NATIONAL OPEN UNIVERSITY

University Village, Plot 91, Cadastral Zone, Nnamdi Azikiwe Express Way, Jabi, Abuja

Faculty of Science and Technology

Course Title: **PRINCIPLES OF COMMUNICATION TECHNOLOGY**
3 Credit Unit

Course code: CIT303

Instruction: Answer Question 1 and any other four

1a. With the aid of a suitably labelled sketch, LIST the FIVE(5) components that constitute a generic data communications system

(4marks)

b. List and briefly explain the different forms of data

(2 marks)

c. Explain briefly, the following modes of data communication: simplex, semi-duplex, full duplex

(2 marks)

d. What are point-to-point and point-to- multipoint connections in data communications?

(2 marks)

e. Describe briefly, the FOUR(4) types of network topologies used in data communications networks

(2 marks)

f. Why are standards necessary in data communications?

(2 marks)

g. List and briefly explain the broad categories of standards in data communications

(2 marks)

h. Outline the layers that make up the OSI model ?

(2 marks)

i. LIST the methods that enable the Media Access Control sub-layer to determine where one frame o data ends and the next one starts

(2 marks)

j. explain briefly, the main function of the IP component of the TCP/IP protocol and list its main characteristics

(2 marks)

{ Total = 22 marks }

2a. Explain briefly, the concept of **convolution**

(4 marks)

b. State, in a mathematical form, the condition necessary for systems or signals to be transformed by Fourier transform

(4 marks)

c. LIST ANY TWO(2) applications of Digital Signal Processing(DSP)

(4 marks)

3a Describe briefly the following network types:

- Local Area Network(LAN)
- Meropolitan Area Netwok(MAN)
- Wide Area Network(WAN)

(4 marks)

b. What are the most common wireless LANs? Explain briefly, their areas of application as well as their advantages and disadvantages

(4 marks)

c. List the basic networking devices .

(4 marks)

4a. Distinguish between guided and unguided transmission media

(4 marks)

b. Describe the aid of a suitable sketch, the performance of optical fiber in terms of attenuation as a function of frequency

(4 marks)

c. Explain, using a suitable illustration, the performance of coaxial cable in terms of attenuation as a function of frequency

(4 marks)

4a. Define cryptography in the context of network security

(2 marks)

b. Describe the following cryptographic techniques:
   i. Symmetric-key cryptography
   ii. Asymmetric-key cryptography

(2 marks)

c. Use the shift cipher with the key = 15 to encode the message; "HELLO"

(2 marks)

5a. LIST and, briefly describe the main transmission impairments

(8 marks)

b. What is the performance metric used in evaluating the performance of transmission systems?

(4 marks)

6a. Define a network operating system(NOS) and state its function(s)

(4 marks)

b. Compare a computer with NOS and one without NOS

(4 marks)

c. Distinguish between **peer-peer** and **client-server** network configurations

(4 marks)

7a. Write short but pertinent notes on the following switching techniques:
   - Circuit switching
   - Packet switching

(4 marks)

b. Describe, briefly, the time-division switching technique

(4 marks)

c. Design a three-stage, 200 x 200 switch(N =200) with k = 4, n = 20. Use the CLOS criterion

(4 marks)