KIBABII UNIVERSITY COLLEGE

(A Constituent College of Masinde Muliro University of Science and Technology)

UNIVERSITY EXAMINATIONS
2013/2014 ACADEMIC YEAR

FOR THE CERTIFICATE IN INFORMATION TECHNOLOGY

COURSE CODE: DIT 069 – Marking Scheme

COURSE TITLE: DATA COMMUNICATION AND NETWORKS II

DATE: December, 2014 **TIME: 2 Hrs**

INSTRUCTIONS

ANSWER QURSTION ONE and **ANY TWO** QUESTIONS

Q1

a) Define the following terms as used in data communications

i) UDP – *User Datagram Protocol a protocol that operates at the transport-level as part of the TCP/IP protocol suite that does not guarantee delivery, preservation of sequence, or protection against duplication.*

ii) Protocol Architecture – *is the layered structure of hardware and software that supports the exchange of data between systems and supports distributed applications, such as electronic mail and file transfer..*

iii) OSI Model - *The Open Systems Interconnection (OSI) reference model was developed by the International Organization for Standardization (ISO) as a model for a computer protocol architecture and as a framework for developing protocol standards*

iv) ATM - *Asynchronous Transfer Mode is a packet-switching technology that is streamlined and efficient than traditional packet switching methods designed to support very high data rate.*

v) Multiplexing - *is a technique used to allocate the total capacity of a transmission medium among a number of users in transmission system utilization* (10 Marks)

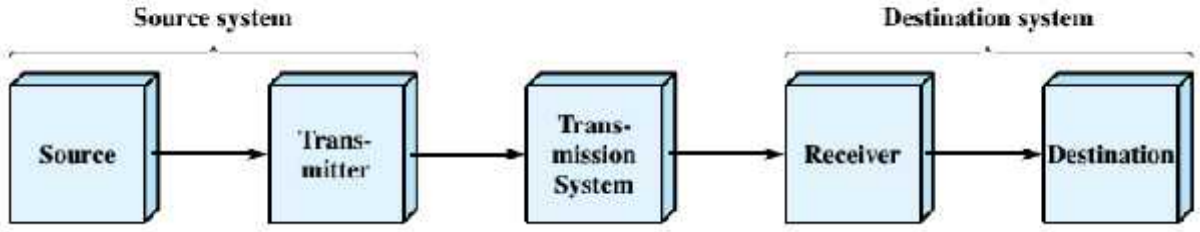
b) Describe the trends that are consistently driving the architecture and evolution of data communications and networking facilities (6 Marks)

1. *Communication traffic, both local (within a building or building complex) and long distance, both voice and data has been growing at a high and steady rate for decades. The increasing emphasis on office automation, remote access, online transactions, and other productivity measures as managers are constantly struggle to maximize capacity and minimize transmission costs.*

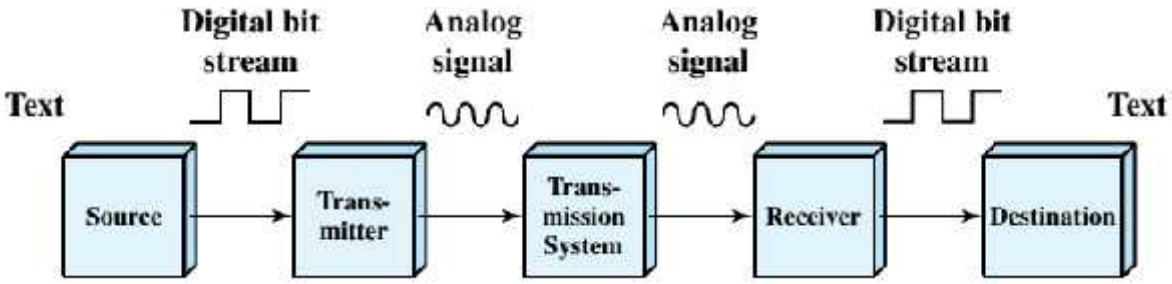
2. *The range of services expands. This increases the demand for high-capacity networking and transmission facilities. The continuous growth in high-speed network offers continuous drop in prices encouraging the expansion of services.*

3. *Innovational trends in technology enable the provision of increasing traffic capacity and the support of a wide range of services.*

c) Differentiate between a general communcation model and a strict data communcation model (8 marks)



A general communication model does not need to modulate or demodulate the transmission signal before transmission as shown above while a digital transmission model must modulate and demodulate the signal before as shown below.



