KISII UNIVERSITY

SCHOOL OF BUSINESS AND ECONOMICS

FIRST YEAR EXAMINATION FOR THE AWARD OF DEGREE OF

BHRM

BHRM 140: MATHEMATICS FOR MANAGEMENT

STREAM: BBAM/BCOM Y1S1 **TIME: 2 HRS**

DAY..... **DATE.....**

INSTRUCTIONS

(i) Answer question **ONE** and any **other three** questions

(ii) Question one carries **25 marks** while the rest of the questions **15 marks** each

(iii) Do not write on the question paper

(iv) Show your working clearly

QUESTION ONE - COMPULSORY **(25 marks)**

(a) Consider the following sets:

$A = \{X|1 \leq x < \infty\}$

$B = \{X|4 \leq x \leq 1000\}$

$C = \{...,-2, -1, 0, 1,...\}$

$D = \{X|-\infty < x < +\infty\}$

State whether the following statements are TRUE or FALSE **($2\frac{1}{2}$ marks)**

(i) $A \subset B$

(ii) $\emptyset \subset D$

(iii) $\{0\} \subset B$

(iv) $C \not\subset D$

(v) $D = C$

(b) Calculate the point elasticity of demand from the given demand function

$Q = 120 - 2P + \frac{100}{P}$, at the point where P = 8. **($5\frac{1}{2}$ marks)**

(c) Find the expansion of $(x - y)^5$ using the binomial theorem by combination **(4 marks)**

(d) Evaluate the following definite integral:

$\int_2^5 (x+3)(x-1)dx$ **(3 marks)**

(e) Determine the critical values and find out whether these critical values are maxima or minima. Hence determine the extreme values of the function

$Y = f(x) = \frac{1}{3}x^3 + x^2 - 35x + 10$ **(4 marks)**

(f) Given the following average revenue and total cost functions

$AR_1 = 6 - Q_1 - 3Q_2$

$AR_2 = 2 - 4Q_1 - Q_2$

$TC = 2Q^2 1 + 3Q_1Q_2 + \frac{1}{2}Q^2_2$

Determine the corresponding profit function. **(3 marks)**

(g) Given B = (5, 8, 11, 20, 25) and C = (1, 3, 5, 7, 9, 11, 13), find

i) $B \cap C$

ii) $n(B \cup C)$ **(3 marks)**

QUESTION TWO **(15 marks)**

(a) Consumption (C) is a function of income (Y), given by the following expression:

C = 8 + 0.65Y.

(i) What is the slope of the consumption function? **(2 marks)**

(ii) Is the function positively or negatively sloped? **(2 marks)**

(iii) What is the level of consumption when Y = 10? **(3 marks)**

(b) The demand and supply functions for rice are given by:

$Q_d = 3 - \frac{1}{2}P$

$Q_s = -1 + \frac{1}{6}P$, where Q_d and Q_s are the quantities of rice demanded and supplied, and P is the price of rice.

i) Graph both these functions on the same coordinate plane **(4 marks)**

ii) You are told that Equilibrium is attained when the supply of and demand are equal. At what levels of Q and P does this happens? **(4 marks)**

QUESTION THREE **(15 marks)**

(a) Consider the following consumption and tax functions:

$C = 65 + 0.75Y$

$T = \alpha_0 + \alpha_1 Y$

(i) What is the name given to α_1? What does it measure? **(1 marks)**

(ii) (ii) Determine the level of tax and consumption when Y = 0. **(2 marks)**

(iii) How much income will bring forth a level of consumption expenditure equal to 78.5? **(3 marks)**

(iv) If income y increases by 100, how much of that increase will be allocated to consumption **(3 marks)**

(b) A National model is given by:

Y = C + I + G where C, I and G are respectively, consumption, investment, and government expenditure components given by:

C = a = bY

I = 0.1Y

G = 250

(i) Find equilibrium value of Y, that is, express Y in terms of constants in the model. **(3 marks)**

(ii) What is the corresponding equilibrium investment? **(3 marks)**

QUESTION FOUR **(15 marks)**

(a) Construct the appropriate standard form for parabola corresponding to the following expression: $X^2 - 6X - 7 = 0$.

Sketch the corresponding parabola if it exist **(4 marks)**

(b) The demand function for a firm is given by:

$P = \beta_1 - \beta_2 Q$

Find:

(i) The average revenue function of the firm and comment on your result **(2 marks)**

(ii) The total revenue function of the firm **(2 marks)**

(c) The demand and total cost functions facing a firm are:

$P_1 = 26 - 3Q_1 - Q_2$

$P_2 = 33 - Q_1 - 2Q^2_2$

$TC = Q^2_1 + Q_1Q_2 + 2Q^2_2$

Find:

(i) The average revenue functions for commodities Q_1 and Q_2. **(2 marks)**

(ii) The total revenue for the firm **(1 marks)**

(iii) The average cost function with respect to Q_1 and Q_2 **(2 marks)**

(iv) The profit function for the firm **(2 marks)**

QUESTION FIVE **(15 marks)**

(a) The demand component of a market model is given by:

$P = - Q^2 - 6Q + 7$ and the supply component is given by:

$P = Q^2 = 3Q + 2$. Find the equilibrium price and quantity in the market. Comment on your answer. **(4 marks)**

(b) Consider a two commodity market model represented by:

$Q_{d1} = 4 - P_1 + \frac{1}{2}P_2$

$Q_{S1} = -\frac{5}{2} + \frac{3}{2} P_1$

$Q_{d2} = 8 + 2P_1 - 2P_2$

$Q_{S2} = -3 + 6P_2$

Calculate the equilibrium prices and quantities for the market **(4 marks)**

(c) The money market of an economy is given by the following equations:

$M_{DT} = \frac{1}{2} Y$

$M_{DS} = 140 - 10r$

$M_S = 1600$

(i) Derive the LM-function for the economy **(3 marks)**

(ii) Find the equilibrium r, when Y = 4000 **(2 marks)**

(iii) Find the equilibrium Y, when r = 8**(2 marks)**

END

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