



MACHAKOS UNIVERSITY

University Examinations 2018/2019

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS, STATISTICS AND ACTUARIAL SCIENCE

SPECIAL/SUPPLEMENTARY EXAMINATION FOR DIPLOMA IN

ELECTRICAL/MECHANICAL/BUILDING AND CIVIL ENGINEERING

ECU 0100 ENGINEERING MATHS I

DATE: 25/9/2019

TIME: 8:30 -10:30 AM

INSTRUCTION: Attempt question ONE and any other TWO questions

QUESTION ONE (30MARKS)

a) Solve the equations

i) $4\log 3 + \log 9 - \log 27 = x\log 3$ (3mks)

ii) $\log_2(2x + 4) - \log_2(5x - 2) = 1$ (4mks)

iii) $2.3^{x^2} = 7^{0.4}$ (5mks)

b) Make f the subject of the formula

$$\frac{R}{r} = \sqrt{\frac{f+p}{f-p}}$$

Hence determine f when $R = 4, r = 2, \text{ and } p = 5$ (3mks)

c) Solve the equation using completing of squares method

$$4x^2 - 6x + 1 = 0 \quad (4\text{mks})$$

- d) The equation of a certain mechanical system satisfies the equation $f = ax + b$ where a and b are constants. If $x = 24$ when $F = 84$ and $x = 15$ when

$F = -105$ find the values of a and b using elimination method (5mks)

- e) Use logarithms to evaluate

i) $\sqrt{\frac{86.76 \div 0.03645}{9.463 \times 756.8}}$ (6mks)

QUESTION TWO (20MKS)

- a) Use logarithms to evaluate

$\sqrt[3]{\frac{(4.72)^2 \times 456}{0.00913 \times (237)^2}}$ (8mks)

- b) Solve the equations

i) $9^{x+1} + 3x^{2x-1} = 28$ (6mks)

ii) $\log_{10} 5 - \log_{10} (2x + 1) = \log_{10} (x - 4) + 2$ (6mks)

QUESTION THREE (20mks)

- a) simplify

$\frac{\log 25 - \log 125 + \frac{1}{2} \log 625}{3 \log 5}$ (5mks)

- b) Solve the quadratic equations

i) $12x^2 + 19x + 4 = 0$ using factor method (4mks)

ii) $x^2 - 8x + 11 = 0$ using formula method (4mks)

iii) $3x^2 + 4x - 5 = 0$ by the method of completing squares (4mks)

c) Transpose the equation $v = \frac{4}{3} \pi r^3$ to make r the subject. (2mks)

QUESTION FOUR (20MKS)

a) Simplify

i) $\frac{\frac{1}{2}\log 625 - \log 125 + \log 5}{7\log 5}$ (4mks)

ii) $\frac{12^2 \times 5^2 \times 60}{18^2 \times (-2)^4 \times 5^3}$ (3mks)

b) Evaluate $2^{x+2} = 3^{2x-4}$ (5mks)

c) Factorise $3x^2 - 2x - 8$ (3mks)