MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATIONS
2017/2018 ACADEMIC YEAR
SECOND YEAR SECOND SEMESTER

SCHOOL OF BUSINESS AND ECONOMICS
BACHELOR OF SCIENCE (ECONOMICS, ECONOMICS &STATISTICS, FINANCIAL ECONOMICS, AGRIBUSINESS MANAGEMENT)

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

DATE: 24TH APRIL 2018   TIME: 1100 - 1300HRS

INSTRUCTIONS TO CANDIDATES

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

QUESTION ONE

    a) Solve the following system of equations using the   (12 marks) inverse method.

$$x_1 + 2x_2 + 4x_3 = 4$$
$$2x_1 + x_3 = 3$$
$$3x_2 + x_3 = 2$$

    b) For the following consumption function $C = 25 + 0.15Y$

  i.   Compute the marginal propensity to consume (MPC)   (2 marks)

  ii.   Compute the corresponding saving function.   (3 marks)

  iii.   Computethe marginal propensity to save (MPS).   (2 marks)

    c) Evaluate by means of integration by substitution

    (6 marks)

$$\int_1^2 (2x - 1)(x^2 - x)^5 \partial x$$

QUESTION TWO

    a) A market model of 3products is given as follows: 10 marks

$$Q_{d1} = 100 - 4P_1 + 10P_2 - 6P_3 \quad Q_{s1} = 16P_1 - 10$$
$$Q_{d2} = 44 + 14P_1 - 4P_2 + 10P_3 \quad Q_{s2} = 24P_2 - 10.2$$
$$Q_{d3} = 34 + 2P_1 + 10P_2 - 6P_3 \quad Q_{s3} = 8P_3 - 2$$

Use the Crammer's Rule to determine the equilibrium prices and quantities for the three products.

    b) The supply function for Commodity X in a given market is   5 marks given as:

$P = -20 + 2Q$. Calculate the producer surplus when the Price = 40

QUESTION THREE

a) Work out the total derivatives of the functions (i) to (iii): 9 marks

   i) $Y = f(Z_1 Z_2) = [9Z_1^2 + 1.5Z_1 Z_2 - 0.5Z_2^2]^6$

   ii) $y = \dfrac{6X+5}{2\sqrt{(3X^2 + 5x + 1)}}$

   iii) $Y = \left(\dfrac{1}{x^2} + 24x\right)^{\frac{3}{4}}$

b) Find the rank of matrix B 6 marks

$$B = \begin{bmatrix} 2 & 4 & 6 & 2 \\ 4 & 8 & 4 & 10 \\ 8 & 0 & 0 & 8 \end{bmatrix}$$

QUESTION FOUR

a) The national income model for an open economy is specified by the following equations: 9 marks

$$Y = C + I_0 + G_0 + X_0 - M$$

$$C = c_0 + c_1(Y^d) \text{ where } c_0 > 0 \quad 0 < c_1 < 1$$

$$T = t_0 + t_1 Y \quad t_0 > 0 \quad 0 < t_1 < 1$$

$$Y^d = Y - T$$

$$M = m_0 + m_1 Y$$

Where Y, C, I, G, T, X, and M are national income, consumption expenditure, investment expenditure, government expenditure, Taxes, Exports and Imports respectively.

Calculate the autonomous government expenditure multiplier and autonomous tax multiplier.

b) A total cost function is given by: 6 marks

$$TC = Q_1^3 + Q_1 Q_2 - 3Q_2^3 + 20$$

Find:

    (i)   The marginal costs for Good 1 and Good2 and tell whether the function displays increasing or decreasing MC with respect to each of the goods.

    (ii)   The degree of homogeneity and nature of returns to scale for the following function

QUESTION FIVE

a) The production function for Firm X is given as $Q = 3L^{\frac{1}{3}}K^{\frac{2}{3}}$.   9 marks
If the firm wants to produce an output of 240liters of milk, find the optimal values of labour and capital that will minimize the total cost of production given that labor cost per liter of milk is \$1.25 and capital cost per liter of milk is \$5.

b) Find the first order differentials of the following system of   6 marks
equations

    i) $y = e^{\left(\frac{4x^2}{2x}+5\right)^4}$

    ii) $y = \frac{4(x^3-2x)}{(3x^2+3)^3}$

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