Kaferelsheikh University		Faculty of Engineering
Department of Electrical Engineering		Year: 3rd Electronics and
Subject: Communication Systems (1)		Electrical Communications
Academic Number: ECE3005		Final Exam: 2 Pages
Full Mark: 85	Date: 20/1/2019	Time allowed: 3 h

This exam measures ILOs no.: a.3, a.4, a. 8, a.18, a.25, b.2, b.7, b.15, c.1, c.14.

Answer the following questions:

[1] Question One: (20 Marks)

A- Sketch the functional block diagram of the analog communication system, and then explain the functions performed by each block. (10 marks)

B- Explain with net sketches and examples the modes of the channel operation. (10 marks)

[2] Question Two: (20 Marks)

A- Sketch the modulator and demodulator block diagram of the conventional amplitude modulation (full AM). Then write its general form equation. (10 marks)

B- Sketch the modulator and demodulator block diagram of the double side band suppressed carrier amplitude modulation. Then write its general form equation. (10 marks)

[3] Question Three: (15 Marks)

A carrier signal $c(t) = A_c \cos(\omega_c t)$ is modulated by a single tone signal $m(t) = A_m \cos(\omega_m t)$ to form the amplitude modulated signal (AM) (5 marks)

$$s(t) = [A_c + A_m \cos(\omega_m t)] \cos(\omega_c t)$$

where $A_c = 10$; $A_m = 2$; $f_c = 1000Hz$; $f_m = 50Hz$.

  i.   Calculate the modulation index μ. (5 marks)

  ii. What is the required bandwidth to transmit the AM signal. (5 marks)

  iii. Show that the total sideband power to the total power in the modulated wave is equal to $\mu^2/(2+\mu^2)$ (5 marks)

[4] Question Four: (30 Marks)

The modulating signal $m(t) = 20\,\text{sinc}\,2000\pi t$ is multiplied by the carrier $c(t) = 100\cos(2\pi f_c t)$ where $f_c = 800$ kHz.

i. Sketch the DSB-SC modulated signal in time domain. (3 marks)

ii. Determine and sketch spectrum of the DSB-SC signal. (6 marks)

iii. Determine the (time domain) expression for the LSB of the SSB AM signal. (3 marks)

iv. Determine and sketch the spectrum of the LSB of the SSB AM signal. (6 marks)

v. Determine the (time domain) expression for the AM signal. (3 marks)

vi. Sketch the AM modulated signal in time domain. (3 marks)

vii. Determine and sketch the spectrum of the AM signal. (6 marks)

Best Wishes   Committee of Correctors and Testers

Dr. Ibrahim Elashry
Dr. Ensherah Naeem