



(Knowledge for Development)

KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS 2019/2020 ACADEMIC YEAR

SPECIAL / SUPPLEMENTARY EXAMINATIONS YEAR TWO SEMESTER ONE EXAMINATIONS

FOR THE DEGREE OF BACHELOR OF SCIENCE COMPUTER SCIENCE

COURSE CODE : CSC 216
**COURSE TITLE : DIGITAL AND ANALOGUE
COMMUNICATION SYSTEM**

DATE: 11/02/2021 TIME: 8.00 A.M – 10.00 A.M

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTIONS ONE AND ANY OTHER TWO.

QUESTION ONE (COMPULSORY) [30 MARKS]

- a) Define multiplexing and explain the two types of multiplexing (6 marks)
- b) Describe the following as used in communication systems: (6 marks)
- Sampling
 - sampling theory
 - modulation
- c) State two advantages and two disadvantages of frequency modulation over amplitude modulation? (4 marks)
- d) Distinguish between coherent and non-coherent receivers (4 marks)
- e) A certain digital signal is represented by

$$f(x) = \begin{cases} -2 & \text{when } -\pi < x < -\frac{\pi}{2} \\ 2 & \text{when } -\frac{\pi}{2} < x < \frac{\pi}{2} \\ -2 & \text{when } \frac{\pi}{2} < x < \pi \end{cases}$$

Whose fourier equation is given by: $f(x) = a_0 + \sum_{n=1}^{\infty} a_n \cos nx$.

- Obtain the fourier co-efficients a_0 and a_n and hence the fourier series of the digital signal (6 marks)
- f) Explain various sources of noise in communication channels (4 marks)

QUESTION TWO [20 MARKS]

- a) With the help of block diagrams, explain Pulse Code Modulation and Differential Pulse Code Modulation techniques (12 marks)
- b) Describe the operation of FSK transmitter and receiver. (8 marks)

QUESTION THREE [20 MARKS]

- a) Explain phase modulation in analogue communication. Use suitable waveform of the carrier, message and modulated signals to illustrate. (5 marks)
- b) Determine the power, P_g given by

$$P_g = \frac{1}{T_0} \int_{-\frac{T}{2}}^{\frac{T}{2}} |g(t)|^2 dt$$

- of a periodic signal $g(t) = t^3$ in the range $-2 < t < 2$. (4 marks)
- c) I. What is amplitude modulation (AM). (3 marks)
- II. Distinguish the following AM techniques from each other
- double sideband-suppressed carrier (DSB-SC)
 - single sideband (SSB)
 - vestigial sideband (VSB) (8 marks)

QUESTION FOUR [20 MARKS]

- a) Give three advantages of digital communication over analogue communication systems. (3 marks)
- b) With the help of a block diagram, describe the main stages of a digital communication system. (7 marks)
- c)
 - i. Define QPSK modulation
 - ii. State advantages of QPSK modulation (10 marks)

QUESTION FIVE [20 MARKS]

- a)
 - i. Discuss superheterodyning as applied to communication systems (2 marks)
 - ii. State three advantages of superheterodyning (3 marks)
- b) Explain the direct and indirect methods of FM transmission (15 marks)