



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of Jkuat)

Faculty of Applied & Health Sciences

DEPARTMENT OF MATHEMATICS & PHYSICS

DIPLOMA IN INDUSTRIAL MICROBIOLOGY AND BIOTECHNOLOGY

DIPLOMA IN NUTRITION HEALTH

DIPLOMA IN MEDICAL LABORATORY SCIENCES

DIPLOMA IN ANALYTICAL CHEMISTRY

AMA 2103: MATHEMATICS FOR SCIENCE I

END OF SEMESTER EXAMINATION

SERIES: AUGUST/SEPTEMBER 2011

TIME: 2HOURS

Instructions to Candidates:

Answer Question **ONE** (Compulsory) and any other **TWO** questions

All working must be clearly shown

This paper consists of **FOUR** printed pages

Question One

- a) (i) Express in the form $a + b\sqrt{b}$
$$\frac{\sqrt{5} + 3\sqrt{2}}{\sqrt{5} - \sqrt{2}}$$
 (3 marks)

- (ii) Find without using the calculator:

$\sec \theta$ and $\cot \theta$ if $\sin \theta = 0.76$ and leave the solution in surd form (5 marks)

- (iii) The weight of ten new borns in grams are:

2450gms	2755gms	3560gms	4025gms	4113gms
2954gms	3214gms	3460gms	3345gms	3645gms

Find the mean weight (3 marks)

- b) (i) Solve the logarithmic equations for x

$$2 \log x^2 - 3 \log x = \log 12x - \log 3x$$

- a) (3 marks)

$$\log_e x = -0.943$$

- b) (2 marks)

- (ii) Expand $(3+x)^{10}$ up to the term x^5 , hence evaluate $(0.003)^{10}$ correct to three decimal places. (5 marks)

- (iii) Solve for x $3^{2x} - 4(3^x) + 3 = 0$ (5 marks)

- c) (i) Simplify $\frac{5! \cdot x4!}{6!}$ (2 marks)

- (ii) Five members of a class of 8 students are to represent the others in a seminar. In how many ways can the selection be done (2 marks)

Question Two

- a) P, Q, R and S are connected by the relation

$$\text{Log} S - \log Q = \log P + 3 \log R$$

- i) Without logarithms express R in terms of P, Q and S (3 marks)

- ii) Without using a calculator, find the value of R, (3 marks)

$$P = 24.3 \times 10^{-3} \quad Q = 4.0 \times 10^{-4} \quad S = 3.6 \times 10^{-4}$$

$$\cos 3A = 4 \cos^3 A - 3 \cos A$$

- b) Show that
c) Using a tree diagram, determine the probability of a couple getting two children of the same sex, if they need 3 children and if the probability of getting a boy is $\frac{1}{4}$ and a girl is $\frac{1}{3}$ at any birth. (9 marks)

Question Three

- a) A researcher collected the following data on the salaries paid to househelps in Nyali in Kenya Pound per month.

Salary in K€	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70
No. of house helps	5	11	13	8	67	7

Find:

- (i) The total number of house helps sampled (2 marks)
(ii) The median wave (4 marks)
(iii) The standard deviation (4 marks)
- b) A bank pays compound interest at 9% per year to all fixed deposits, compounded after every four months. How much interest, will a customer who deposits 600,000/= for 28 months earn. (6 marks)

Question Four

- a) Hamisi is employed by Kenya Ports Authority at basic salary Ksh. 26,500 per month. If his increment is Ksh. 750 effected every start of the year, find:
(i) His basic wage at the start of his eleventh year (3 marks)
(ii) The total amount of money KPA will have paid him if he retires after working for 30 years. (3 marks)
- b) Mombasa town currently has a population of 500,000 people. How long will the population take to double if the growth rate of Mombasa is 2.5% per year? (5 marks)
- c) A plot of land has the shape of a triangle as shown below.

28°

- Find;
- (i) the area of the plot (5 marks)
 - (ii) The number of slabs if the ground is to be covered by rectangular slabs of 90cm by 120cm. (14 marks)

Question Five

- a) Express y in terms of a , b and c

$$ay^2 + by + c = 0$$

(8 marks)

- b) Determine the Quotient in each of the following

(i) $(4x^3 - 3x^2 + 5x - 3) \div (x - 4)$ (3 marks)

(ii) $(2x^3 + 3x^2 - x + 4) \div (x + 2)$ (3 marks)

- c) Using the factor theorem factorize completely

$$2x^4 - x^3 - 8x^2 + x + 6$$

(6 marks)