MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF BUSINESS AND ECONOMICS

DEPARTMENT OF COMMERCE

UNIVERSITY ORDINARY EXAMINATION

2020/2021 ACADEMIC YEAR

FIRST YEAR **ONE** SEMESTER EXAMINATION FOR, BACHELOR OF

AGRIBUSINESS MANAGEMENT AND SMALL BUSINESS AND

AGRICULTURAL EDUCATION AND EXTENTION

UNIT CODE: SMA 100

UNIT TITLE: MATHEMATICS.

DURATION: 2 HOURS

Instructions to candidates:

1. Answer question One and Any Other Two questions.
2. Mobile phones are not allowed in the examination room.
3. You are not allowed to write on this examination question paper.

SECTION A: ANSWER ALL QUESTIONS IN THIS SECTION

QUESTION ONE (30 MARKS)

(a) Mention **five** types of matrices (5 marks)

(b) Solve for x in $log_3(x+1)$ (x+1) – log_3 (x-1) =1 (4 marks)

(c) What sum will amount to Ksh 21,490 in 5 years at 12% compound interest Payable half yearly?

d. Evaluate the integral $\int(5x+7)^4 dx$ (3marks)

(e) The price per unit at which a company can sell all of its products is given by the function P(X) = 500+28X, Where X is the number of units produced. Find X so that the profit is maximum. (5 marks)

(f) If the third, sixth and the least terms of a Geometric progression (GP) are 6, 48 and 3,072 respectively, find the first term in and the number of terms in GP. Are 66, 48 and 3,072 respectively, find the first term and the number of terms in a GP

(7 marks)

(g) Solve the simultaneous linear equations

$$5x+6y=24400$$
$$7x+9y=35600$$

(3 marks)

(h) Solve for x in $3x-2 \geq 5x+13$ (3 marks)

SECTION B – ANSWER ANY TWO QUESTIONS IN THIS SECTION

QUESTION TWO (20 MARKS)

(a) If total cost function is $C(x) = 500 + 90x$ and the total revenue function is given by $R(x) = 150x - x^2$

(i) Find the break-even point(s) (3 marks)

(ii) What level of production will maximize profit? (3 marks)

(b) Find the minimum and the maximum values in the function

$$y = 2x^3 + 5x^2 - 4x + 7$$

(7 marks)

(c) Solve for x in

$$6x^{1/3} + x^{-1/3} = 5$$

(7 marks)

QUESTION THREE (20 MARKS)

(a) A manufacturer produces two types of models M_1 and M_2. Each M_1 model requires 4 hours of grinding and 2 hours of polishing, whereas each M_2 model requires 2 hours of grinding and 5 hours of polishing. The manufacturer has 2 grinders and 3 polishers. Each grinder works for 40 hours a week and each polisher works for 60 hours a week. Profit on an M_1 model is Ksh3.00 and that on an M_2 model is Ksh4.00. Whatever is produced in a week is sold in the market. Formulate the linear programming problem. (4marks)

(b) The demand function for a manufacturer's product is $X = 70 - 5P$, where X is the number, of units produced and P is the price per unit. Using differential calculus, determine the value of X that gives maximum revenue and the maximum revenue. (7 marks)

(c) The 10^{th} term of an Arithmetic Progression is -1 5, and 31^{st} term is -57, find the 15^{th} term.

(6 marks)

(d) The price of a new machine is Ksh.175, 000 it losses value at the rate of 10 per cent per annum. Find its value after six years. (3 marks)

QUESTION FOUR (20 MARKS)

(i) Quick survey of 1000 children in a refugee camp produced the following results

320 children were fed on beans

200 children were fed on potatoes

450 children were fed on potatoes

150 children were fed on beans and potatoes

70 children were fed on beans and rice

100 Children were fed rice and potatoes.

300 Children were fed on none of three types of food.

(ii) Present the above diagram on a Venn diagram. (3 marks)

(iii) Find the number of children who were fed on all the three types of food. (2 marks)

(iv) Find the number of children who were fed on exactly one of the three types of food .

(2 marks)

(c) Solve the simultaneous linear equations

$$4x + y + 2z = 7$$
$$7x - y + z = 7$$
$$3x + 4y + z = 8$$

Using matrix algebra (7marks)

Find the maximum and the minimum points in the function $y = x^3 - 3x^2 - 9x + 27$.

(6 marks)