



MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

FIRST YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE (INFORMATION AND TELECOMMUNICATION TECHNOLOGY)

SPH 104: INTRODUCTION TO TELECOMMUNICATION

DATE: 24/3/2021

TIME: 11.00-1.00 PM

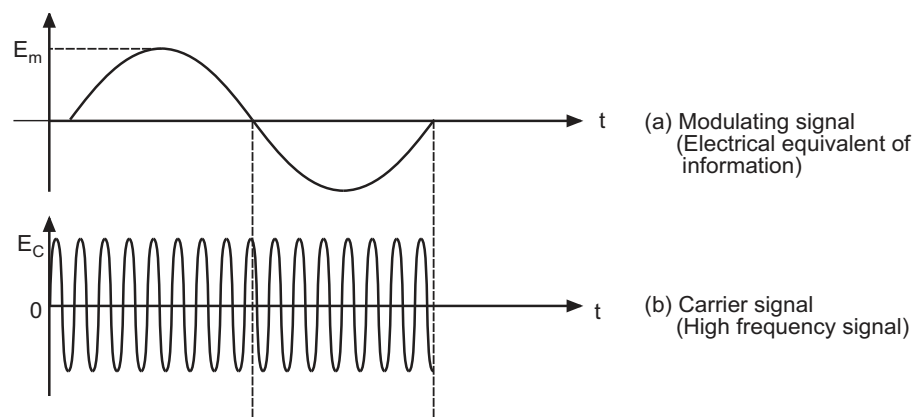
INSTRUCTIONS

Answer Question One and any Other Two Questions

QUESTION ONE (30 MARKS) (COMPULSORY)

- a) Explain 5 advantages of modulation (5 marks)
- b) The following is provided as the shape of the carrier and the message signal. Sketch the output waveform in case each of the following modulation schemes (6 marks)
- Amplitude
 - Frequency
 - Phase

Give the assumptions made in each case



- c) Differentiate between the following terms (6 marks)
- Multiplexing and modulation

- ii. Baseband and broadband communication
- d) Define the following technologies (3 marks)
 - i. Telex
 - ii. Facsimile
 - iii. Telegraph
- e) An audio signal given by $15\sin 2\pi(2000t)$ amplitude modulates a sinusoidal carrier wave $60\sin 2\pi(100000)t$.
Determine (a) modulation index (b) percent modulation (c) frequencies of signal & carrier (10 marks)

QUESTION TWO (20 MARKS)

- a) Discuss the three main communication channel medium and give two example of each (9 marks)
- b) Discuss three limitations of twisted pair wire and differentiate between shielded twisted pair and unshielded twisted pair. (8 marks)
- c) Explain three reasons why wires are twisted in twisted pair copper wire (3 marks)

QUESTION THREE (20 MARKS)

- a) A 10MHz sinusoidal carrier wave of amplitude 10mV is modulated by a 5 kHz sinusoidal audio signal wave of amplitude 6mV. find the frequency components of the resultant modulated wave and their amplitudes. (12 marks)
- b) Explain 3 advantages, 3 disadvantages and 2 application of amplitude modulation (8 marks)

QUESTION FOUR (20 MARKS)

- a) Describe five components of fiber optic transmission that makes it widely use compared to wired transmission. (10 marks)
- b) Explain 5 historic discoveries that helped in creation and enhancement telecommunication (10 marks)

QUESTION FIVE (20 MARKS)

- a) Define the following terms as used in radio receivers (3 marks)
 - i. Sensitivity
 - ii. Selectivity
 - iii. Fidelity
- b) Draw a well labelled diagram of an FM Superhetrodyne radio receiver (12 marks)
- c) Illustrate three advantages and two disadvantages of using diode detectors in AM broadcast receivers. (5 marks)