JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

UNIVERSITY EXAMINATION FOR THEDEGREE OF BACHELOR OF EDUCATION (SCIENCE)

MAIN

SPECIAL RESITS EXAMINATIONS   FEB 2022

COURSE CODE: SPH 9428

COURSE TITLE: TELECOMMUNICATIONS SYSTEMS

EXAM VENUE: **STREAM: (BED SCI)**

DATE: **EXAM SESSION:**

TIME: 2:00HRS

1. <u>Instructions:</u> **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 and explain the meaning of the term teleconferencing. **(3 marks)**
   b. Give three applications of satellites communications system.   **(3 marks)**
   c. i)   Name the waves/radiations that fall in the family of the electromagnetic spectrum used in telecommunication systems **(1 mark)**
      ii)   Name the telecommunication system where each wave mentioned in i) above is applied **(2 marks)**
   d. Distinguish between modulation and demodulation as applied in telecommunications **(4 marks)**
   e. Give any three disadvantages of frequency modulation over amplitude modulation **(3 marks)**
   f. Name and explain any two sources of noise in a telecommunication system **(4 marks)**
   g. In a system, The Signal to Noise ratio is 1.5. Given that the signal power at the input to a receiver is 7.5 Megawatts, determine the sum of the noise power and signal power of the system. **(3 marks)**

   h. A satellites communications system consists of two earth stations, uplink frequency, downlink frequency and a transponder. Briefly give an overview of the satellite communication system using a well labelled diagram involving these these four parameters **(4 marks)**

   i. Explain how a radar system can be used to distinguish between a stationary, a receding and an approaching target **(3 marks)**

QUESTION TWO   (20 MARKS)

   a. draw a schematic artchitecture of the Radio Broadcasting, Transmission and Reception System explaining the functions of the principal parts. **(10 marks)**
   b. Using illustrative waveform diagrams, give full account of
      i.   Frequency modulation
      ii.   Amplitude modulation **(6 marks)**
   c. Derive the equation for the Amplitude Modulated Carrier Wave and give its full analysis **(4 marks)**

QUESTION THREE   (20 MARKS)

    a. Outline the stepwise procedure of how a radio receiver functions
           (8 marks)

    b. Draw the schematic block diagram of the Superhetrodyne AM radio receiver and fully explain its operations   **(8 marks)**

    c. The refractive index of the core of an optical fibre is 1.6 while that of the cladding is 1.2. What is the minimum angle at which a light signal must be fed at the transmission terminal so that the light wave is guided through the whole fibre length to the receiver end. **(4 marks)**

QUESTION FOUR   (20 MARKS)

    a. Draw the schematic well labelled Block Diagram of the radar communication system   **(4 marks)**

    b. Explain the working mechanism of the radar communication system drawn in a above   **(6 marks)**

    c. Using an illustrative block diagram, fully explain the working mechanism of a satellite communication system   **(10 marks)**

QUESTION FIVE   (20 MARKS)

    a. Distinguish between step index and graded index optical fibres.
           (4 marks)

    b. Draw a fully labelled schematic block diagram of the fiber optic telecommunication system and explain the functions of the principal components   **(10 marks)**

    c. State any four benefits of using fiber optics communication **(4 marks)**

    d. State any two applications of fiber optics communication **(2 marks)**