Q2

a) Briefly describe the responsibilities of a Data Communications Engineer in a Networked environment. (6 Marks)

- *Delivery: The network or data communication engineer must deliver data to the correct destination(s). Data must be received only by the intended recipients and not by others.*
- *Correctness: The network or data communication engineer must ensure data is delivered accurately, because distorted data is generally unusable.*
- *Timeliness: He/She must ensure data is delivered before they need to be put to use; else, they would be useless.*
- *Fault tolerance and cost effectiveness are important characteristics of networks.*
- *Limited resources can become overbooked, resulting in message loss. A network should be able to deliver messages even if some links experience outages.*
- *The tunable parameters (or "knobs") for a network include: network topology, communication protocols, architecture, components, and the physical medium (connection lines) over which the signal is transmitted.*

b) Explain the key issues encountered while transmitting messages from senders to receivers in a networked environment (6 Marks)

- *"Noise" damages (corrupts) the messages; we would like to be able to communicate reliably in the presence of noise. Noice causes attenuation*
- *Establishing and maintaining physical communication lines is costly; we would like to be able to connect arbitrary senders and receivers while keeping the economic cost of network resources to a minimum*
- *Time is always an issue in information systems as is generally in life; we would like to be able to provide expedited delivery particularly for messages that have short deadlines*

c) Explain any three applications that has been standardized to operate on top of the TCP suite (6 Marks)

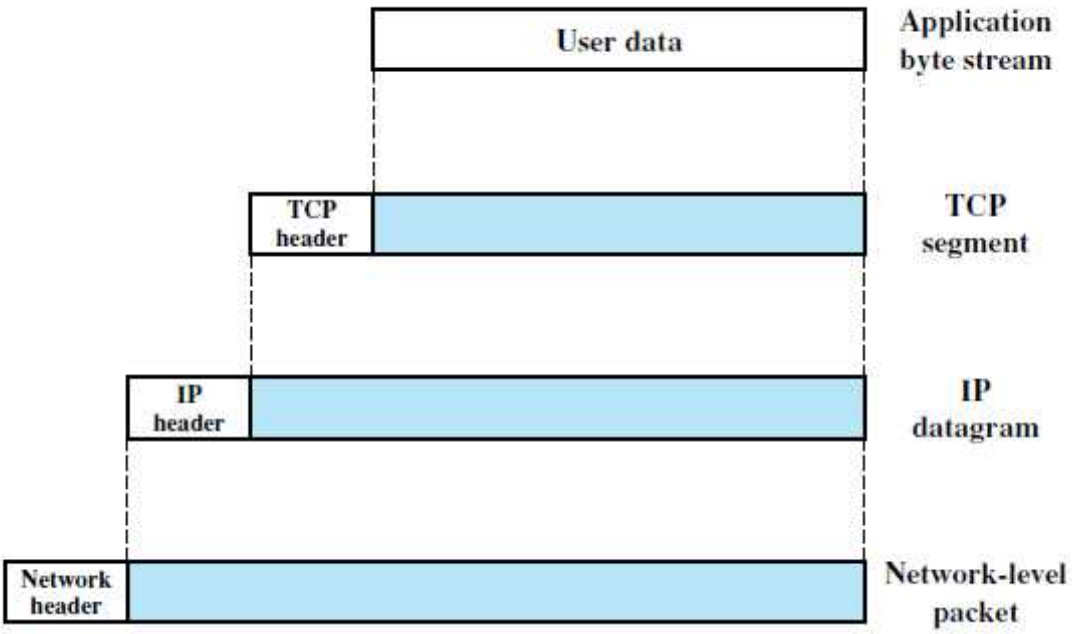
- *The Simple Mail Transfer Protocol (SMTP) provides a basic electronic mail transport facility. It provides a mechanism for transferring messages among separate hosts.*

- *The File Transfer Protocol (FTP)is used to send files from one system to another under user command. Both text and binary files are accommodated, and the protocol provides features for controlling user access.*

- *TELNET provides a remote logon capability, which enables a user at a terminal or personal computer to logon to a remote computer and function as if directly connected to that computer.*

Q3.

a) Using a diagram, illustrate the Protocol Data Units (PDUs) entailed in the TCP/IP Architecture.



