MURANGA UNIVERSITY COLLEGE

(A constituent College of Jomo Kenyatta University of Agriculture & Technology)

MAIN CAMPUS

ORDINARY UNIVERSITY EXAMINATIONS

2014/2015 ACADEMIC YEAR

SECOND YEAR SECOND SEMESTER EXAMINATIONS

FOR THE DEGREE

BACHELOR OF BUSINESS INFORMATION TECHNOLOGY

COURSE CODE: HBT 2105

COURSE TITLE: DATA COMMUNICATIONS AND NETWORKS

DATE: 24TH APRIL 2015 **TIME:** 2.00 P.M. – 4.00 P.M

INSTRUCTIONS TO CANDIDATES

Question ONE (1) is compulsory
Answer THREE (3) questions

MRUC observes ZERO tolerance to examination irregularities

Question ONE: (30 MARKS) – COMPULSORY

a) Define the following:-
   (i) Bandwidth (2 marks)
   (ii) Channel capacity (2 marks)
   (iii) Multiplexing (2 marks)
   (iv) LAN (2 marks)

b) With a neat block diagram explain data communication model. 6 marks)

c) Sketch and OSI model. Describe the purpose of each layer in one sentence. (4 marks)

d) Represent the binary data 01001100011 in NRZ-L and NRZI coding schemes. (4 marks)

e) Explain the working of CSMA/CA and CSMA/CD protocol (4 marks)

f) Briefly describe circuit switching and packet switching. (4 marks)

Question TWO

a) Define computer networks. Enlist the various network topologies and discuss three types of networks topologies in computer network. (10 marks)

b) Differentiate between:
   i.) Hub (2 marks)
   ii.) Switch (2 marks)
   iii.) Router (2 marks)

c) Compute the channel capacity for a teleprinter channel with a 300-Hz bandwidth and a signal-to-noise ratio of 3 dB, where the noise is white thermal noise. (4 marks)

Question THREE

a) What is TCP/IP Model? Explain the functions and protocols and services of each layer? Compare it with OSI Model. (7 marks)

b) Discuss in detail and compare the following modes of data transmission on a communication link. Use diagrams to help illustrate your answers. (6 marks)
   a) Asynchronous transmission.
   b) Synchronous transmission.

c) In relation to modulation and data encoding define the term modulation. (1 mark)

d) Define and discuss in detail, using an example to illustrate each, the following transmission modes:

i) Simplex (2 marks)
ii) Half-Duplex (2 marks)
ii) Full-Duplex (2 marks)

Question FOUR

a) Discuss the concept of redundancy in error detection and correction. (3 marks)

b) Distinguish between

i.) Forward error correction versus error correction by retransmission (3 marks)

ii.) Single-Bit Error and Burst Error (3 marks)

c) Explain the role of Media Access Control layer in Local Area Networks (LAN). (3 marks)

a) In relation to transmission media

(i) Describe the components of optical fiber cable and their importance. (6 marks)

(ii) Explain why a satellite have distinct uplink and downlink frequencies. (2 marks)