



**ELIZADE UNIVERSITY, ILARA-MOKIN, ONDO
STATE
FACULTY OF ENGINEERING
DEPARTMENT OF COMPUTER ENGINEERING**

FIRST SEMESTER EXAMINATION, 2020/2021 ACADEMIC SESSION

COURSE TITLE: DATA COMMUNICATION AND NETWORKS

COURSE CODE: ECE 409 AND ECT 415

EXAMINATION DATE: MARCH 2021

COURSE LECTURER: PROF A. O. OLUWATOPE & ENGR A. O. OLAWUYI

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HOD's SIGNATURE

TIME ALLOWED: 3 HOURS

INSTRUCTIONS:

1. ANSWER FOUR QUESTIONS ONLY.
2. SEVERE PENALTIES APPLY FOR MISCONDUCT, CHEATING, POSSESSION OF UNAUTHORIZED MATERIALS DURING EXAM.
3. YOU ARE NOT ALLOWED TO BORROW ANY WRITING MATERIALS DURING THE EXAMINATION.

QUESTION #1

- Highlight the components of a data communication system. [2½ marks]
- List the criteria necessary for an effective and efficient networks. [1½ marks]
- The effectiveness of a data communication system depends on four fundamental characteristics. Discuss. [6 marks]
- What do you understand by 'switching' and discuss the types of switched network available? [5 marks]

QUESTION #2

- Briefly discuss the services provided by a data link layer. [8 marks]
- Briefly describe the types of data link addresses with relevant examples. [3 marks]
- Assume that there are 20 computers connected to the network (link): computer A, computer B, and 18 other computers. Also assume that computer A has 10 datagrams to send to computer B in one second. Using this case study, what is the implication of a system using Address Resolution Protocol (ARP) over a system not using ARP protocol? [4 marks]

QUESTION #3

- Discuss the TCP/IP protocol suite. [10 marks]
- Highlight the advantages of optical fiber over twisted pair coaxial cable. [5 marks]

QUESTION #4

- Explain the following concepts of error detection and correction: [4 marks]
 - redundancy
 - block coding
- List the types of errors in data communication. [1 mark]
- The table below shows the list of dataword and codeword. Assume the sender encodes the dataword 11 as 11110 and sends it to the receiver. Consider the following cases (i-iii) below. [6 marks]

<i>Dataword</i>	<i>Codeword</i>
00	00000
01	01011
10	10101
11	11110

- the receiver receives 11110.
 - the receiver receives 11100.
 - the receiver receives 00000.
- What will be the feedback from the receiver in each case?
- From the table above, find the minimum hamming distance of the coding scheme. [4 marks]

QUESTION #5

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- a. Explain why collision is an issue in a random access protocol but not in controlled access or channelization protocols. [4 marks]
- b. Briefly discuss the following multiple access protocols: [6 marks]
 - i. reservation method
 - ii. frequency division multiple access
 - iii. carrier sense multiple access
- c. A network using CSMA/CD has a bandwidth of 10Mbps. If the maximum propagation time is $25.6\mu\text{s}$, what is the minimum size of the frame? What will be the minimum frame size if the data rate is increased to 100Mbps? [5 marks]

QUESTION #6

- a. Discuss the characteristics of the standard ethernet. [6 marks]
- b. In a standard Ethernet with the transmission rate of 10Mbps, the length of the medium is 2500m and the size of the frame is 512 bits. The signal propagate at speed of 2×10^8 m/s, find the efficiency of the Ethernet. [4 marks]
- c. With the use of flowchart, explain Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA). [5 marks]