(4 Marks)

b) Differentiate between the following as used in the TCP protocol suite

i) HTTP and FTP

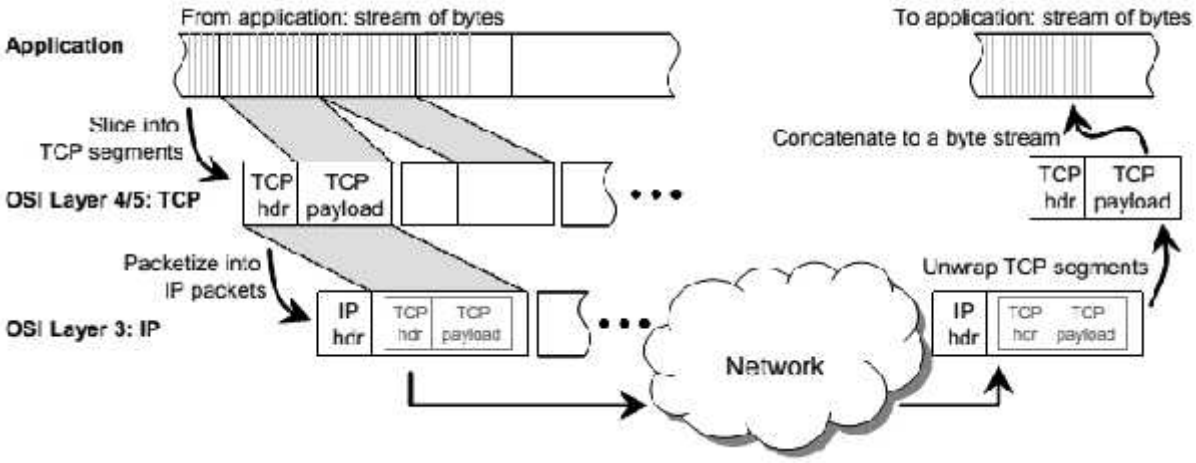
- *The Hyper TextTransfer Protocol is a protocol that enables sharing of textual and graphical files across various interconnected terminals in a network while the File Transfer Protocol move files from one terminal to another within interconnected terminals in a network*

ii) UDP and TCP (4 Marks)

- *While User Datagram Protocol (UDP) does not guarantee delivery, preservation of sequence, or protection against duplication, the*

Transmission Control Protocol (TCP) provides a reliable connection for the transfer of data between applications.

c) Briefly describe the communication process in the TCP/IP suite (10 Marks)



TCP accepts a stream of bytes as input from the application, slices it into segments, and passes to the IP layer as IP packets. This process is reversed at the receiver.

Q4.

a) Explain the importance of the network protocol architecture (3 Marks)

The importance of network protocol architecture is to streamline the communication tasks into standardized subroutine tasks that are easy to manage and control between two or more communicating terminals.

b) Describe the key features of a protocol (6 Marks)

- *Syntax: Concerns the format of the data blocks*
- *Semantics: Includes control information for coordination and error handling*
- *Timing: Includes speed matching and sequencing*

c) Briefly describe any three network topologies, highlighting there architectural design and infrastructure details such as cables, connectors and the respective interlinking devices. (9 Marks)

i) The BUS topology

- *Highly relies on broadcasting on a main backbone communication channel*

- *Cables required in a BUS topology are the Coaxial cables and the connectors are the British Naval Connectors (BNC). The backbone however requires a 75 ohm terminator that absorbs signals from the rest of the network to reduce network traffic.*

ii) *The Star topology*

- *The star topology requires the 10BaseT cabling that runs from the computing device to the interconnecting device. The associated connector tp this cable type are the RJ45 type of connectors. I*

- *nterconnection between computer terminals requires an interconnecting devices such as the Hub, Switch, repreaters, etc.*

iii) *The Token Ring topology*

- *Relies on a logical program that goes around the network in a ringcollecting and delivering network packets.*

- *The cable mainly associated with this type of topology is the fibre optic cable.*

Q5.

a) Using a diagram, illustrate how data is packaged before being transmitted across the network. (4 Marks)

b) The Ugandan and Tanzanian presidents need to come to an agreement by telephone, but neither speaks the other's language. Further, neither has on hand a translator that can translate to the language of the other. However, both presidents have English and Swahili translators in their ministerial staffs. Draw a diagram to depict the communication situation in the TCP/IP Suite, and describe the interaction and each level. (10 Marks)

c) Explain the advantages of layering in protocol architectures (4 Marks)