# MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY

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**University Examinations 2023/2024**

FIRST YEAR, FIRST SEMESTER EXAMINATION FOR DIPLOMA IN AGRICULTURE

**AAD 2105: MATHEMATICS**

**DATE: DECEMBER 2023** **TIME: 1.5 HOURS**

**INSTRUCTIONS:** *Answer question **one** and any other **two** questions*

**QUESTION ONE (30 MARKS)**

a) Given the sequence 2, 4, 6, 8, 10,….. find:

(i) The 20th term of the sequence (3 marks)

(ii) The sum of the first 20 terms of the sequence (3 marks)

b) Find the value of x which satisfies the equation $16x^2 = 8^{4x-3}$ (4 marks)

c) If $\tan\theta = \frac{24}{45}$ find without using tables or calculator the value of $\frac{\tan\theta - \cos\theta}{\cos\theta + \sin\theta}$ (4 marks)

d) Factorize $a^2 - b^2$, hence find the exact value of 25572 – 25472 (4 marks)

e) Ten men working six hours a day take 12 days to complete a job. How long will it take eight men working 12 hours a day to complete the same job? (4 marks)

f) Find the value of x which satisfies the equation $(16^x)^2 = 8^{2x+2}$ (3 marks)

g) The following data represents marks scored by 10 students in a mathematics test 30, 49, 40, 47, 81, 47, 53, 61, 74, 53, 47. Calculate

(i) Mean mark (3 marks)

(ii) Median mark (3 marks)

**QUESTION TWO (15 MARKS)**

a) The coordinates of A and B are (1, 6, 8) and (3, 0, 4) respectively. if O is the origin and P the midpoint pf AB. Find the length of OP (5 marks)

b) Solve for p in $\log P^3 + \log 5 = log 2^5 - \log 5P$ (5 marks)

c) The displacement, s meters of a moving particle after, t seconds is given by $s = 2t^3 - 5t^2 + 4t + 2$. Determine

(i) The velocity of the particle when t = 10 seconds (3 marks)

(ii) The value of t when the particle is momentarily at rest (2 marks)

**QUESTION THREE (15 MARKS)**

At an agricultural Research Centre, the length of a sample of 50 maize cobs were measured and recorded as shown in the frequency distribution table below

| Length | 8-10 | 11-13 | 14-16 | 17-19 | 20-22 | 23-24 |
|---|---|---|---|---|---|---|
| No. of Labs | 4 | 7 | 11 | 15 | 8 | 5 |

a) Calculate the modal class and size (2 marks)

b) Calculate

(i) The mean (5 marks)

(ii) The variance (5 marks)

(iii) The standard deviation (3 marks)

**QUESTION FOUR (15 MARKS)**

a) Use matrix method to solve $\begin{matrix} 2x + y = 7 \\ 4x + 3y = 17 \end{matrix}$ (5 marks)

b) A box contains five red balls and four black balls all identical. Three balls are drawn without replacement from the box at random;

a. Draw a tree diagram to show the situation

b. Draw a tree diagram to find the probability that;

(i) The balls picked are of the same color (2 marks)

(ii) More red balls were picked (2 marks)

(iii) At most 1 red ball was picked (3 marks)