MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY

(MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS

2021/2022 ACADEMIC YEAR

FIRST YEAR SECOND SEMESTER EXAMINATION FOR DIPLOMA IN GENERAL AGRICULTURE

COURSE CODE: DAG 051

COURSE TITLE: INTRODUCTION TO AGRICULTURAL MATHEMATICS

DATE: 18/1/22   **TIME:** 12-2PM

INSTRUCTIONS TO CANDIDATES
- Answer questions in Section A and any TWO Questions in Section B.

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

1

SECTION A: Answer all questions (30 Marks)

QUESTION ONE

a) i) Apart from substitution and elimination method name three other methods used to solve simultaneous equations (3mks)

ii) Solve the system of the equations (3mks)

$$2x + 3y = 4$$

$$4x + 6y = 7$$

b) Integrate $2x + 3x^2 + 80x^5$ (3mks)

c) Find the minimum and maximum points of the $f(x) = x^3 - 3x^2 + 4x - 10$ (5mks)

d) Find the number of terms in the geometric progression $6, 12, 24, ..., 1536$ (5mks)

e) Find the third derivative of $f(x) = 2x + 3x^2 + 9x^3$ (3mks)

f) Prove that $|A \cup B| = |A| + |B| - |A \cap B|$ (5mks)

g) If $f(x) = 0$ find x given that $f(x) = x^3 + x^2 - 20x$ (3mks)

SECTION B: Answer any two questions (40 marks)

QUESTION TWO

a) i) Prove that the quadratic formula is given by $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ (5mks)

ii) Solve $27x^2 + 40x - 200$ using quadratic formula (5mks)

b) Given that set $A = \{1,2,3,4,5\}, B = \{4,5,6,7,8\}$ and $C = \{2,4,6,8,10\}$ find;

i. $A \cap B'$ (2mks)

ii. $A \cup C$ (2mks)

iii. $A \cap B \cap C$ (2mks)

iv. $A' \cap B'$ (2mks)

v. Draw the Venn diagram to represent the three Sets (2mks)

QUESTION THREE

a) A farmer has realized that his annual profit in maize production is given by the following

$$P = 15x^2 - 5y^2 - 80x - 30y + 20xy + 20$$

Where $x = is\ the\ yield$

$y = is\ the\ selling\ cost\ (In\ hundred\ thousands)$

Determine the maximum value of x and y that will maximize the profit (7mks)

b) Prove that $\tan\theta + Cot\theta = Sec\theta\ Csc\theta$ (5mks)

c) Solve the following;

i. $\int_1^4 2x^3 + 5x^4 + x^6 dx$ (3mks)

ii. $\int 4x^3 + 3x^2 + 2x\ dx$ (3mks)

iii. $\frac{d}{dx}(x^3 + 3x^2 + 3x + 60)$ (2mks)