MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATIONS

2018/2019 ACADEMIC YEAR

SECOND YEAR SECOND SEMESTER

SCHOOL OF BUSINESS AND ECONOMICS

BSC. ECON, ECON STAT, FIN ECON, AGBM

COURSE CODE: ECO 2204

COURSE TITLE: MATHEMATICS FOR ECONOMISTS II

DATE: 24TH APRIL, 2019 **TIME: 1430 – 1630HRS**

INSTRUCTIONS TO CANDIDATES

Answer Question **ONE** and any other **THREE** questions

This paper consists of 4 printed pages. Please turn over.

QUESTION ONE

a) Define Comparative Static Analysis as used in Mathematics for Economist **(2 marks)**

b) Find the derivatives of y with respect to x:

i. $y = \left(\frac{ax}{x+b} - cx \right)$

ii. $y = \frac{(2x^2+1)}{(x^{\square})^{\square}}$ **(6 marks)**

b) Find the partial derivative of Z with respect to x and y

$Z = \frac{3x+y^3}{x^2+3y^2}$ **(2 marks)**

c) Given the following Consumption function, find the Marginal Propensity to Consume (MPC) and Marginal Propensity to Save (MPS):

$C = 100 + 0.6Y^d$

$T = 40 + 0.3Y$

(3marks)

d) Compute the elasticity of Q with respect to P and state whether the function is elastic, inelastic or unit elastic

$Q = \frac{2}{p^2}$ **(3 marks)**

e) Compute the following integral:

$\int \left(5e^x - \frac{1}{x^2} + \frac{3}{x} \right) dx$ **(3 marks)**

f) The following demand and supply functions were extracted from a perfectly competitive market

$P = 80 - \frac{1}{2} Q$ demand function

$P = 20 + \frac{1}{10} Q$ supply function

Determine Producer Surplus and Consumer Surplus at equilibrium
(6 marks)

QUESTION TWO

a) Given the following figures for an economy:

$C = 50 + 0.8Y^d$
$I = 100$
$G = 50$
$T = 50$

Compute:

i. Equilibrium level of national income
ii. Government Expenditure Multiplier
iii. Income Tax Rate Multiplier
iv. ΔY resulting from $\Delta G = 25$, all other things held constant

(8 marks)

b) Murume has a miraa farm in Meru county having the following functions:

$Q = 0.6P - 40$
$TFC = 175$
$AVC = 6 + 2Q$

Find Murume's profit maximizing level of output. Conduct the Second Derivative Test
(7 marks)

QUESTION THREE

Naliaka has the following utility function for her *mrenda (X)* and *likhubi (Y)* consumption

$U = 4X^{1/3} Y^{2/3}$

Supposing that the bunch prices of *mrenda* and *likhubi* are Ksh 20 and Ksh. 40 respectively, and that she has a total of Ksh. 500 to spend on the two inputs:

i. Set up the constrained utility maximization problem for Naliaka
ii. By applying the First Order Condition, find the critical values of λ, X and Y
iii. Using Second Order Condition, confirm that the critical values present maximum utility
iv. What will be the stationery value of U
(15 marks)

QUESTION FOUR

a) Kameme is a monopolist having the following demand and cost functions:

$Q_1 = 40 - 2P_1 + P_2$
$Q_2 = 15 + P_1 - P_2$
$C = Q_1^2 + 2Q_2^2 + 20$

i. Determine the output levels (Q_1 and Q_2) and the prices (P_1 and P_2) that will maximize profit for the firm
ii. Using the Hessian, confirm that the values present maximum profit
iii. What will be the Firm's profit **(15 marks)**

QUESTION FIVE

a) What is the usefulness of the Lagrangean multiplier in mathematical optimization
(3 marks)

b) Tich Tek Ta Enterprises has the following cost function and production constraint (quota):

Cost Function = $2X_1^2 - X_1X_2 + 3X_2^2$

Production Quota $x + y = 36$

i. Using Lagrangean optimization technique, solve the constrained cost minimization problem and compute the critical values X_1, X_2 and λ
ii. Using the Bordered Hessian, Confirm that the critical values present a minimum
(12 marks)

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END.....