



**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) Determine the value of

$$\frac{7}{6} \text{ of } \left( 3\frac{1}{2} - 2\frac{1}{4} \right) + 5\frac{1}{8} \div \frac{3}{16} - \frac{1}{2}$$

(4 mks)

- b) A block of alloy consists of 70% nickel and 30% copper. if it contains 88.2g of nickel, determine the total mass of dyes used. (2 mks)

- c) When mixing a quantity of paints, dye of four different colors are used in the ratio of 7:3 :19 : 5. if the mass of the 1<sup>st</sup> dye used is 3½g. Determine the total mass of the dyes used. (2mks)

d) Convert the following binary number into decimal numbers

(i).  $10111.011_2$  (3mks)

(ii)  $11010101.10111_2$  (3mks)

e) Add the following binary numbers  $110011_2 + 11101_2$

Convert your answer to decimal number (5 mks)

f) Convert decimal numbers into binary number

i. 31.28125 (4 mks)

ii. 45.21875 (4 mks)

g) Solve for x

$$\frac{x}{4} - \frac{x+6}{5} = \frac{x+3}{2}$$

(3 mks)

### Question TWO (20 MARKS)

a) Evaluate

i. 
$$\frac{4^{1.5} \times \left(8^{\frac{1}{3}}\right)^2}{2^2 \times 32^{-\frac{2}{5}}}$$
 (3mks)

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

b) Solve the equation

i.  $\log_4 x = -2 \frac{1}{4}$  (2mks)

ii.  $2^x = 5.5$  (2mks)

c) Solve following indicial equations for x each giving your answer correct to 4 significant figures.

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

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

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

iv.  $3^{2t-1} = 7^{t+1}$  (3mks)

**Question THREE (20 MARKS)**

a) Solve the following equations

i.  $\frac{3}{t-2} = \frac{4}{3t+4}$  (2mks)

ii.  $\frac{1}{3}(3m-6) - \frac{1}{4}(5m+4) + \frac{1}{5}(2m-9) = -3$  (3mks)

iii.  $\frac{x+3}{4} = \frac{x-3}{5} + 2$  (3mks)

b) Solve the following simultaneous equations

i. By elimination

$$\frac{x}{2} + \frac{y}{3} = 4$$

(3 mks)

$$\frac{x}{6} - \frac{y}{9} = 0$$

ii. By substitution

$$\frac{a}{2} - 7 = -2b$$

$$12 = 5a + \frac{2}{3}b$$

(3 mks)

c) Solve following quadratic equation

i. By factorization

$$15x^2 + 2x - 8 = 0$$

(3mks)

- ii. By use of quadratic formulae  
 $2x^2 - 7x + 4 = 0$  (3 mks)

**Question FOUR (20 MARKS)**

- a) Find the sum of all the numbers between 0 and 207 which are exactly divisible by 3 (4 marks)

- b) Which term of the series 2187, 729, 243... is  $\frac{1}{9}$  (4 mks)

- c) Evaluate

i.  ${}^9C_6$  (2mks)

ii.  ${}^8C_5$  (2mks)

- d) Evaluate

i.  ${}^8P_5$  (2mks)

ii.  ${}^{10}P_3$  (2mks)

- e) Expand  $(2a + 3b)^5$  using Pascal's triangle (4 mks)

**Question FIVE (20 MARKS)**

- a) Solve the given simultaneous equation graphically

$$x + y = 2$$

$$3y - 2x = 1$$

(8 mks)

- b) Solve the quadratic equation  $y = 4x^2 + 4x - 15 = 0$  graphically given that the solution lies in the range  $x = -3$  to  $x = 2$

Determine also the coordinates and nature of turning point of the curve. (9 mks)

- c) Without plotting graph give the gradient and y axis intercept of the given functions.(3mks)

$$y = 5 - 4x$$

$$y - 6x = 3$$

$$3y - 2x = 1$$