BOWEN UNIVERSITY IWO, OSUN STATE, NIGERIA

PHYSICS PROGRAMME

COLLEGE OF AGRICULTURE, ENGINEERING AND SCIENCE (COAES)

2022/2023 SECOND SEMESTER BSc EXAMINATIONS

PHY 454: COMMUNICATION (2 CREDITS)

Date: Thursday, 22nd June, 2023　　　　　　　**Time:** 8.30 – 10.30am

Instruction: Answer any **Three (3)** questions

1a (i) What is meant by a "**Linear Channel or System**"?　　　　3$^{1/2}$mks

(ii) Deduce an expression for the Transmission characteristic of a linear channel.　6mks

(iii) For an RC low pass filter, determine the transfer characteristic and

illustrate the output with amplitude / phase versus frequency curve.　　4mks

b (i) What is multiplexing?

(ii) Discuss the two types of multiplexing.　　　　　　6mks

c　Briefly explain the following terms:

(i)　Carrier wave; and

(ii)　Modulation.　　　　　　6mks

d　Differentiate between the analogue and digital system of transmission in

Telecommunication.　　　　　　8mks

2a Explain the term "**Percentage Modulation.**"　　　　4mks

b Derive the equation showing that a sinusoidal modulated carrier wave contains

components at three different frequencies and hence identify these frequencies.　10mks

c　A 4MHz carrier wave is amplitude modulated by the band of audio frequencies

300Hz – 3400Hz. Determine (i) the frequencies contained in the modulated wave and

(ii) the bandwidth occupied by the signal.　　　　10$^{1/2}$mks

d Describe briefly using sketches where necessary, how the amplitude of a modulating

signal is conveyed by amplitude modulation.　　　　9mks

3a Define "Radio waves"   2¹ᐟ²mks

b Describe the mode of propagation of radio waves   10mks

c Explain the term, "geosynchronous" satellite.   2mks

d (i) Using block diagram, discuss briefly the major processes involved in optical fiber
     communication system   10mks

  (ii) State six (6) advantages of using an optical fiber system.   6mks

  (iii)Mention two types of optical transmitters used in optical fiber systems.   3mks

4a(i) What is **pulse code** modulation?   4mks

  (ii) Explain briefly the three (3) types of pulse modulation commonly
       used in telecommunication.   6mks

b The power dissipated by the amplitude modulated wave is 100W when its depth of
   modulation is 40%. What modulation depth "m" is necessary to increase the power
   to 120W?   8mks

c With the aid of an appropriate block diagram, explain the basic working principle of the

   super heterodyne receiver system.   8¹ᐟ²mks

d(i) Explain the term "Noise" used in communication   2mks

  (ii) Mention <u>five</u> (5) types of noise common to communication devices.   5mks