INTI
INTERNATIONAL COLLEGE PENANG (507232-U)
LAUREATE INTERNATIONAL UNIVERSITIES

FINAL
Examination Paper

(COVER PAGE)

Session : August 2012

Programme : Diploma in Electrical and Electronic Engineering Programme

Course : **EEE2107 : Introduction to Communication**

Date of Examination : 14 December 2012

Time : 11a.m. – 1p.m. Reading Time : Nil

Duration : 2 Hours

Special Instructions :

This paper consists of **SIX (6)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

Materials permitted : Nil

Materials provided : Nil

Examiner(s) : **V.Meenakshi**

Moderator : **Cheah Kean Seng**

This paper consists of 5 printed pages, including the cover page.

INTI INTERNATIONAL COLLEGE PENANG

DIPLOMA IN ELECTRICAL AND ELECTRONIC ENGINEERING PROGRAMME (DEE)
DIPLOMA IN MICROELECTRONIC ENGINEERING PROGRAMME (DMI)
DIPLOMA IN TELECOMMUNICATION ENGINEERING PROGRAMME (DTE)

EEE2107: INTRODUCTION TO COMMUNICATION
FINAL EXAMINATION: AUGUST 2012 SESSION

Instructions: This paper consists of **SIX (6)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

Question 1

(a) Define the following terms
- (i) Signal
- (ii) Demodulation.
- (iii) Multiplexing.
- (iv) Aperiodic signal.
- (v) Periodic Signals.

(10 marks)

(b) An FM signal expressed as $V(t) = 50Cos(2\pi 10^7 t + 0.5Cos2\pi 10^4 t)$ is measured across a 50 Ω antenna. Determine the following
- (i) Total antenna power
- (ii) Modulation Index (shows the steps to derive it)
- (iii) Peak frequency deviation
- (iv) Bandwidth based on Carson's rule
- (v) Power of the first side band at the antenna.
- (vi) Sum of all side band power at the antenna.

(15 marks)

Question 2

(a) Draw and explain the architecture of super heterodyne receivers and explain how this can overcome the limitations of Tuned Radio Frequency receivers.

(12 marks)

(b) A carrier of 200 kHz with amplitude of 2V is frequency modulated by a signal, $m(t)=3Cos(6\pi 10^3 t)$ with a modulation index of 4. Calculate:
- (i) The frequency deviation (Δf).
- (ii) The frequency modulation sensitivity (K).
- (iii)The maximum and minimum instantaneous frequencies (fi).

The Carson bandwidth

(10 marks)

(c) Define Sampling theorem.

(3 marks)

Question 3

(a) What is frequency division multiple access? Give an example of such a scheme?

(8 marks)

(b) A transmitter supplies 8Kw to the antenna when modulated. Determine the total power radiated when modulated to 30%.

(4 marks)

(c) The antenna current of an AM transmitter is 8A when only carrier is sent. It increases to 8.93A when the carrier is modulated by a single sine wave. Find the percentage modulation.

(4 marks)

(d) The 24 channel T1 PCM carrier telephone system bandwidth limits of input voice frequencies in each channel to 4 kHz. The ratio of maximum voice level gives a dynamic range of 72 db,Calculate

i) minimum Sampling rate
ii) number of bit required to quantize it for dynamic range of 72 dB
iii) the required bit rate at the output of the multiplexer

(9 marks)

Question 4

(a) (i) With the aid of diagram explain about Delta modulation also mention the two noises involved in DM.

(6 marks)

(ii) A DSB-AM transmission has a modulation index, m = 30% and the total transmitted power is 209 W. Calculate the carrier power and the side band power of this transmission.

(6 marks)

(b) (i) Compare AM with DSB-SC and SSB-SC.

(6 marks)

(ii) Draw the block diagram of the PCM system and explain how it works?

(7 marks)

Question 5

(a) (i) Determine the system noise temperature (T_{sys}) of a satellite receiver station in order to maintain a constant figure of merit equal to 40.7dB with a receiver antenna gain of 55dB.

(8 marks)

(ii) What is single tone and multi tone modulation?

(6 marks)

(b) Briefly explain what you understand about TDM and with the help of a simple diagram show a 4-channel TDM system that includes the transmitter and receiver ends

(8 marks)

(c) Define noise figure. (3 marks)

Question 6

(a) i) A receiver has an input power of 42.2 mW while the noise power is 33.3μW.Find the SNR for the receiver.

(3 marks)

ii) Find the transmission bit rate if the baud rate is 1200 and there are two bits per symbol or single transition.

(2 marks)

(b) The non-modulated carrier wave of a FM signal can be represented by $Vc(t) = 10Cos(2\pi 10^6 t)$. This carrier wave is modulated with a signal $Vm(t) = 2Cos(2\pi 10^4 t)$ resulting in a FM signal with modulation index of 2.

(i) What is the Carson's bandwidth requirement for the modulated signal?
(ii) Show the spectrum (magnitude and phase) of the modulated signal.
(iii) Calculate the combined power of the carrier and all the sideband (within the Carson's bandwidth) of the modulated signal.

(14 marks)

(c) What are the characteristics of a receiver? Define all the characteristics.

(6 marks)

--THE END--

EEE 2107/ (F)/AUGUST 2012/ V.Meenakshi Sundaram/date