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MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY

(MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS

2023/2024 ACADEMIC YEAR

FIRST YEAR FIRST SEMESTER MAIN EXAMINATION FOR THE CERTIFICATE IN GENERAL AGRICULTURE

COURSE CODE: CAG 005

COURSE TITLE: MATHEMATICS

DATE: 6.12.23 **TIME: 3-5PM**

INSTRUCTION TO CANDIDATES

Answer ALL questions in section A and any TWO in section B

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

This paper has 3 printed pages PLEASE turn over

SECTION A: Answer all questions (30 Marks)

QUESTION ONE

a) What do you understand by the following terms? (3mk)
   i. Sample
   ii. Variance
   iii. Skewness

b) A farmer starts work at 8: 50 with a ten minute for preparation. Before lunch, he works in three plots where he takes fifty-five minutes in each plot and one fifteen minute break. Lunch is one hour. What time does the farmer finish lunch? Give your answer using the 24-hour clock. (4mks)

c) Show that $\frac{sec^2\theta - 1}{sec^2\theta} = sin^2\theta$ (2mks)

d) The mean of yearly production of milk in liters of a certain farmer is 240 and median 230.4 determine the liters that the farmer gets most often every year (3mks)

e) The following distribution table shows the number of tree seedlings donated by 49 individuals in Kakamega County during tree planting awareness.

No. of Trees	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100-110
Individuals	4	18	9	7	6	3	1	1

What is the average number of tree donation from the individuals (4mks)

f) Determine the value of x and y by use of Matrix Method (5mks)

$2x + 4y = 14$

$4x - 4y = 4$

g) If $0° \leq \theta \leq 360°$ solve $sin\,\theta = 0.5$ (2mks)

h) Factorize $3x^2 + 4x - 4$ (3mks)

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

SECTION B: Answer any two questions (40 marks)

QUESTION TWO

a) Find the solution to the following system (3mks)

$ax + by - a + b = 0$

$bx - ay - a - b = 0$

b) First four moments about mean of a distribution are 0, 2.5, 0.7 and 18.75. Find coefficient of skewness and kurtosis (4mks)

c) Solve the following using quadratic formula (5mks)

$2x^2 + 8x + 7 = x^2 + 6x + 5$

d) Calculate mean, Median and the Skewness of the following frequency distribution: (8mks)

Classes	1-10	10-20	20-30	30-40	40-50	50-60
Frequency	11	29	18	4	5	3

QUESTION THREE

a) State and prove the Pythagoras theorem (4mks)

b) Use the following data to find the harmonic and geometric mean (4mks)

21, 28, 32, 54, 36, 37, 38, 53, 40, 54, 42, 45, 61, 68, 28, 33, 56, 57, 37, 52, 39, 40, 54

a) Solve the equation $1 + \sin\theta = 2cos^2\theta$ and find all the solutions for $0° \leq \theta \leq 360°$ (5mks)

b) The volume of the closed cylindrical tank is 30 cubic meters. If the total surface area is a minimum, what is its base radius, in m? (7mks)

QUESTION FOUR

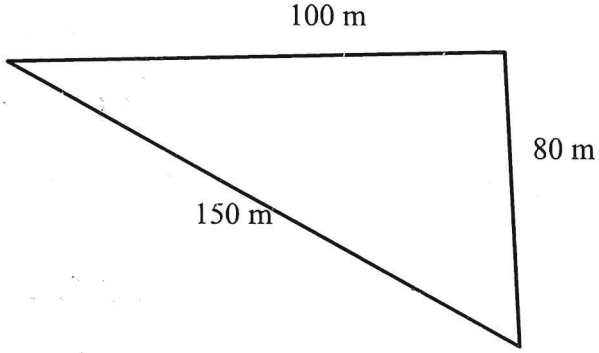
a) State the methods used to solve quadratic equations (3mks)

b) The farmer wants to construct a small dam that will store water to be used for irrigation during dry season. If the dam measures 6 metres wide, 10 metres long and 15 metres high find the litres of water the dam can hold. (4mks)

c) Use Grouping and analysis method to calculate the mode (7mks)

Size of garment	28	29	30	31	32	33
No. of persons wearing	10	20	40	65	50	15

d) Determine the angles of the following triangular plot (6mks)



QUESTION FIVE

a) Solve by completing square method $x^2 - x - 6 = 0$ (3mks)

b) A bucket is in the form of frustum of cone and holds 28.490 litres of water. The radii of the top and bottom are 28 cm and 21 cm respectively. Find the height of the bucket. (4mks)

c) The data below shows the number of days that 400 Agriculture students visit the farm per semester.

Class	11 – 20	21 – 30	31 – 40	41 – 50	51 – 60	61 – 70	71 – 80
Frequency	42	38	m	54	n	36	32

Calculate;

i. Find the value of m and n if the median is 38.5 (3mks)

ii. The days that most students visit the farm (2mks)

iii. The coefficient of quartile (3mks)

iv. The coefficient of variation (5mks)