(The *University of Choice*)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN, BUNGOMA, KAPSABET, BUSIA, NAIROBI, WEBUYE

UNIVERSITY EXAMINATIONS
2015/2016 ACADEMIC YEAR

THIRD YEAR FIRST SEMESTER EXAMINATIONS

FOR THE DEGREE
OF
BACHELOR OF COMMERCE

COURSE CODE: BCO 105

COURSE TITLE: BUSINESS MATHEMATICS

DATE: THURSDAY, 17TH DEC 2015 TIME: 2.00-5.00PM

INSTRUCTIONS TO CANDIDATES

- Section A is compulsory. Attempt any two questions in section B

QUESTION ONE

a) A hypothetical two sector economy has the following input – output relationship technological matrix

		User A	User B
Producer	P	0.3	0.2
	Q	0.1	0.4

Suppose final demand for a particular planning period is estimated as Ksh 4500 for sector P and Ksh 1800 for Sector Q.

i) Determine the level of output required for each sector so that both intermediate demand and final demand is satisfied (3mks).

ii) Determine the total worth of primary input for both sector P and Q (5 mks)

iii) Account for the usage of sector P output (3 mks)

iv) Account for the usage of sector Q input (3 mks)

b) Matrix addition is commutative but matrix subtraction is not. True or false. Argue your case using practical example (3 mks)

c) A company manufactures and sells Q units of product per month. The firm has developed the following cost and price demand functions.

Total cost (tc) = $16Q2 - 280Q + 800$

Price (P) = $1150 - Q$

Required

i) How many units should the firm produce in order to break-even (3mks)

ii) Determine the price per unit (2mks)

iii) What is the possible profit realized by the manufacturer, is it maximum or minimum (3mks)

d) Differentiate the following equations stating the rule applicable.

i) $Y = (4x + 6)^8$ (1.5 mks)

ii) $Y = (2x^2 + 3x)(4x^3 + 2)$ (1.5 mks)

e) Integrate the following functions

i) $Y = {}^2/_3x^5 + 2x^3 + 2$ (1mks)

QUESTION TWO

a) Find the market equilibrium price and quantity if the demand equation is given by p-3q =22 and the supply equation q^2 +2p+4q=100. Where p is the price and Q is the quantity of the commodity. Find the total revenue and market equilibrium price. (6mks)

b) Firms A, B and C supplied 40,35, and 25 truck loads of stones and 10, 5 and 8 truck loads of sand respectively to a contractor. If the cost of stones and sand are Sh.1,200 and Sh.500 per truck load respectively. Find the total amount paid by contractor to each of these firms using matrix method. (5mks)

c) An investment costs 120,000. Its string of income after depreciation and taxation from the first year through the fifth year is as follows

Year	Returns
1	40,000
2	35,000
3	36,000
4	40,000
5	46,000

Cost of capital is 11%. Compute the internal rate of return (9 mks)

QUESTION THREE

A consumer survey among 5000 consumers of bread performed by competition authority of Kenya during the month of may 2014 revealed the following switching patterns. Among 1500 consumers from Broadway 600 shifted to Kenblest and 200 students shifted to Superloaf, the rest remained loyal to Broadway. Among 1800 consumers from Kenblest 300 consumers shifted to Broadway and 700 consumers shifted to Superloaf, the rest remained loyal to Kenblest. Among 1700 consumers from Superloaf 150 shifted to Broadway and 300 consumers shifted to Kenblest, the rest remained loyal to Superloaf.

Required

i) Transition matrix representing the above switching pattens (3mks)

ii) Respective market shares two months later (8mks)

iii) Market share in the longrun (6mks)

iv) Highlight three applications of a markovian process (3mks)

QUESTION FOUR

With the growth of internet service providers, a researcher decides to examine whether there is a correlation between cost of internet service per month (rounded to the nearest dollars) and degree of customer satisfaction (on a scale of 1-10 with a 1 being not at all satisfied and a 10 being extremely satisfied). The researcher only includes programs with comparable types of services. A sample of the data is provided below.

Dollars	Satisfaction
11	6
18	8
17	10
15	4
9	9
5	6
12	3
19	5
22	2
25	10

i) Compute simple linear regression equation (8mks)
ii) Determine the strength of relationship between dependent variable and the independent variable (6mks)
iii) What does this statistic mean concerning the relationship between amount of mo y spent per month on internet provider service and level of customer satisfaction? (2mks)
iv) Determine the dollars to be realized if the customer was over-satisfied at a scale o 12. (2mks)
v) If 28 dollars were used what will be the level of satisfaction. (2mks)

QUESTION FIVE

a) Differentiate between the present value of an annuity and the future value of an annuity **3 mks**

b) A customer deposits ksh250 every 3 months into a building society account that pays interest at a rate of 8% per annum convertible quarterly (i.e. compounded every 3 months). How much money will be in the account at the end of 10 years? **4 marks**

c) A Wiseman put ksh 1500 at the end of every year in a child education trust when she turned three years old girl at the beginning of the year. If the amount is compounded annually at the rate of 2.5% how much will the child receive when she turns 18 years? **4 marks**

d) A man borrows Ksh 20000 and agrees to pay the borrowed amount in 10 equal installments at the rate of 6% per annum. Find the amount of each installment, the first being paid year after the money was borrowed. **4 marks**