COURSE CODE: CIT 303
COURSE TITLE: Principles of Communication Technology
CREDIT: 3 Units
TIME: 2½ Hours
INSTRUCTION: Answer Question ONE (1) and any other THREE (3) Questions

Question 1
1(a) Describe Symmetric-Key Cryptography and provide a diagram that illustrates the concept. **(2marks)**
1(b) A data communications system has five components. List and briefly explain them. **(10 Marks)**
1(c) Explain Half-duplex communication by providing a diagram and an example.   **(3marks)**
1(d) List and explain the key elements of a communication protocol.   **(3marks)**
1(e) Explain the two subcategories of communication standards you know.   **(2marks)**
1(f)i. Each TCP/IP host on an IPv4 network is assigned a unique 32-bit logical address that is divided into two main parts. Mention and describe them. **(2 Marks)**
1(f)ii. Define the term Analog Signal Processing and differentiate it from Digital Signal Processing. **(3 Marks)**

Question 2
2(a) Describe the common basic networking devices and identify which OSI layers they belong to. **(5marks)**
2(b)i. Network topology has two types, name them. **(2marks)**
2(b)ii. Signal sampling is usually carried out in two stages, discretization and quantization. Describe what happens in each stage. **(2marks)**
2(c) Explain in detail the features of the Datalink layer of the OSI model. **(6marks)**

Question 3
3(a) Explain three (3) functions of the Network Layer.   **(6marks)**
3(b) Differentiate between Mesh network topology and Tree network topology using only diagrams. **(4marks)**
3(c) Explain the concept of Signal Attenuation**. (2marks)**
3(d) A signal travels through an amplifier, and its power is increased 10 times. Calculate the amplification in decibels. **(3marks)**

Question 4
4(a) Compare the key features of Peer-to-Peer versus Client/Server networks. (**6 Marks)**
4(b) Packet-switched networks can further be divided into two subcategories list and explain them. **(2 Marks)**
4(c) Compare Time and Space-Division Switching by highlighting the main advantages/disadvantages of both approaches. **(5 Marks)**
4(d) Draw a diagram for a PC Without LAN software. **(2 Marks)**

Question 5
5(a) Network Security can provide five services; Message confidentiality, Message Integrity, Message Authentication, Message Non repudiation and Entity Authentication. Explain them. **(5 marks)**
5b. In the context of cryptography, distinguish between symmetric and asymmetric keys. **(8marks)**
5(c) Describe Modern Round Ciphers. **(2marks)**

Question 6
6(a) A network must be able to meet a certain number of criteria. List and explain Three (3) of the most important criteria. **(6marks)**
6bi. What is the full meaning of CFB? **(1 Mark)**
6bii. CFB is a mode of operation for which types of ciphers? **(1 Mark)**
6biii. Identify three (3) characteristics of CFB. **(3 Marks)**
6(c) Describe the functions of Network Operating System (NOS). **(2 Marks)**
6(d) The Redirector is the key piece of software in a computer with a NOS. Explain why this is true. **(2 Marks)**