
  - v) 28.2.100.20
- d) Mary designed a network for her company by connecting the existing Local area network to the internet. Explain the reason for using the following hardware devices in the task:
- i) Router **(2 Marks)**
  - ii) Proxy server **(2 Marks)**
  - iii) NIC **(2 Marks)**
- a) Digital communication systems are rapidly emerging as the preferred methods of communication globally. Describe **TWO** reasons for this rapid development of digital systems. **(4 Marks)**
- b) Rosa, a network consultant was hired by a certain company to troubleshoot the slow speed of company's computer network. Explain **FOUR** possible causes of a slow network **(4 Marks)**

**QUESTION TWO: (20 MARKS)**

- a) TCP/IP is the most commonly used set of communication protocols over the internet. Illustrate TCP/IP protocol suite and describe its operation in terms of layers **(8 Marks)**
- b) When two computers on a network communicate with each other they need to use the same protocol. Define the term protocol and a part from TCP/IP, give 2 examples of protocols. **(4 Marks)**
- c) Most schools have a computer network. Some schools allow teachers to access the school network from their home computers. Give one reason why some schools allow this and one reason why some schools do not allow this. **(2 Marks)**

- d) Explain **THREE** circumstances that could necessitate an organization to install wireless network. (6 Marks)

**QUESTION THREE: (20 MARKS)**

- a) ABC secondary school recently purchased standalone computers for their new computer laboratory. Specifying the purpose in each case, identify **FOUR** components that ABC Secondary school would require in order to network the laboratory. (8 Marks)
- b) Ethernet is a network technology that uses CSMA/CD to prevent computers from accessing a communication medium at the same time. Describe the concept of CSMA/CD as used in collision prevention. (4 Marks)
- c) From the command prompt (Ms Dos) show how you would accomplish the following network operations:
- i) Determine the MAC address of a computer (2 Marks)
  - ii) Determine the IP address of a computer (2 Marks)
  - iii) Test connectivity between any two devices (2 Marks)
  - iv) Establish the path data has taken from source to destination (2 Marks)

**QUESTION FOUR: (20 MARKS)**

- a) Johnson intends to connect his laptop to the internet. Explain how he can achieve this objective. (3 Marks)
- b) Bidii Company Ltd is considering replacing their network cables with fibre optic cables. Discuss **FOUR** advantages of fiber optic cables. (4 Marks)
- c) Tom a network designer was tasked to set a computer network for Mwangaza Technical Institute. He was provided with coaxial cable, 6 computers, 1 printer, 2 terminators and UTP cables. With the aid of a diagram, design the most appropriate network topology that Tom should set up. (4 Marks)
- d) A computer network is created when two or more computers are wired together to share information and resources. Briefly explain **FIVE** other motivations for computer networks (5 Marks)
- e) For each of the following four networks, discuss the consequences if a connection fails.
- i) Five devices arranged in a mesh topology. (1 Mark)
  - ii) Five devices arranged in a star topology (not counting the hub). (1 Mark)
  - iii) Five devices arranged in a bus topology. (1 Mark)
  - iv) Five devices arranged in a ring topology (1 Mark)

**QUESTION FIVE: (20 MARKS)**

- a) Mary, a computer network technician prefers using the dynamic host configuration protocol (DHCP) network management tool to configure internet protocol (IP) addresses

**Required**

- i) Justify why Mary would prefer using DHCP. (2 Marks)
  - ii) Explain the process of DHCP configuration. (8 Marks)
- b) Identify **FOUR** distinct characteristics of client server architecture. (4 Marks)
- c) The open systems interconnection (OSI) reference model partitions the protocols, functions and devices of a network into different layers. Explain the function of the following OSI layers:
- i) Network layer (2 Marks)
  - ii) Transport layer (2 Marks)
  - iii) Session layer (2 Marks)