(The *University of Choice*)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

UNIVERSITY EXAMINATIONS 2015/2016 ACADEMIC YEAR

SECOND YEAR SECOND SEMESTER EXAMINATIONS

FOR THE DEGREE OF BACHELOR OF COMMERCE

COURSE CODE: BCO 105
COURSE TITLE: BUSINESS MATHEMATICS

DATE: MONDAY, 18TH APRIL 2016 TIME: 9.00-11.00AM

INSTRUCTIONS TO CANDIDATES

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

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 4 Printed Pages. Please Turn Over.

QUESTION ONE

a) Consider an industry consisting of three sectors, cotton, polyester and fiber. The hypothetical flow of goods and services in physical units is summarized in the table below.

	Cotton	**Polyester**	**Fiber**	**Final Demand**
cotton	80	160	0	160
polyester	30	60	30	180
fiber	0	60	40	100

i) Determine the technological matrix. (2 mks)
ii) Determine the total output from the three sectors. (8 mks)
iii) Distribute the output above among the users in the economy. (4 mks)

b) 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) = 18Q2 - 180Q + 40

Price (P) = 1200 – Q

Required

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

i) Determine the price per unit (1mks)

ii) What is the possible profit realized by the manufacturer, is it maximum or minimum (2mks)

c) Differentiate the following equations stating the rule applicable.

i) $Y = (3x + 8)^7$ (2mks)

ii) $Y = (4x^2 + 3x)(6x^3 + 2)$ (1mks)

d) Integrate the following function and determine the area under the curve (6, 2)

i) $Y = {}^2/_4x^3 + 3x^2 + 2$ (1 mks)

e) highlight any four applications of Markov chains in Business (2 mks)

f) Firms A, B and C supplied 70,45, and 35 truck loads of stones and 20, 8 and 10 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. (4mks)

SECTION B

QUESTION TWO

Your company manufacturers large scale units. It has been shown that the marginal (or variable) cost, which is the gradient of the total cost curve, is (92 – 2x) Ksh. thousands, where x is the number of units of output per annum. The fixed costs are Ksh. 800,000 per annum. It has also been shown that the marginal revenue which is the gradient of the total revenue is (112 – 2x) Ksh. thousands.

Required

i. Establish by integration the equation of the total cost curve (3marks)

ii. Establish by integration the equation of the total revenue curve (3 marks)

iii. Establish the break even situation for your company (4 marks)

a) Determine the number of units of output that would maximize the total revenue and total cost(4 marks)

b) The maximum total revenue and total costs and their nature (6 marks)

QUESTION THREE

A consumer survey among 3000 students performed by commsion for university education (CUE) during the month of February 2014 revealed the following switching patterns. Among 1000 students from JKUAT 300 shifted to UON and 350 students shifted to Moi university, the rest remained loyal to JKUAT. Among 800 students from Moi university 320 shifted to UON and 250 students shifted to JKUAT University, the rest remained loyal to Moi university. Among 1200 students from UON 100 shifted to JKUAT and 300 students shifted to Moi university, the rest remained loyal to UON.

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

An investment company advertised the sale of pieces of land at different prices. The following table shows the pieces of land, their acreage and costs

Piece of land	A	B	C	D	E	F	G	H	J
Acreage Hectares	2.3	1.7	4.2	3.3	5.2	6.0	7.3	8.4	5.6
Cost Sh'0,000'	23	15	45	31	55	59	74	85	53

Required

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 money spent and acreage? (2mks)

iv) Estimate the cost of a piece of land with 4.5 hectares (2 marks)

v) Estimate the expected average if the piece of land costs Sh 900,000 (2 marks)

QUESTION FIVE

a) An investment costs t70,000 and has a scrap value of t30,000. Its string of income before depreciation and taxation from the first year through the fifth year is as follows

Year	Returns
1	50,000
2	25,000
3	46,000
4	32,000
5	45,000

Assume 30% tax rate and depreciation is given as t10,000 on a straight line basis. Required rate of return is 11%.

Required

i) Compute the Net Present Value. (4mks)

ii) Compute the internal rate of return (7mks)

iii) Advice the management on the viability of the above investment based on the two criteria. (2 mks)

b) Solve the equation $2x^2 - 11x + 22 = 10$ (3 marks)

c) The hire purchase value of a sewing machine is 25% more than its cash price. The HP terms require a customer to pay 32 ½ % of the HP price as deposit followed by 9 monthly instalments of Sh. 1500 each. Calculate the cash price of the sewing machine. (4 marks)