



# MANICALAND STATE UNIVERSITY OF APPLIED SCIENCES

## FACULTY OF ENGINEERING, APPLIED SCIENCES AND TECHNOLOGY

DEPARTMENT: COMPUTER SCIENCE AND INFORMATION SYSTEMS

DATA COMMUNICATIONS AND COMPUTER NETWORKS

CODE: BCOS 221

SESSIONAL EXAMINATIONS  
JUNE 2024

DURATION: 3 HOURS

EXAMINER: RANGANAI N

---

### INSTRUCTIONS

1. *Answer ANY FOUR Questions*
2. *Each question carries 25 marks*
3. *Start each question*

## **QUESTION ONE**

1(a) Explain the following terms used in network performance.

i. Bandwidth [2marks]

ii. Throughput [2marks]

1(b) Give the differences between the following as they are used in networking.

ii) Period and frequency. [4marks]

iii) Baseband and broad band. [4marks]

1(c) Explain how a composite signal can be decomposed into its individual frequencies. [6marks]

1(d) Describe the contribution of Shannon capacity theory to data communication and architecture. [7 marks]

## **QUESTION TWO**

2(a) Explain the significant role of the OSI reference model. State in order the layers which built the model. [14marks]

2(b) Describe the functionality provided by the Transmission Control Protocol (TCP). [6marks]

2(c) Explain CSMA/CD and CSMA/CA protocols used in LANs discuss its advantages and limitation [5marks]

## **QUESTION THREE**

3(a) Which of the four digital to analog conversion techniques ASK, FSK, PSK, and QAM is the most susceptible to noise. Defend your answer. [6marks]

3(b) Differentiate diagrammatically the unipolar NRZ and polar NRZ given 101011100. **[10marks]**

3(c) Explain the three multiplexing techniques common used in fiber optic links? **[5marks]**

3(d) Calculate the required bandwidth that a voice channel occupies a bandwidth of 4KHz which need to multiplex 10 voice channels with guard bands of 500Hz using FDM. **[4marks]**

#### **QUESTION FOUR**

4(a) Describe the services provided by data link layer **[8marks]**

4(b) Compare and contrast flow control and error control **[4marks]**

4(c) How a single bit error differ from a burst error **[2marks]**

4(d) Compare and contrast the fields in the main headers of IPv4 and IPv6. Make a table that shows the presence or absence of each field. **[8marks]**

4(e) Explain baseline wandering and its effect on digital transmission. **[3marks]**

#### **QUESTION FIVE**

5(a) Explain types of network routing stating merits and demerits of each. **[4marks]**

5(b) Explain DHCP components in the application layer protocols. **[4marks]**

5(c) Describe the following protocols.

- i. POP
- ii. HTTP
- iii. SMTP

iv. IMAP

**[8marks]**

5(d) Explain the following network security attacks.

i. Passive attack

ii. Active attack

**[4marks]**

5(e) Give some advantages and disadvantages of combining the session, presentation and application layer in the OSI model into one single application layer in the internet model.

**[5marks]**

**END OF EXAMINATION**