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(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR

THIRD YEAR SPECIAL/SUPP EXAMINATIONS

FOR THE AWARD
OF
DIPLOMA IN ENGINEERING

COURSE CODE: DEE 084

COURSE TITLE: COMMUNICATION SYSTEMS

DATE: Thursday 6th Oct, 2022 **TIME:** 11.00a.m – 1.00P.m

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS.
QUESTION ONE CARRIES 30 MARKS AND ALL OTHERS 20 MARKS EACH.

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

Question One

a) Define what is meant by a signal

(1 mark)

b) Describe the following terms:

i) Modulation

(2 marks)

ii) Demodulation

(2 marks)

iii) Carrier Wave

(2 marks)

c) State and explain the components of a Communication System

(5 marks)

d) i) State and briefly explain the FOUR parameters of a transmission line

(8 marks)

ii) A lossy transmission line has Vmin 10V and Vmax 12V, determine its standing wave ratio

(2 marks)

e) State the THREE classifications of transmission lines

(3 marks)

f) Show that the characteristic impedance of a transmission line is given by

$$Z_0 = \sqrt{\frac{R + j\omega L}{G + j\omega C}}$$ *(6 marks)*

Question Two

a) State THREE needs why Modulation is necessary in a Communication System

(3 marks)

b) State and describe THREE types of Modulation

(6 marks)

c) Describe what is meant by Baseband System and Passband System

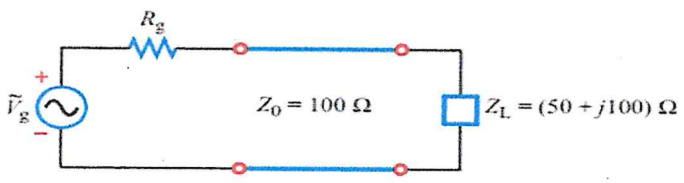
(6 marks)

d) The antenna current of an AM transmitter is 8 A when only carrier is sent but it increases to 8.93 A when the carrier is modulated due to superimposing the message signal. Find the percentage modulation.

(5 marks)

Question Three

a) The circuit shown in Fig. consists of a 100-Ω lossless transmission line terminated in a load with $ZL = (50 + j100)\ \Omega$. If the peak value of the load voltage was measured to be $|V_L| = 12$ V,



Determine:

(i) The time-average power dissipated in the load,

(ii) The time-average power incident on the line,

(iii) The time-average power reflected by the load.

(7 marks)

b) An Analog Modulation wave is represented by the expression *V=4(1+0.7Cos6150t)Cos 2.72x106t V.*

i) Determine the minimum and maximum amplitudes of the AM wave?

(2 marks)

ii) Find the frequency components contained in the modulated wave

(2 marks)

iii) Determine the amplitude of each components

(2 marks)

c) List any FIVE types of distortion in communication systems

(5 marks)

d) Differentiate between AM and FM

(2 marks)

Question Four

a) With the aid of a labelled diagram, explain the working principle of radio transmitter

(10 marks)

b) Distinguish between super heterodyne transmitter and ordinary transmitters

(4 marks)

c) Calculate the bandwidth in an AM transmission given that the carrier frequency is 100KHZ and modulating frequency is 5KHZ

(2 marks)

d) State TWO advantages and TWO disadvantages of diode detector

(4 marks)

Question Five

a) Describe the components of optical fiber cable.

(4marks)

b) A carrier wave of 500 watts is subjected to 100% amplitude modulation. Determine:

i) **Power of modulated wave**

(3 marks)

ii) **Power in sidebands.**

(3 marks)

c) A modulated carrier wave in AM has maximum and minimum amplitudes of 750mV and 250mV respectively. Calculate percentage modulation

(3 marks)

d) An audio signal given by $15Sin2\pi(2000t)$ amplitude modulates a sinusoidal carrier wave $60Sin2\pi(100{,}000)t$. Determine

i) Modulation index

(2 marks)

ii) Percentage modulation

(2 marks)

iii) Frequency spectrum of the modulated wave

(3 marks)