

**SIR ARTHUR LEWIS COMMUNITY COLLEGE**  
**ENGINEERING AND THE CIRCULAR ECONOMY**  
**ACADEMIC YEAR (2024/2025) - SEMESTER ONE**  
**END OF SEMESTER EXAMINATION**

TUTOR (S) : Mr Lindsley Philbert &  
Mrs Annie Sealy-Emmanuel

PROGRAMME TITLE : Computer Systems Engineering  
Electrical Engineering

COURSE TITLE : Data Communications

COURSE CODE : ELE210

LEVEL : Associate Degree/ Year Two

PAPER : One

DATE : Monday, 9<sup>th</sup> December 2024

COMMENCEMENT TIME : 1:00 p.m.

DURATION : Two (2) Hours

INVIGILATOR(S) : K. Emmanuel (Chief) & S. Auguste

ROOM(S) : OTW-1R-01

STUDENT ID :

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**GENERAL INFORMATION AND INSTRUCTIONS**

- This paper consist of One (1) Section with eight (8) Long Answer Questions. **You are required to answer ALL questions.** Question one (1) MUST be attempted on this question paper whilst questions two (2) – eight (8) must be answered on the foolscap provided.
- The marks allocated are in the brackets “()” next to each question. Marks are awarded accordingly.
- Students must sign **IN** and **OUT** on the examination class list.
- Students must **not** write their names on their answer sheets, only their ID number
- Please number your responses accurately.
- Calculators are needed
- **Note: Bags, Books as well as writing paper not given by the invigilator should be deposited at the front of the examination room or as otherwise indicated.**
- **All cell phones must be turned off during the exam**

**DO NOT TURN THIS COVER SHEET UNTIL  
YOU ARE TOLD TO DO SO!!!**

### SECTION A

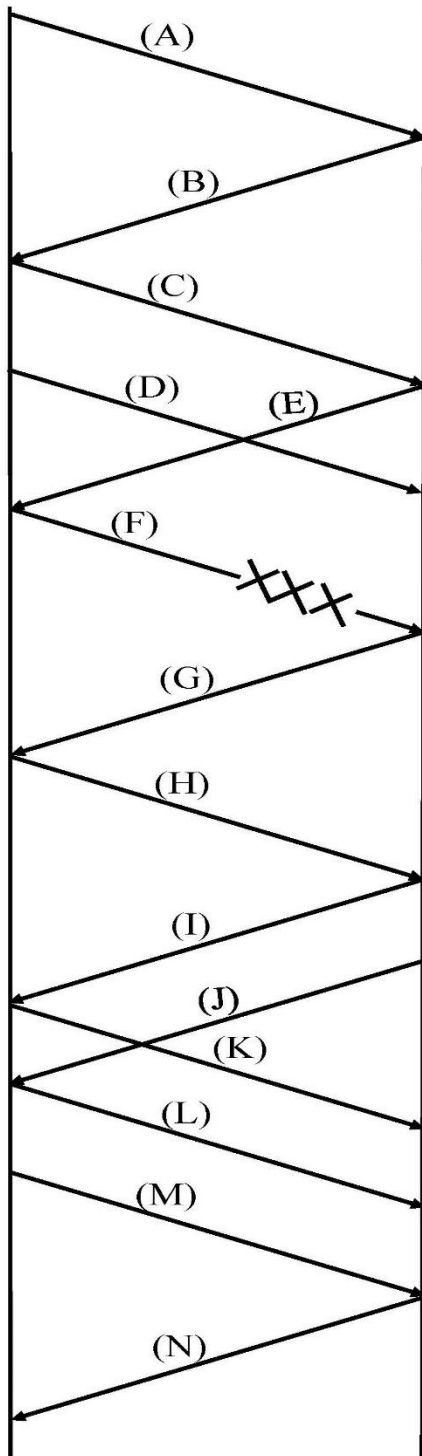
Answer question one on the question paper.

**Question One**

Put in the missing information for the HDLC full-duplex data transfer between two combined stations. Complete link setup, data transfer and link termination.

All Frames transmitted are Information frames, where required, use the supervisory command – SREJ- for any frames that must be re-transmitted.

**(14 marks)**



A	
B	
C	
D	
E	
F	
G	
H	
I	
J	
K	
L	
M	
N	

**Answer questions two to eight on the foolscap provided.**

**Question Two**

We want to transmit 500 characters with each character encoded as 8 data bits.

- (i) Find the number of transmitted bits for synchronous transmission. **(1 mark)**
- (ii) Find the number of transmitted bits for Asynchronous transmission using the minimum frame size. **(1 mark)**
- (iii) Find the efficiency of the transmission in each case. **(2 marks)**

**Question Three**

Consider a network connecting two systems located 8000 km apart. The bandwidth of the network is 500 Mbps. The propagation speed of the media is  $4 \times 10^6$  meters per second. The average packet size is  $10^7$  bits. Find the propagation time and transmission time. Which is the dominant factor? Show all formulas used. **(5 marks)**

**Question Four**

- (i) The actual communication in a circuit-switched network requires three phases, Explain. **(3 marks)**
- (ii) Why does a circuit-switched network need end-to-end addressing during the first and last phase? **(2 marks)**
- (iii) With regards to path selection and message delivery, differentiate between the packet switching concepts of Datagrams and Virtual circuits. **(4 marks)**
- (iv) Packet switched networks use connectionless transmission. What is connectionless transmission? **(1 mark)**

**Question Five**

- (i) As it relates to data transmission, give ONE reason why network congestion occur? **(1 mark)**
- (ii) State the category of congestion control that Resource reservation fall under and explain how is used as a congestion control method. **(4 marks)**

**Question Six**

- (a) There are three error detection methods currently in use, list them. **(3 marks)**
- (b) Explain how even parity and odd parity differ when used for error detection. **(2 marks)**

**Question Seven**

- (a) With regards to data transmission, what is the main difference between a switch and a hub? **(2 marks)**
- (b) Give the function of a router in an internetwork and name one characteristic **(2 marks)**
- (c) Name the networking device that matches each of the following characteristics **(5 marks)**
  - (i) It cannot filter network traffic and cannot determine the best path

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- (ii) It connects two segments of the same network, overcoming the distance limitations of the transmission medium
- (iii) It checks the destination address of a frame and decides if the frame should be forwarded or dropped.
- (iv) Unlike a hub, which shares bandwidth among all its ports, it allocates bandwidth for each port.
- (v) It directs data requests from one network to another, examine incoming packets to determine the appropriate destination address and then forward the packet to that destination

**Question Eight**

- (a) Name the three important Routing elements **(3 marks)**
- (b) One routing metric is Hop count. Define Hop count **(1 mark)**
- (c) Explain how flooding routing works. Give one advantage and one disadvantage of Flooding. **(4 marks)**

**END OF EXAMINATION!!!**