



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF EDUCATION
(SCIENCE)
MAIN
REGULAR

COURSE CODE: SPH 419

COURSE TITLE: Telecommunications Systems

EXAM VENUE: STREAM: (BED SCI)

DATE: EXAM SESSION:

TIME: 2:00HRS

- 1. Instructions: Answer question 1 (Compulsory) in Section A and ANY other 2 questions in Section B.**
- 2. Answer Question 1 (compulsory) and ANY other 2 questions**
- 3. Candidates are advised not to write on the question paper.**
- 4. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

QUESTION ONE COMPULSORY (30 MARKS)

- a. Define the term telecommunication (2 marks)
- b. State and explain any three types of telecommunication transmission media (3 marks)
- c. Give three advantages of satellites communications. (3 marks)
- d. Name the parts (waves) of the electromagnetic spectrum used in telecommunication industry and state the telecommunication system each is applied (3 marks)
- e. i) Define the term demodulation (1 mark)
ii) Give two functions of a demodulator (2 marks)
- f. Give any three advantages of frequency modulation over amplitude amplification (3 marks)
- g. Define the term noise as used in telecommunication (1 mark)
- h. The signal power at the input to a receiver is 7.8 mW and the noise power at the input to that receiver is 2.5 mW. Find
 - i. The Signal to Noise Ratio (2 marks)
 - ii. The signal to Noise ratio in decibels (2 marks)
- i. Derive the equation for the maximum range of a radar system (4 marks)
- j. Name and briefly describe the four types of fiber optics (4 marks)

QUESTION TWO (20 MARKS)

- a. draw a schematic archtitecture of the Radio Broadcasting, Transmission and Reception System explaining the functions of the principal parts (8 marks)
- b. Define modulation as used in telecommunication (2 marks)
- c. Using illustrative waveform diagrams, give full account of
 - i. Frequency modulation
 - ii. Amplitude modulation (6 marks)
- d. Derive the equations for instateneous voltage of Amplitude modulated wave and give its full implication (4 marks)

QUESTION THREE (20 MARKS)

- a. In order to reproduce the A.M. wave into sound waves, every radio receiver must perform several functions. Outline the functions of a radio receiver stepwise (6 marks)
- b. Draw the schematics of the following types of AM radio receivers and fully explain their operations
 - i. Straight wire radio receiver (4 marks)
 - ii. Superhetrodyne radio receiver (5 marks)
- c. Using a well labelled block diagram, explain the operation basics of an FM receiver (5 marks)

QUESTION FOUR (20 MARKS)

- a. Draw the schematic well labelled Block Diagram of the radar communication system (2 marks)
- b. Explain the working mechanism of the radar communication system drawn in a above (5 marks)
- c. Using an illustrative diagram, fully explain the satellite communication process (4 marks)
- d. There are the three important types of Earth Orbit satellites namely Geosynchronous Earth Orbit Satellites; Medium Earth Orbit Satellites; Low Earth Orbit Satellites. Briefly discuss each of them giving their specific applications (9 marks)

QUESTION FIVE (20 MARKS)

- a. Draw a fully labelled schematic architecture of the basic fiber optic link and explain the functions of the principal components (8 marks)
- b. Briefly describe the following types of optical fibers
 - i) Step-index multimode fiber
 - ii) Step-index single mode fiber
 - iii) Graded-index fiber. (6 marks)
- c. A 10-km fiber optic communication system link has a fiber loss of 0.30 dB/km. Find the output power if the input power is 20 mW. (3 marks)
- d. Give any three advantages of fibre optics communication (3 marks)