# Midterm Version

0

Each exam is equally difficult. Answer your own exam.

# MID-TERM EXAMINATION 11:30 – 12:20 AM March 19, 2015

This exam has three (3) questions on one (1) page. The marks for each question are as indicated. There are a total of 10 marks. Answer all questions. Write your answers and all rough work in the exam book provided. Show your work. Draw a box around your final answer. Numerical answers must include units. You may answer the questions in any order. Books and notes are allowed. No electronic devices other than calculators are allowed. Take this exam paper with you when you leave.

Show your work.

## Question 1 (4 marks)

You are measuring the voltage across a POTS pair and initially see a DC voltage difference of about 45V.

The voltage difference then drops to a few volts DC with a small AC voltage superimposed on it.

Shortly after that you see a sequence of pulses at about 10 pulses per second.

- (a) What caused the DC voltage to drop?
- (b) What was/were the frequency(ies) of the small AC signal?
- (c) What caused the pulses?
- (d) What type of signalling was being used by the subscriber?

#### Question 2 (4 marks)

You are installing a PON system with an ONT that requires a signal level of -23 dBm to operate properly. You will use optical fiber with a loss of 0.3 dB/km. Subscribers will be located at distances of up to 20 km from the OLT. The system will use a splitting ratio of 1:32. Assuming ideal (lossless) splitters, no other losses and no margin, what is the minimum optical transmitter power required?

#### Question 3 (3 marks)

You observe the following waveform on a T1 line using B8ZS encoding. How many bits were transmitted? How many AMI line coding violations are included in this waveform? What sequence of bits was transmitted?



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## Question 2 (4 marks)

You are installing a PON system with an ONT that requires a signal level of -23 dBm to operate properly. You will use optical fiber with a loss of 0.3 dB/km. Subscribers will be located at distances of up to 20 km from the OLT. The system will use a splitting ratio of 1:64. Assuming ideal (lossless) splitters, no other losses and no margin, what is the minimum optical transmitter power required?

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You observe the following waveform on a T1 line using B8ZS encoding. How many bits were transmitted? How many AMI line coding violations are included in this waveform? What sequence of bits was transmitted?



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#### Question 2 (4 marks)

You are installing a PON system with an ONT that requires a signal level of -20 dBm to operate properly. You will use optical fiber with a loss of 0.3 dB/km. Subscribers will be located at distances of up to 30 km from the OLT. The system will use a splitting ratio of 1:32. Assuming ideal (lossless) splitters, no other losses and no margin, what is the minimum optical transmitter power required?

#### Question 3 (3 marks)

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