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:DECEMBER 2016

TIME:TWO HOURS

Instructions to Candidates

You should have the following for this examination
-Answer Booklet, examination pass and student ID
This paper consists of five 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

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

(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 1st 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 (4 mks)

f) Convert decimal numbers into binary number

i. 31.28125 (3 mks)

ii. 45.21875 (3 mks)

g) Solve for x

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

h) Transpose

$y=4ab^2c^2$ making *b* the subject (3mks)

Question TWO (20 marks)

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)

a) Solve the equation

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

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

iii. Express the following in terms of log 2,log 3 and log 5

$\log\left(\frac{125 \times \sqrt[4]{16}}{\sqrt[4]{81}}\right)$ (3mks)

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

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

ii. $X^{1.5} = 14.91$ (3mks)

Question THREE

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

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

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

(3 mks)

ii. By substitution

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

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

(3 mks)

c) Derive the quadratic formulae hence solve the following using the same.

$2x^2 - 7x = 4 = 0$ (6mks)

Question FOUR

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. ${}^{9}C_{6}$ (2mks)

ii. ${}^{8}C_{5}$ (2mks)

d) Evaluate

i. ${}^{8}P_{5}$ (2mks)

ii. ${}^{10}P_{3}$ (2mks)

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

Question FIVE

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)

$$y = 5 - 4x$$
$$y - 6x = 3$$
$$3y - 2x = 1$$