



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: 2 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) Transpose the formulae below to make p the subject.

$$\frac{k}{r} = \sqrt{\frac{f+p}{f-p}} \quad (4 \text{ mks})$$

- b) Derive the quadratic formulae and hence solve the equation below

$$3x^2 - 14x + 8 = 0 \quad (7 \text{ mks})$$

c) Solve for the unknowns in the following set of equations below.

$$\frac{3r+2}{5} - \frac{2s-1}{4} = \frac{11}{5}$$

$$\frac{3+2r}{4} + \frac{5-s}{3} = \frac{15}{4} \quad (5\text{mks})$$

d) Solve for x in the equation

i. $\text{Log}_8 X = -\frac{4}{3}$ (3mks)

ii. $X^{0.25}=0.792$ (4mks)

iii. $8 + 4(x-1) - 5(x-3) = 2(5-2x)$ (3mks)

e) 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)

f) 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)

SECTION B

Question TWO (20 MARKS)

a) Solve the equation given below

$$5.4^{x+3} \times 8.2^{2x-1} = 4.8^{3x} \quad (6\text{mks})$$

b) $7(14.3^{x+5}) \times 6.4^{2x} = 294$ (6mks)

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

d) solve the equation

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

Question THREE (20 MARKS)

a) Simplify the expression

$$K = 2.76 \times (8.45 + 3.14) + 3.45^2 - 4.89 \div 2.18 \quad (3\text{mks})$$

b) solve for the unknown

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

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

$$(iii). \frac{2y}{5} + \frac{3}{4} + 5 = \frac{1}{20} - \frac{3y}{2} \quad (3\text{mks})$$

c) Solve following quadratic equation

i. By completing square correct to 3 decimal places

$$4.6x^2 + 3.5x - 1.75 = 0 \quad (4 \text{ mks})$$

ii. By factorization

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

Question FOUR (20 MARKS)

a) Convert the following binary numbers into decimal number

i. 10111.00111_2 (3 mks)

ii. 101101.11001_2 (3 mks)

b) Convert decimal numbers into binary numbers

i. 58.3125_{10} (3 mks)

ii. 51.34375_{10} (3 mks)

c) Evaluate

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

ii. 7C_2 (2mks)

d) Evaluate

i. 9P_6 (2mks)

ii. 8P_3 (2mks)

Question FIVE (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)