UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2019/2020

COURSE NAME	:	ELECTRONIC COMMUNICATION SYSTEM
COURSE CODE	:	BNR 20903
PROGRAMME CODE	:	BND / BNE / BNF
EXAMINATION DATE	:	DECEMBER 2019 / JANUARY 2020
DURATION	:	2 HOURS 30 MINUTES
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

TERBUKA

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

Q1   (a)   An amplifier has gain of 50,000, which is too much for the amplification. With and input voltage of 20 μV, what attenuation factor is needed to keep the output voltage from exceeding 100 mV? Let A_1 = amplifier gain; A_2 = attenuation factor; A_T=total gain.

(6 marks)

(b)   Two-way (duplex) is a type of transmission mode in electronic communications system. Discuss the difference between half duplex and full duplex and give an example of each.

(4 marks)

(c)   Two resistors of 20 kΩ and 50 kΩ are at room temperature (290 K). For a bandwidth of 100 kHz, calculate the thermal noise voltage generated by

(i)   each resistor

(5 marks)

(ii)   the two resistor in series

(5 marks)

(iii) the two resistor in parallel

(5 marks)

Q2   (a)   With the add of figure, differentiate between a signal represented in time-domain and a signal represented in frequency domain.

(8 marks)

(b)   Thermal noise is one of the uncorrelated noises exists in electronic communication system

(i)   Explain how thermal noise exists?

(2 marks)

(ii)   Calculate the thermal noise power in watts and dBm from any resistor at room temperature (290 K) for a bandwidth of 1 MHz.

(6 marks)

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(c)   For a nonlinear amplifier with two input frequencies; 2 kHz and 7 kHz, determine,

(i)   First three harmonics present in the output for each input frequency

(4 marks)

(ii) Cross product frequencies for values of m and n of 1, 2 and 3.

(5 marks)

Q3   (a)   A carrier signal with a peak voltage of 2.0 V is amplitude modulation with 10 kHz sine wave. The modulation voltage has an effective value of 750 mV. Compute the following:

(i)   The percent modulation, *m*.

(2 marks)

(ii) The instantaneous voltage of positive and negative envelope when the 10 kHz sine has completed 68 μs of its cycle.

(4 marks)

(iii) Illustrate the resulting AM waveform

(3 marks)

(b)   Based on a Smith Chart, determine the input impedance and VSWR for a transmission line 1.35λ long with a characteristic impedance $Z_0 = 50\ \Omega$ and a load impedance $Z_L = 30 - j40\ \Omega$.

(16 marks)

Q4   (a)   A piece of RG-59B/U coaxial cable has a 7575-Ω characteristic impedance and a nominal capacitance of 69 pF/m.

(i)   Determine its inductance per meter.

(2 marks)

(ii) If the diameter of the inner conductor is 0.584 mm, and the dielectric constant of the insulation is 2.23, calculate the outer conductor diameter?

(4 marks)

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(b)   Briefly explain the following terms:

(i)   Wave attenuation

(3 marks)

(ii)   Absorption loss

(3 marks)

(iii) Electromagnetic wave reflection

(3 marks)

(c)   The analogue signal with frequency of 4 kHz, Maximum and minimum voltage of 8 V and -4 V respectively are sampled with the sampling frequency which is 50% higher than the minimum sampling frequency of the Nyquist rate. The bit rate of this Pulse code modulation (PCM) transmission is fixed at 24 kbps.

(i)   Determine the quantization level

(4 marks)

(ii)   Based on the quantization level that you state in (i), calculate the corresponding voltage for each quantization level.

(4 marks)

(iii) Calculate the bandwidth, BW

(2 marks)

- END OF QUESTION -