



MACHAKOS UNIVERSITY

SCHOOL OF PUREE AND APPLIED SCIENCES

**DEPARTMENT OF MATHEMATICS AND STATISTICS SECOND SEMESTER EXAMINATIONS FOR
CERTIFICATE IN ELECTRICAL AND AUTOMOTIVE.**

MATHEMATICS IV

Instructions

Answer all the questions

Show all your working clearly.

Question one

Simplify the following

Question one

a) Simplify the following

i) $69 \div \{6 + (3 \times 8 - 7)\}$

ii) $2\frac{1}{2} \times 1\frac{1}{3} - \frac{3}{5} \div 1\frac{4}{11}$

iii) $\frac{2a-4b}{4} - \frac{a-b}{3}$ (11 marks)

b) The common ratio of a geometric progression is 2 and the sum of the first eight terms is 1020.

Find the first term. (4 marks)

c) Find the sum of the first 60 terms of the series $10+10.3+10.6+\dots$ (5marks)

Question two

a) Solve the following equations

i) $32^{x-3} \times 4^{x+3} = 128 \div 2^x$

ii) $\log(5x+75) - 2 \log 3 = \log(2x-9)$ (12 marks)

b) Calculate the compound interest on shs 7120 for 3 years at 11% per annum (3 marks)

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

Question three

a) Give that $A = \begin{pmatrix} 1 & 2 \\ -3 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & -1 \\ 1 & -1 \end{pmatrix}$

- i) $2A+3B$
- ii) $(AB)^T$ (7 marks)
- b) Solve the equation for matrix R

$$R + \begin{pmatrix} 4 & -5 \\ -3 & 6 \end{pmatrix} = \begin{pmatrix} -3 & 7 \\ -5 & 8 \end{pmatrix} \text{ (4 mark)}$$

- ci) Convert 11010_{two} to octal
- ii) Add $e7_{\text{twelve}}$ to $8t_{\text{twelve}}$
- iii) Multiply 243_7 by 35_7 (9 marks)

Question four

- a) Solve the following simultaneous equations using matrix method
 $4x+3y-32=0$ and $3x-2y=7$ (8 marks)
- b) The 5th term of an A.P is 82 and the 12th term is 103. Determine
 - i) The first term and the common difference
 - ii) The sum of the first 21 terms (6 marks)
- c) Evaluate
 - i) $(2^6 \times 64^{-\frac{1}{3}})/(3^{-3} \times 81)$
 - ii) $\log_2(1/4)$

Question five

- a) $1/3$ of josephs books are the same in number as $3/4$ of john, if john has 60 books how many has joseph?
- b) Evaluate
 - i) $3x^2 2xy + z^3$ when $x=-2$, $y=2$ and $z=-1$
 - ii) 27.19×0.573 and give the answer in standard form correct to 3 s.f
- c) Use logarithms to evaluate

$$\sqrt{0.0782 \times \frac{34.39}{4.836}} \text{ (7 marks)}$$

- d) State the number of significant figures in the following measures
 - i) 6010cm
 - ii) 42.058s
 - iii) 85000cm^3 (3 marks)