JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF BUSINESS & ECONOMICS

UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF BUSINESS ADMINISTRATION WITH IT

2ND YEAR 1ST SEMESTER 2018/2019 ACADEMIC YEAR

MAIN CAMPUS

COURSE CODE: ABA 205

COURSE TITLE: MANAGEMENT MATHEMATICS II

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

DATE: **EXAM SESSION:**

TIME: 2 HOURS

Instructions:

1. **Answer Question ONE (COMPULSORY) and ANY other 2 questions**
2. **Candidates are advised not to 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)

		To	
From		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)