MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

FIRST YEAR THIRD SEMESTER EXAMINATION FOR

CERTIFICATE IN ELECTRICALENGINEERING

CERTIFICATE IN AUTOMOTIVE ENGINEERING

CERTIFICATE IN MECHANICAL ENGINEERING

MATHEMATICS 1

DATE: 14/12/2020 **TIME: 11.30-2.30 PM**

INSTRUCTIONS

ANSWER ALL THE QUESTIONS

SHOW ALL YOUR WORKING CLEARLY.

QUESTION ONE

1 a) Given that **A** = $\begin{bmatrix} -1 & 3 \\ 2 & 4 \end{bmatrix}$ and $\begin{bmatrix} 0 & 6 \\ 5 & 8 \end{bmatrix}$**B** = 0 6 ; determine

(i) 2 A - B | (ii) BA A (iv) B^T (8 marks)

b) If the matrix $\begin{bmatrix} y & 4 \\ y & 1 \end{bmatrix}$ y 4 is singular, find possible values of y (4 marks)

c) Use matrix method to solve the following simultaneous equation,

3x - 2y =8

x - 5y =7 (8 marks)

QUESTION TWO

a) Determine the term stated in the following series

(i) -32, -29, -26,…….9^{th} term

(ii) 16, -8, 4, ……10^{th} term (6 marks)

b) Find the sum of the first 60terms of the series 10+10.3+10.6+…….. (3 marks)

c) The 9^{th} and 14^{th} terms of our arithmetic progression are 240 and 365 respectively. Calculate the sum of the first 50terms. (7 marks)

d) The common ratio of a G.P is 2 and the sum of the first eight terms is 1020. Find the first term. (4 marks)

QUESTION THREE

a) Find the (i) median (ii) mode (iii)quartile deviation of the following measures

52, 50, 51, 53, 59, 54, 52, 60 and 58 (7 marks)

b) The masses of ball bearings from a factory are recorded in the table below.

Mass(g)	5-9	10-14	15-19	20-24	25-29
No of balls	10	12	20	10	8

By using a working mean of 17, determine

(i) The mean mass and

(ii) The standard deviation (10 marks)

c) The mean of 20,14,9, 20, a and 6 is 15; find the value of a (3 marks)

QUESTION FOUR

a) Solve the following equations

i. 1- log (x - 6) =log x

ii. $\frac{a^8=a^3xa^x}{a^2}$

iii. Log 12 + $3\log^x$ = log 96 (10 marks)

b) Calculate

i. simple interest and

ii. compound interest of Ksh 7,120 invested for 3years at 11% per annual (5marks)

c) Find the length of the shortest piece of a string that can be cut into equal length, each 28cm, or 35cm or 42cm. (5marks)

QUESTION FIVE

a) Convert

i. 67 to binary

ii. toe_{12} to decimal

iii. 11101_2 to octal

iv. Work out $3417_8 - 2735_8$ (9 marks)

b) If $\begin{pmatrix} c+2d & 14 \\ -3 & d-2 \end{pmatrix} = \begin{pmatrix} 4 & 14 \\ -3 & 7+3c \end{pmatrix}$ find the value of c and d (6 marks)

c) Simplify { }

i. 69 ÷ 6+ (3 x 8-7)

ii. $\frac{2x-4y}{4} - \frac{x-y}{3}$ (5 marks)