

INT478E: Network Architecture and Data Communications I Midterm Exam Two

- * You have **50 minutes** for this exam.
- * **YOU MUST SHOW YOUR WORK.**
- * Include the **units** for numerical answers.
- * **Indicate** your answers by underlining them or circling them.
- * This exam is open book and open notes.
- * You may use a calculator.

Name: _____ [5 points]

Useful Information:

$B = f_{\max} - f_{\min}$	10^{15}	peta	P
$M = L = 2^n$	10^{12}	tera	T
$R = rn$	10^9	giga	G
bit time = $1/R$	10^6	mega	M
	10^3	kilo	k
$T = 1/f$	10^0		
X in dB = $10 \log(X)$	10^{-1}	deci	d
$C = 2B \log_2(1 + S/N)$	10^{-2}	centi	c
$Y = A \sin(2\pi f + \phi)$	10^{-3}	mili	m
	10^{-6}	micro	μ
SNR = $10 \log(S/N)$	10^{-9}	nano	n
$\log_n(x) = \log_{10}(x) / \log_{10}(n)$	10^{-12}	pico	p
	10^{-15}	femto	f
$\% \text{overhead} = \frac{\text{non-info bits}}{\text{total bits}}$			
$\% \text{throughput} = \frac{\text{info bits}}{\text{total bits}}$			

1. [15 points] Clearly define **THREE** of the following:

a. Parity Bit	f. FDM
b. Framing Error	g. Selective Repeat Request
c. Simplex	h. Bit robbing
d. TDD	i. Synchronous transmission
e. TDMA	j. LAPD

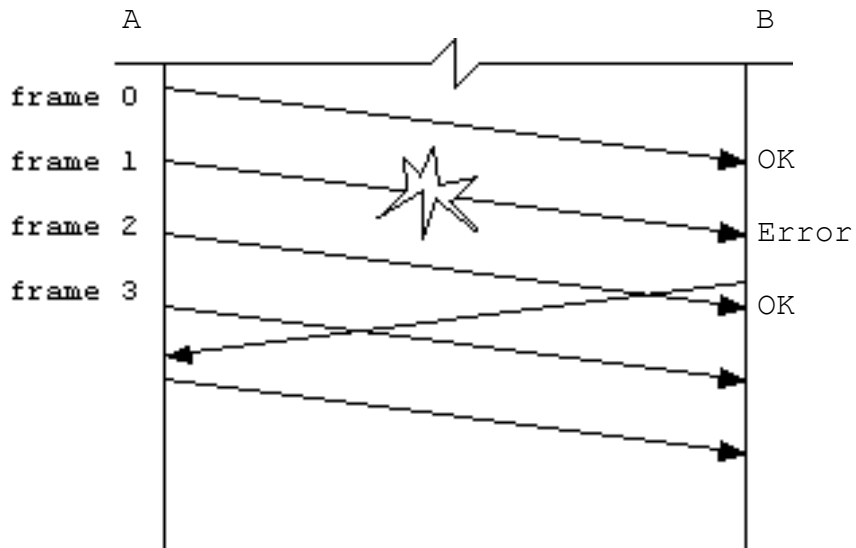
A) _____

B) _____

C) _____

2. [10 points] What are the advantages and disadvantages of using Go-back-N error control?

The following diagram applies to questions 3 ~ 6.



3. [5 points] The data link control method shown is best described as:

- Sliding Window, Go-back-N, Half Duplex
- Stop and Wait, Go-back-N, Half Duplex
- Sliding Window, Go-back-N, Full Duplex
- Stop and Wait, Go-back-N, Full Duplex
- Stop and Wait, Full Duplex

4. [5 points] What message does "B" send to "A" after frame one is received in error (explain)?

5. [6 points] What will "B" do with:

A) Frame 0

B) Frame 1

C) Frame 2

6. [2 points] What frame would "A" send after receiving from "B" the message noted in question 5?

7. [10 points] Describe the flow and error control methods of High-Level Data Link Control (HDLC).

8. [10 points] The following bit stuffed HDLC frame is received at layer two from layer one. Strip off the layer 2 header and trailer, and unstuff the data in preparation for handing it up to layer three. (write small and neatly)

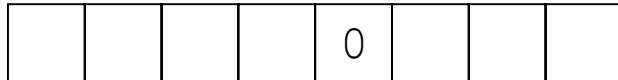
Layer 1 HDLC frame delivered to Layer 2	Data sent up to Layer 3 from layer 2
-----	-----
(flag) 01111110	
(address) 111110111	
(control) 01100100	
(info) 1111100001010011111	
	0111110111110111110
	11111011
(FCS) 1101001000101101	
(flag) 01111110	

9. Look at the received HDLC frame in question 8.

A) [3 points] What frame number did you just receive (answer in binary)?

B) [3 points] What frame is the transmitter expecting from you next (answer in binary)?

C) [5 points] You did not (and were not required to) reply to the frame received in question 8. What should the control field of the next frame you receive look like? The poll/final bit is given for you.



10. Consider an E-1 system.

A) [3 points] What is the total data rate of an E-1 system?

B) [3 points] What is the information data rate?

C) [1 point] Is an E-1 system a synchronous system?

D) [2 points] What is the bit time on an E-1 system?

12. [12 points] Name and describe the three main parts of the circuit switched telephone network?