



UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF MARINE ENGINEERING TECHNOLOGY

FINAL EXAMINATION
JANUARY 2016 SEMESTER

COURSE CODE : LED 20703

COURSE NAME : ELECTRONIC COMMUNICATION SYSTEM

PROGRAMME NAME : DIPLOMA ELECTRICAL & ELECTRONIC MARINE
(FOR MPU: PROGRAMME LEVEL) TECHNOLOGY

DATE : 28 MAY 2016

TIME : 8.00 AM – 11.00 AM

DURATION : 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please **CAREFULLY** read the instructions given in the question paper.
2. This question paper has information printed on both sides of the paper.
3. This question paper consists of **TWO (2)** sections; Section A and Section B.
4. Answer **ALL** questions in Section A. For Section B, answer **TWO (2)** questions.
5. Please write your answers on the answer booklet provided.
6. Answer all questions in English language **ONLY**.

THERE ARE 5 PAGES OF QUESTIONS, INCLUDING THIS PAGE.

SECTION A (Total: 60 marks)

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

Question 1

- (a) Define an electronic communication system. (2 marks)
- (b) With the aid of a diagram, sketch and label a basic block diagram of a communication system. Explain the function of each block. (9 marks)
- (c) Explain the meaning of the following transmission modes. For each of them, give an example of a practical system that uses that kind of mode? (6 marks)
- (i) Simplex
 - (ii) Duplex / Full Duplex
 - (iii) Half Duplex
- (d) A music signal has a frequency component from 20 Hz to 10 kHz is being amplitude modulated by a 1.4 MHz carrier signal. Calculate the wavelength for frequencies generated for the upper and lower sidebands? (3 marks)

Question 2

- (a) Describe the function of an antenna? (2 marks)
- (b) With the aid of diagram, explain how to convert a transmission line into an antenna. (4 marks)
- (c) Name and sketch FOUR (4) types of commonly used antenna. (4 marks)
- (d) With the aid of diagram, explain briefly the construction and component of a fiber optic cable. (4 marks)

- (e) There are several important Antenna Characteristics that should be considered when choosing an antenna such as Antenna radiation pattern, Directivity, Antenna gain, Polarization and Effective radiated power (ERP). Explain in details any THREE (3) of the antenna characteristics.

(6 marks)

Question 3

- (a) With the aid of a diagram, explain the operation of ALL network topologies that is currently used for Local Area Network (LAN).

(6 marks)

- (b) A FM signal is given by:

$$V_{FM}(t) = 100 \cos [200 \pi \times 10^6 t + 4 \sin 2 \pi \times 10^3 t] \text{ V}$$

Determine the:

- (i) number of significant sideband (n),
- (ii) the frequency deviation (Δf)
- (iii) the carrier swing frequency (fcs)
- (iv) maximum and minimum frequencies
- (v) power in the FM signal that appears across a 100Ω load
- (vi) Bandwidth by using both Bessel Function Table.
- (vii) Sketch and label the diagram in frequency domain.

(14 marks)

SECTION B (Total: 40 marks)

INSTRUCTION: Answer TWO (2) questions.

Please use the answer booklet provided.

Question 4

- (a) With the aid of a diagram, describe THREE (3) radio wave propagation methods available and commonly used in Radio Communication.

(6 marks)

- (b) An oscilloscope is used to monitor an output of a conventional AM modulator. The input signals of the modulator are:

$$V_1 = 20 \cos 1070k \pi t$$

$$V_2 = 5 \cos 20k \pi t$$

Determine the:

- (i) upper and lower side frequencies
- (ii) modulation coefficient,
- (iii) upper and lower sideband amplitude voltages,
- (iv) maximum and minimum amplitudes of AM modulated wave,
- (v) total transmitted power using conventional AM for 75Ω load.

(14 marks)

Question 5

- (a) A circuit of two amplifiers with gains of 7.8 and 15.3 dB and two filters with attenuations of -15.4 and -3.9 dB. If the output voltage is 900 mV, calculate the input voltage.

(5 marks)

- (a) In an AM system, the 75 MHz carrier signal has an amplitude of 50V is modulated by a 3 kHz audio sinusoidal signal having an amplitude of 20V. Determine

- (i) the modulation factor and percent modulation.
- (ii) the frequency that will show up in a spectrum analysis of the modulated wave.
- (iii) Write the trigonometric equation for the carrier and the modulating waves.

(13 marks)

- (b) In an Amplitude modulated wave has a power content of 800 W at its carrier frequency. Determine the power content of the sidebands for a 90% modulation.

(2 marks)

Question 6

- (a) Explain what is meant by a baseband transmission. Describe in your own word, why baseband transmission is not suitable for long distance communication? (4 marks)
- (b) Antennas produce two sets of fields that are the near field and the far field. Explain the meaning of both fields? (4 marks)
- (c) Explain in detail THREE (3) basic requirements of a communication system. (3 marks)
- (d) With the aid of a diagram, draw the uplink and downlink connection in a satellite communication system. Explain the meaning and its function. (4 marks)
- (e) With the aid of a diagram, explain and describe the different types of satellite orbits? (5 marks)

END OF EXAMINATION PAPER

APPENDIX 1

Table 1: Bessel Function Table

Modulation Index	Carrier	Sideband (Pairs)															
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	16th
0.00	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0.25	0.98	0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0.5	0.94	0.24	0.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.0	0.77	0.44	0.11	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-
1.5	0.51	0.56	0.23	0.06	0.01	-	-	-	-	-	-	-	-	-	-	-	-
2.0	0.22	0.58	0.35	0.13	0.03	-	-	-	-	-	-	-	-	-	-	-	-
2.5	-0.05	0.50	0.45	0.22	0.07	0.02	-	-	-	-	-	-	-	-	-	-	-
3.0	-0.26	0.34	0.49	0.31	0.15	0.04	0.01	-	-	-	-	-	-	-	-	-	-
4.0	-0.40	-0.07	0.36	0.43	0.28	0.13	0.05	0.02	-	-	-	-	-	-	-	-	-
5.0	-0.18	-0.33	0.05	0.36	0.38	0.26	0.13	0.05	0.02	-	-	-	-	-	-	-	-
6.0	0.15	-0.28	-0.24	0.11	0.36	0.36	0.25	0.13	0.06	0.02	-	-	-	-	-	-	-
7.0	0.30	0.00	-0.30	-0.17	0.16	0.35	0.34	0.23	0.13	0.06	0.02	-	-	-	-	-	-
8.0	0.17	0.23	-0.11	-0.29	-0.10	0.19	0.34	0.32	0.22	0.13	0.06	0.03	-	-	-	-	-
9.0	-0.09	0.24	0.14	-0.18	-0.27	-0.06	0.20	0.33	0.30	0.21	0.12	0.06	0.03	0.01	-	-	-
10.0	-0.25	0.04	0.25	0.06	-0.22	-0.23	-0.01	0.22	0.31	0.29	0.20	0.12	0.06	0.03	0.01	-	-
12.0	-0.05	-0.22	-0.08	0.20	0.18	-0.07	-0.24	-0.17	0.05	0.23	0.30	0.27	0.30	0.12	0.07	0.03	0.01
15.0	-0.01	0.21	0.04	0.19	-0.12	0.13	0.21	0.03	-0.17	-0.22	-0.09	0.10	0.24	0.28	0.25	0.18	0.12