MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATIONS
2018/2019 ACADEMIC YEAR
SECOND YEAR, FIRST SEMESTER

SCHOOL OF BUSINESS AND ECONOMICS
BSC. AGRICULTURAL ECONOMICS AND RESOURCE MANAGEMENT

COURSE CODE: ECO 2204
COURSE TITLE: MATHEMATICS FOR ECONOMISTS II

DATE: 11TH DECEMBER, 2018 **TIME: 1100 - 1300 HRS**

INSTRUCTIONS TO CANDIDATES

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

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

QUESTION ONE

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

i. $y = \frac{(6x^5)(x^2-4)-(2x)(x^6)}{(x^2-4)^2}$

ii. $y = 3u^{\frac{1}{2}} + u^3$ $\quad u = x^2 + 2x^2$ **(4 mks)**

b) Given the following Marginal Propensity to Consume (MPC) function, derive the corresponding Consumption function:

$MPC = 0.7 + 0.1Y^{-1/4}$

And C= 80 when Y= 0 **(3mks)**

c) 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 mks)**

d) Discuss the limitations of Static Equilibrium Analysis **(4 mks)**

e) Compute the following integral:

$\int (x^{2/3} - \frac{7}{x} + 5e^{3x})dx$ **(3 mks)**

f) A national income model is represented by the following functions:

$Y = C + I + G$

$C = a + bY^d$

$T = tY$

$G = G^0$

$I = I^0$

Derive the following multipliers:

i. Government Expenditure Multiplier
ii. Income Tax Rate Multiplier **(6 mks)**

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

$Z = (3x^4 + 3y^5 - y^3)^6$ **(2 mks)**

QUESTION TWO

a) Given Demand and Supply functions in a one-commodity market model as:

$Q_d = a - bP$

$Q_s = -c + dP$

i. Derive the equilibrium price and quantity

ii. Using comparative static partial derivatives, compute:

   a. Effect of a shift of the demand function on equilibrium quantity ($\frac{\partial Q}{\partial a}$). Use a diagram to show an increase in the parameter a

   b. Effect of change in the slope of the supply function on equilibrium price ($\frac{\partial P}{\partial d}$). Use diagram to show increase in the parameter d

(8 marks)

b) Magothe has a coffee firm in Kiambu county having the following functions:

Q= 0.8P – 20

TFC = 180

AVC = 4 + 2Q

Find Magothe's profit maximizing level of output and his profit

(7 marks)

QUESTION THREE

a) Wijenje has the following maize production function

$Q = 40K^{0.4}L^{0.6}$

Where Q is the quantity of maize produced while K and L are units of inputs capital and labour respectively. Supposing that the prices of K and L are Ksh 20 and Ksh. 40 respectively, and that he has a total of Ksh. 5000 to spend on the two inputs:

i. Using Lagrangean optimization technique determine the values of λ, K and L at profit maximization level

ii. What will be Wijenje's maximum profit

iii. Using bordered Hessian matrix, confirm that the critical values present a maximum **(15 marks)**

QUESTION FOUR

a) Noellene is a price discriminating monopolist having the following functions for her milk production firm:

$P_1 = 32 - 2Q_1$

$P_2 = 22 - Q_2$

$TC = 10 + 2Q + Q^2$

Determine the prices and quantities for the milk in the two different markets **(9 marks)**

b) 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 FIVE

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

b) Faith has a mango firm in Kitui in which she has an objective of:

Maximizing profit = $60x - 2x^2 - xy - 3y^2 + 80y$

Subject to $x + y = 12$ as the constraint

i. Compute the values of x, y and λ at profit maximization point **(10 marks)**

ii. What will be Faith's profit **(2 marks)**

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