



MACHAKOS UNIVERSITY

University Examinations for 2022/2023

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

FIRST YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (TELECOMMUNICATION AND INFORMATION
TECHNOLOGY)

SPH104: INTRO. TO TELECOMMUNICATION

DATE:

TIME:

INSTRUCTIONS:

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QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Explain three reasons why modulation is done to signals before transmission. (3 marks)
- b)
 - (i) Explain heterodyning action (2 marks)
 - (ii) Superheterodyne AM receiver works on the principle of heterodyning action. Give Three reasons why heterodyning action has to take place. (3 marks)
 - (iii) Name four types of transmission media: (4 marks)
- c) Explain three reasons why wires are twisted in twisted pair copper wire (3 marks)
- d) Differentiate between the following terms (6 marks)
 - (i) Multiplexing and modulation
 - (ii) Baseband and broadband communication
- e) Name at least four different ways of communicating at a distance prior to the advent of electrical communication. (4 marks)

- f) Name three basic impairments found in all telecommunication transmission systems. (3 marks)
- g) Define the following technologies (2 marks)
- (i) Facsimile
 - (ii) Telegraph

QUESTION TWO (20 MARKS)

- a) Telecommunication has evolved in several stages; that is from Telegraph, telephone, transistor, computer and satellites. Discuss two challenges accompanied by each of the stages. (10 marks)
- b) In relation to telecommunication systems/network, explain the importance of the following requirements to the users
- (i) Availability
 - (ii) Reliability
 - (iii) User friendly
 - (iv) Response time (8 marks)
- c) Explain the principal drawback of using coaxial cable for long-distance transmission (2 marks)

QUESTION THREE (20 MARKS)

- a) An audio frequency signal $10\sin 2\pi \times 500t$ is used to amplitude modulate a carrier of $50\sin 2\pi \times 10^5 t$. calculate
- (i) Modulation index
 - (ii) Sideband frequencies
 - (iii) Amplitude of each sideband frequencies
 - (iv) Bandwidth required (8 marks)
- b) Explain the following;
- (iii) Frequency modulation
 - (iv) Phase modulation
 - (v) Amplitude modulation
 - (vi) Noise (8 marks)

- c) for an FM or AM receiver to be efficient and effective, it has to fulfil various requirements. Give four of the requirements. (4 marks)

QUESTION FOUR (20 MARKS)

- a) (i) An AM modulator has two inputs. The first input is a sine wave with a frequency of 500 Hz and amplitude of 2V RMS. The second input is a carrier signal with RMS voltage of 4 V and frequency of 1.5 MHz. Determine the equation for the modulated signal. (6 marks)
- (ii) With the help of correct logic and timing diagrams, explain Manchester coding. (4 marks).
- b) Describe the following terms as used in radio receivers (6 marks)
- a. Sensitivity
 - b. Selectivity
 - c. Fidelity
- c) Illustrate Two advantages and two disadvantages of using diode detectors in AM broadcast receivers. (4 marks)

QUESTION FIVE (20 MARKS)

- a) Describe five components of fiber optic transmission that makes it widely used compared to wired transmission. (10 marks)
- b) Draw a well labelled diagram of an FM Superhetrodyne radio receiver (10 marks)