



TECHNICAL UNIVERSITY OF MOMBASA
Faculty of Applied & Health
Sciences

DEPARTMENT OF MATHEMATICS & PHYSICS
CERTIFICATE IN ELECTRICAL ENGINEERING (CEPE I)

AMA 1101: ENGINEERING MATHEMATICS I

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: OCTOBER 2013

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

This paper consist of **FIVE** questions in **TWO** sections **A & B**

Answer question **ONE (COMPULSORY)** and any other **TWO** questions
 Maximum marks for each part of a question are as shown
 This paper consists of **THREE** printed pages
SECTION A (COMPULSORY)

Question One

a) Simplify:

$$\frac{(1+x)^{\frac{1}{2}} - \frac{1}{2}x(1+x)^{-\frac{1}{2}}}{1+x}$$

(i)

$$\frac{32^{\frac{3}{4}} \times 16^0 \times 8^{\frac{5}{4}}}{128^{\frac{3}{2}}}$$

(ii)

(6 marks)

b) Solve:

$$2^x \times 2^{x+1} = 10$$

(i)

$$3^{4x} = 4$$

(ii)

(8 marks)

c) (I) A stone is thrown in air. After t seconds its height is given by $h = 3 + 40t - 5t^2$. Find t when it is 60m high. **(5 marks)**

d) (i) The second term of an arithmetic progression is 15, and the fifth is 21. Determine the common difference the first term and the sum of the first ten terms.

(ii) Find the sum of the first eight terms of the geometrical progression $2 + 6 + 18 + \dots$

(11 marks)

SECTION B (Answer any TWO questions from this section)

Question Two

a) Show that $x^2 + 2bx + c = 0$ given as $x = -b \pm \sqrt{b^2 - c}$ using completing the square method **(10 marks)**

b) Solve the following simultaneous equations:

$$x^2 + y^2 = 25r^2$$

$$2y + x = 10r$$

(i)

$$7x + 2y = 11$$

$$4x + y = 7$$

(ii)

(10 marks)

Question Three

a) Solve the following equations

$$4x - 12 \times 2^x + 32 = 0$$

(i)

$$2^{x+3} = 8^{x-1}$$

(ii)

(10 marks)

b) Evaluate:

$$\log_{27} 3$$

(i)

$$\log_5 125$$

(ii)

$$\log_4 x - \log_4(x-2) = \frac{1}{2}$$

(iii)

(10 marks)

Question Four

a) (i) In an arithmetical progression, the thirteen term is 27, and the seventh term is three times the second term. Find the first term, the common difference and the sum of the first ten terms.

(ii) In a geometrical progression, the sum of the second and third terms is 6, and the sum of the third and fourth terms is -12. Determine the first term and the common ratio (14 marks)

b) The sum of a number of consecutive terms of an arithmetic progression is $19\frac{1}{2}$, the first term is $16\frac{1}{2}$, and the common difference is -3. Find the number of terms (6 marks)

Question Five

a) A man invests kshs 500 at 6% per annum compound interest. Find to the nearest shilling.

(i) By direct calculation the total amount at the end of the third year

(ii) By compound formula, the amount at the end of the tenth year

(8 marks)

b) Calculate the principle which amounts to kshs 546 in 6 years at 5% per annum simple interest.

(6 marks)

$$2^{2x} + 2^x = 56$$

c) Solve

(6 marks)