



NATIONAL OPEN UNIVERSITY OF NIGERIA
14-16 AHMADU BELLO WAY, VICTORIA ISLAND LAGOS
MARCH/APRIL 2016 EXAMINATION

SCHOOL OF SCIENCE AND TECHNOLOGY

COURSE CODE: CIT303
COURSE TITLE: Principles of Communication Technology

Time: 3 hrs.

Course Credit Unit: 3

Instruction: Attempt any five (5) questions. Each question carries 14 marks

Question 1

- a) Outline the layers of Open System Interconnection Reference Model (OSI Model), in the right order.
- b) Write briefly on the Physical Layer.
- c) Cryptography algorithms (ciphers) can be divided into two groups, True or False? If True;
 - i) Write briefly on any of the two groups

Question 2

- a. With the aid of a table ONLY, describe the five classes of IP addresses under the following fields:
 - i. IP Address Class
 - ii. Format
 - iii. Purpose
 - iv. Number of network/ host bits
 - v. Max number of hosts(7.5 marks)
- b. Briefly explain each of the following terms:
 - i. Linear filter (1 mark)
 - ii. Stable filter (1 mark)
 - iii. Unstable filter (1 mark)
 - iv. Time-invariant filter (1 mark)
 - v. Adaptive filter (1 mark)

vi. Linearity (in the context of linear-time invariant (LTI) (1.5 marks)

Question 3

- a. Encrypt the word “IGNORANCE” with the following ciphers:
- i. Shift cipher with key=1 (1 mark)
 - ii. Shift cipher with key= 26 (1 mark)
 - iii. Shift cipher with key=0 (1 mark)
 - iv. Transposition cipher where plain text: 1 2 3 4 5 6 7 8 9 and cipher text: 4 3 1 5 2 6 7 9 8 (with no bogus character) (1.5 marks)
- b. Decrypt the word “ANCEIGNOR” with the following ciphers:
- xx. Shift cipher with key=1 (1 mark)
 - xxi. Shift cipher with key= 26 (1 mark)
 - xxii. Shift cipher with key=0 (1 mark)
 - xxiii. Transposition cipher where plain text: 1 2 3 4 5 6 7 8 9 and cipher text: 4 3 1 5 2 6 7 9 8 (with no bogus character) (1.5 marks)
- c. The amplification in a cable is usually defined in decibels per kilometer (dB/km). If the signal at the beginning of a cable with 2 dB/km has a power of 2 mW, what is the power of the signal at 5 km? (2.5 marks)
- d. Briefly explain the term attenuation (1.5 marks)

Question 4

- a) What is Data Communications? (3 marks)
- b) Define Protocols. (3marks)
- c) The effectiveness of a data communications system depends on four fundamental characteristics. List and define these characteristics. (8 marks)

Question 5

Contrast between:

- a) Analog Signal Processing and Digital Signal Processing (4.5 marks)
- b) OSI Presentation Layer and OSI Application Layer (5 marks)
- c) Symmetric-Key and Asymmetric-Key (4.5 marks)

Question 6

- a. Define the term “network topology”. (1 mark).
- b. With the aid of diagrams, briefly explain the following network topologies:
- i. Ring (2 marks)
 - ii. Mesh (2 marks)
 - iii. Tree (2 marks).

- c. State and briefly explain 3 advantages and 3 disadvantages of using fiber optic cables in networking. (4.5 marks)
- d. State 1 advantage and 2 disadvantages of STP cables in comparison to UTP cables. (2.5 marks)