JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF BUSINESS AND ECONOMICS

UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF BUSINESS WITH IT

2nd YEAR 1st SEMESTER 2016/2017 ACADEMIC YEAR

KISUMU LEARNING CENTRE

COURSE CODE: ABA 205

COURSE TITLE: MANAGEMENT MATHEMATICS II

EXAM VENUE: **STREAM: (BBA)**

DATE: **EXAM SESSION:**

TIME: 2 HOURS

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1. **Answer Question ONE (COMPULSORY) and ANY other 2 questions**
2. **Candidates are advised not write on the question paper**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**

QUESTION ONE

a) If $A = \begin{bmatrix} 1 & 1 & 2 \\ 2 & 4 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 & -1 \\ 4 & 2 & -1 \end{bmatrix}$

Calculate 3A – 2B (4mks)

b) Differentiate $\frac{x^3}{3x + 7}$ (4mks)

c) Describe any four areas of application of Markov analysis (4mks)

d) Solve by matrix algebra (4mks)

$x + 3y = 3$

$2x + 4y = 7$

e) Two manufactures X and Y are competing with each other in a very restricted market. The state - transition matrix for the market summarizes the probability that customers will more from one manufacturer to the other in any one month. Interpret the state - transition matrix in terms of.

a) Retention and loss (3mks)

b) Retention and gain (3mks)

From \ To	X	Y
X	0.6	0.4
Y	0.3	0.7

f) Given the matrices

$A = \begin{bmatrix} 5 & 4 \\ 2 & 1 \end{bmatrix}$ B= $\begin{bmatrix} 3 & -2 \\ 5 & -3 \end{bmatrix}$ and C= $\begin{bmatrix} 5 & 1 & 1 \\ 6 & 2 & 4 \end{bmatrix}$

Calculate:

$(B\ C)^T$ (5mks)

g) Evaluate $\lim_{x \to 2} \frac{x^2 - 1}{x - 1}$ (3mks)

QUESTION TWO

a) State four conditions of Markov chains conditions (4mks)

b) There are three industries in an economy. Their input – output coefficient matrix is given below.

$$A = \begin{bmatrix} 0.2 & 0.3 & 0.2 \\ 0.4 & 0.1 & 0.2 \\ 0.1 & 0.3 & 0.2 \end{bmatrix}$$

If the final demand vector is:

$$\begin{bmatrix} 10 \\ 5 \\ 6 \end{bmatrix}$$

Calculate the final output matrix (10mks)

c) Suppose there are two market products of brands A and B respectively. Let each of these two brands have exactly 50% of the total market in same period and let the market be of a fixed size. The transition matrix is given as:

	To	
From	A	B
A	0.9	0.1
B	0.5	0.5

If the initial market share breakdown is 50% for each brands ,then determine their market shares in the steady state. (6mks)

QUESTION THREE

a) Solve by matrix algebra (12mks)

$$X + 2y + 3z = 3$$

$$2x + 4y + 5z = 4$$

$$3x + 5y + 6z = 8$$

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b) A firm produces two product X and Y with a contribution of £8 and £10 per unit respectively. Production data are (per unit).

	Labour hours	Material A	Material B
X	3	4	6
Y	5	2	8
Total available	500	350	800

Formulate the L P model in the standard manner and solve graphically (8mks)

QUESTION FOUR

a) A fast food chain has three shops A ,B and C .The average daily sales and profit in each shop is given in the following table.

	Units sold			Unit profit		
	Shop A	Shop B	Shop C	Shop A	Shop B	Shop C
Burger	800	400	500	20 p	40 p	33 p
Chips	950	600	700	50 p	45 p	60 p
Drinks	500	1200	900	30 p	35 p	20 p

Use matrix multiplication to determine,

i) The profit for each product (5mks)

ii) The profit for each shop (5mks)

b) A refrigerator manufacturer can sell all the refrigerators of a particular type that he can produce. The total cost (£) of producing (q) refrigerators per week is given by 300q + 2000 .The demand function is estimated as 500 – 2q

i) Derive the revenue function (2mks)

ii) Obtain the total profit function (2mks)

iii) How many units per week should be produced in order to maximize profit? (2mks)

iv) Show that the solution of the equation $\frac{\delta R}{\delta x} = \frac{\delta c}{\delta x}$ Where C represents the cost function, gives the same value for q as in part (iii) (2mks)

(v) What is the maximum profit available (2mks)

QUESTION FIVE

a) State four purposes of input - output analysis. (4mks)
b) For the following inputs - output tables. Calculate the technology matrix and also write the balance equations for the two sectors (6mks).

Sector	A	B	Final Demand
A	50	150	200
B	100	75	100

C) Find the following

(i) $\int \left(4x2 + \frac{1}{2}x - 3\right) dx$ (3mks)

(i) $\int (x\frac{3}{4} + \frac{3}{7}x - \frac{1}{2}$ +x2) dx (3mks)

(d) Find $\frac{\partial y}{\partial x}$ for 3x2(4x3 +x2) (4mks)

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SCHOOL OF BUSINESS AND ECONOMICS
ABA 205: MANAGEMENT MATHEMATICS II
COURSE OUTLINE SEPTEMBER –DECEMBER 2016
EVENING KISUMU TOWN CAMPUS
INSTRUCTOR AMOS ASEMBO
CLASS MEETS SUNDAYS
TIME 1.00pm-3.00pm

Course description

This course provides the learner with the mathematical skills necessary for them to articulate and analyze business performance and to enable them apply these mathematical skills to efficiently and effectively assign and allocate the scarce business resources for profit maximization and cost minimization.

Learning objectives: The objective of this course is to equip the learner with mathematical skills to enable him/her effectively and efficiently assign and allocate the scarce business resources for a firm's profit maximization and cost minimization and also for the right managerial decisions.

Expected learning outcomes

At the end of the learning exercise, the learner is expected to:

- Solve matrix problems
- Understand the laws of matrices
- Apply the knowledge of matrices in solving real life business situations
- Solve simultaneous equation
- Understand markorean process
- Understand input-output model
- Understand linear programming
- Apply linear programming to solve business problems
- Solve problems concerning differential and integration
- Apply limits and continuity knowledge and their application in business.

TOPICS COVERED

WEEK	**TOPIC**
ONE	- Matrices
	- Matrix algebra
	- Operation on matrices
	- Law of matrices
TWO	- special matrix
	- Application of matrices
THREE	- Data storage
	- Solving simultaneous equations
FOUR	-Markorean process
	- Input- output model
FIVE	- Linear programming
	- Introduction
	- Basic concept
	- Formulation of LP problem
SIX	- Characteristics of LP problems
SEVEN	- Examples of LP problems
	- Solution of LP by graphical methods

EIGHT	- Solution of LP by simplex method.
NINE	- Calculation – differentiation of univariate functions
TEN	- Limits of function
	- Limits and continuity
ELEVEN	- CAT
TWELVE	- Univariate optimization
THIRTEEN	- Integral –differentiation and indefinite and their application In business.

Teaching methodology

Lecture, discussion and presentation

Grading

Assignment	10%
Sit-in-test	20%
Semester Examination	70%

REFERENCES:

1. Quantitative Techniques (Third Edition) by C.R Cathori.
2. Applied Mathematics for Business, Economics and the Social Sciences (Fourth Edition) by Frank S. Budnic.
3. E-Books from the library
4. Any other relevant materials.