THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of Jkuat)

Faculty of Engineering and Technology

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

DIPLOMA IN COMPUTER SCIENCE ENGINEERING (DCSE 4)

EET 2203: DATA COMMUNICATION I

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: OCTOBER 2011

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer booklet*

This paper consists of **FIVE** questions. Answer question **ONE (COMPULSORY)** and any other **TWO** questions

Maximum marks for each part of a question are clearly shown.

This paper consists of **FOUR** printed pages

SECTION A (COMPULSORY)

Question 1

a) (i) State Nyquist sampling theorem

(ii) With the aid of diagrams, describe how a liasing occurs

(iii) With the aid of a diagram, describe the operations of a sample and hold circuit (9 marks)

b) (i) Perform longitudinal redundancy test on the following data
1110011 11011101 00111001 10101001

(ii) State any TWO limitations of Vertical Redundancy Check (VRC) (5 marks)

c) (i) Encode the following bit stream using differential Manchester code
100011011010

(ii) Describe briefly any TWO factors in the choice of a line encoding format

(iii) Describe the Manchester encoding method (6 marks)

d) (i) Illustrate the following data stream using ASK 1001111010

(ii) State the disadvantages of ASK

(iii) Draw a 16QAM (12 phases, 3 amplitudes) (5 marks)

e) (i) State any TWO benefits of fiber optic cables

(ii) Distinguish between single mode and multimode fiber cables

(iii) Explain the functions of the pigtail used in optical fibers (5 marks)

SECTION B (Answer *any TWO questions from this section - 20 marks each*)

Question 2

a) Define the following terms as used in data communications
i. Crosstalk
ii. Skin effect
iii. Multiplexing
iv. Modem
v. Messages
vi. Signal attenuation (6 marks)

b) Discuss the applications of data communications in the following areas
i. Control
ii. Education
iii. Medicine
iv. Research (10 marks)

c) List **FOUR** advantages of digital signals over analog signals (4 marks)

d) State **FOUR** factors that influence the extent of attenuation and distortion in transmitted signal (4 marks)

Question 3

a) Distinguish between the following digital signals
   i. Unipolar
   ii. Bipolar
   iii. Polar (4 marks)

b) (i) Explain any **TWO** reasons why data signals cannot be directly transmitted over a transmission media
   (ii) State any **ONE** application of each of the following codes
      I. AMI
      II. RZ

   (iii) Use BZ8 to encode the bit stream
      100000 0000010
      Assume the first 1 is positive (8 marks)

c) (i) With the aid of sketches, illustrate the following digital modulation methods
   I. FSK
   II. 2PSK - (phase coherent)

   (ii) State the limitations of PSK

   (iii) A 32 QAM signal has a bandwidth of 4KHZ. Determine

      I. Baud rate
      II. Bit rate (9 marks)

Question 4

a) (i) State and explain any **TWO** advantages of digital coding in data communication

   (ii) Draw a block diagram of pulse code transmitter and state the function of each block

   (iii) State two advantages of non-linear over indar quantization (9 marks)

b) With the aid of a block diagram and wave form, explain the operation of delta modulation (6 marks)

c) Twenty **FOUR** audio channels each band limited to 4KHz are to be transmitted over the telephone line with a signal to quantization noise ratio of 43.8db. Determine the total bit rate of the system (5 marks)

Question 5

a) (i) Explain multiplexing and state its main purpose

(ii) Explain the following terms

I. Time division multiplexing (TDM)

II. Frequency division Multiplexing (FDM0

(iii) Compare pure TDM with statistical TDM (8 marks)

b) (i) What is the purpose of data compression in a device?

(ii) State the application of inverse multiplexing (2 marks)

c) (i) With the aid of a diagram, describe any THREE features of each of the following

i. Stepped index

ii. Graded index

(ii) Draw a block diagram of an optical communication system and state the functions of each block (10 marks)