**ALUPE UNIVERSITY COLLEGE**

*...Bastion of Knowledge....*

**OFFICE OF THE DEPUTY PRINCIPAL**

**ACADEMICS, RESEARCH AND STUDENTS' AFFAIRS**

# UNIVERSITY EXAMINATIONS

# 2018 /2019 ACADEMIC YEAR

### FIRST YEAR SECOND SEMESTER REGULAR EXAMINATION

## FOR THE DEGREE OF BACHELOR O BUSINESS MANAGEMENT/BA.ECONOMICS/EDUCATION BUSINESS

**COURSE CODE:** ECO 122
**COURSE TITLE:** INTRODUCTION TO MATHEMETICS II

**DATE:16/04.2019**                                   **TIME: 2.00-5.00PM**

## INSTRUCTION TO CANDIDATES

- **SEE INSIDE**

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- *Answer Question **ONE** and any other **TWO** questions*
- *Question ONE carries 30 marks*
- *Time allowed: 3 hours*

**Question One**

a) Evaluate the determinant of the following matrix.

$$\begin{bmatrix} 1 & -2 & -3 & 4 \\ -2 & 3 & 4 & -5 \\ 3 & -4 & -5 & 6 \\ -4 & 5 & 6 & -7 \end{bmatrix}$$

(5 marks)

(b) If A = $\begin{bmatrix} 2 & -1 \\ 3 & 2 \\ 4 & -6 \end{bmatrix}$

(i)  Find a matrix I (identify) such that  A .I = A          (3 marks)
(ii)  Is it true that I.A = A in this example?          (2 marks)

C) i) The function describing the marginal cost of producing a product is

MC = x + 100

Where x equals the number of unit produce. It is also known that total cost

equals Ksh. 40,000 when x = 100.

Determine

(i.i) The fixed cost          (3 marks)

(i.ii) The total cost function          (4 marks)

ii) solve the following using the rules of sums and differences in derivatives          (5marks)

a) $p = 15q^3 - 3q^4$
b) $R = 10t^3 - 3t^2 + 8$


## Question Two

Given the following demand and total cost functions:

$P = 10 - 7Q$

$TC = 20 + 3Q + 4Q2 + 5Q3$

Find :-

| | | |
|---|---|---|
| (i) | The level ofQ, P that will maximize profits | (8 marks) |
| (ii) | The level ofQ that will maximize total revenue | ( 6 marks) |
| (iii) | The level ofQ that will maximize MC and AVC | (6 marks) |


## Question Three (20mks)

1)

(a) Explain the importance of mathematical economics.                    (5 marks)

(b) Verify the distributive law, given A={4, 5), B = {3,6,7} and C = {2, 3}.        (4 marks)

(c) The demand and supply functions of a two commodity market model are as follows:

$Q_d1 = 10 - 2P_1 + P_2$

$Q_s1 = -2 + 3P_1$

$Q_d2 = 15 + P_1 - P_2$

$Q_s2 = -1 + 2P_2$

Find equilibrium price and quantity.                            (4 marks)

2)  An economy has the following import and export functions:

$M = 20 + 0.2Y$

$X = 70$

Find the level of income at which the economy enjoys trade balance.            (2 marks)

3) If given the function $y = (3x + 2)(4x3)$, determine the derivative using product rule. (3marks)

**Question Four**

a) A single commodity market is given by the following model:

$Q = 9 - 2/3 \, P$

$Q = -3 + \frac{3}{4} \, P$

i. Using the model and with reasons, identify the demand and supply functions. (3 marks)

ii. Use graphical method to determine the equilibrium of the market (5 marks)

b) The consumption (C) of a given commodity is related to income (Y) as shown by the following function: $C = \square + \square Y$:

i. State the slope of the consumption function (1 mark)

ii. State the conditions that must prevail for the consumption function to hold. (2 marks)

iii. Compute the level of consumption, given that marginal propensity to consume is 0.75, income is Kshs 10,000 and autonomous consumption is Kshs 1,000. (2 marks)

c) Consider the following national income model for an economy with no external trade

$Y = C + I + G$

If the consumption function, investment and government expenditure are:

$C = 100 + 0.8Y$

$I = 70$

$G = 40$

Find: (i) Derive the savings function (2 marks)

(ii) Compute and interpret the marginal propensity to save (2 marks)

(ii) Equilibrium income (2 Marks)

(ii) Equilibrium Consumption (3 marks)

**Question Five**

a) Solve for the following:

i) $dy/dt + 10y = 20$ given $y(0) = 10$ (4marks)

b) Solve the following simultaneously using Gauss- Jordan method          (6marks)

$3x - 2y - 3z = -14$

$4x - 2y + 3z = 19$

$2x - 2y + 10z = 48$

c) Given the differential equation

$(2xy - 3x^2)\, dx + (x^2 - 2y)\, dy = 0$

   i)   Show that he differential equation is exact          (3marks)

   ii)   Solve the differential equation          (4marks)

d) Evaluate    $\int (5x - 3)^3 (5)\, dx$          (3 marks)