



**TECHNICAL UNIVERSITY OF MOMBASA
FACULTY OF HEALTH AND APPLIED SCIENCES
DEPARTMENT OF MATHEMATICS AND PHYSICS**

UNIVERSITY EXAMINATION FOR:

UPGRADING MATHEMATICS

AMA 1001: ALGEBRA

END OF SEMESTER EXAMINATION

SERIES: MAY SERIES

TIME: 2 HOURS

DATE: MAY 2016

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of 5 questions. Attempt question one compulsory and any other two questions

Do not write on the question paper.

Question ONE (30 marks)

a) Simplify

i.
$$\frac{1}{4} \times \frac{1}{3} - \frac{1}{3} \div \frac{3}{5} + \frac{2}{5} \quad (2 \text{ mks})$$

ii.
$$\frac{1}{(4/7 \times 2\frac{1}{4})} \div \left(\frac{1}{3} + \frac{1}{5}\right) + 2\frac{2}{24} \quad (2\text{mks})$$

b) Determine how much of copper and how much zinc is needed to make a 99kg brass ingot, if they have to be in the proportion copper: zinc 8:3 respectively (2 mks)

c) If 3 people can complete a task in 4 hours, how long will it take 5 people to complete the same task assuming rate of work remains the same. (2 mks)

d) Convert the following binary numbers into decimal number

i. 10111.00111_2 (3 mks)

ii. 101101.11001_2 (3 mks)

e) Convert decimal numbers into binary numbers

i. 58.3125_{10} (4 mks)

ii. 51.34375_{10} (4 mks)

f) Solve for x in the equation

i. $\log_8 x = -\frac{4}{3}$ (2mks)

ii. $x^{0.25} = 0.792$ (2 mks)

g) Evaluate

$$\frac{(2^4)^2 \times 3^{-2} \times 4^4}{2^3 \times 16^{\frac{1}{2}}} \quad (2\text{mks})$$

h) Solve

$$8 + 4(x-1) - 5(x-3) = 2(5-2x) \quad (2\text{mks})$$

Question TWO (20 MARKS)

a. Solve for the unknown

(i). $\frac{1}{3a-2} + \frac{1}{5a+3} = 0$ (3mks)

(ii). $\frac{3\sqrt{t}}{1-\sqrt{t}} = -6$ (3mks)

b) Solve the following simultaneous equation elimination

$$1.5x - 2.2y = -18$$

$$2.4x + 0.6y = 33 \quad (5 \text{ mks})$$

c) Solve following quadratic equation

i. By completing square

$$2x^2 + 9x + 8 = 0 \quad (5 \text{ mks})$$

ii. By factorization

$$3x^2 - 11x - 4 = 0 \quad (4\text{mks})$$

Question THREE (20 MARKS)

a. Evaluate using laws of indices

$$(i). \frac{(3^2)^{\frac{3}{2}} \times \left(8^{\frac{1}{3}}\right)^2}{(3^2)^{\frac{3}{2}} \times (4^3)^{\frac{1}{2}} \times 9^{-\frac{1}{2}}} \quad (2\text{mks})$$

$$(ii). \frac{8^{-2} \times 5^2 \times 3^{-4}}{25^2 \times 2^4 \times 9^{-\frac{1}{2}}} \quad (2\text{mks})$$

b. Solve the following indicial equations

i. $4^{2x-1} = 5^{x+2}$ (3 mks)

ii. $2^{x+1} = 3^{x+2}$ (3 mks)

iii. $X^{1.5} = 14.91$ (2mks)

c. Evaluate

i. ${}^{10}C_6$ (2mks)

ii. 7C_2 (2mks)

d. Evaluate

i. 9P_6 (2mks)

ii. 8P_3 (2mks)

Question FOUR (20 MARKS)

- a) Expand using Pascal's triangle

$$(2p - 3q)^5$$

(5 mks)

- b) The 6th term of an AP is 17 and the 13th term is 38. determine the 19th term (3mks)
- c) Find the 15th term of an AP if the 1st term is 2.5 and the 16th term is 16 (2mks)
- d) The 1st, 12th, and the last term of an AP is 4, 31, and 376.5 respectively. Determine the number of terms in the series, the sum of all terms and the 80th term (5mks)
- e) Find the sum to infinity of the series 3, 1, 1/3..... (2 mks)
- f) The 1st term of a GP is 12 and the 5th term is 55. determine the 8th and 11th term. (3mks)

Question FIVE (20 MARKS)

- a) solve the following simultaneous equation graphically

$$3x - 2y = 0$$

$$4x + y + 11 = 0$$

(8mks)

- b) Solve the following quadratic equation $y = -5x^2 + 9x + 7.2$ graphically given that the solution lies in the range $x = -1$ to $x = 3$.

Determine also the co-ordinates of turning point and nature of turning points. (9 mks)

- c) Determine the gradient and y axis intercept of each of the following functions without plotting

i. $Y = 2x + 5$

ii. $Y = 4x - 5$

iii. $Y = 3 - 4x$

(3 mks)