TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Applied & Health Sciences

DEPARTMENT OF MATHEMATICS & PHYSICS

UNIVERSITY EXAMINATION FOR THE BACHELOR OF SCIENCE COMMUNITY HEALTH/BACHELOR OF MEDICAL LABORATORY SCEINCES

AMA 4104: MATHEMATICS FOR SCIENCE

SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: OCTOBER 2013
TIME: 2 HOURS

<u>**Instructions to Candidates:**</u>
You should have the following for this examination
- *Answer Booklet*

This paper consist of **FIVE** questions in **TWO** sections **A** & **B**
Answer question **ONE (COMPULSORY)** and any other **TWO** questions
Maximum marks for each part of a question are as shown
This paper consists of **THREE** printed pages

SECTION A (COMPULSORY)

Question One

$$\frac{\log 35 - \log 125 + \frac{1}{2}\log 625}{3\log 5}$$

a) (i) Evaluate **(3 marks)**
Without use of tables/calculators

(ii) Solve the equation $2^{x+1} = 3^{2x-5}$ correct to 2 decimal places **(4 marks)**

b) (i) The sum of 7 terms of an AP is 35 and the common difference is 1.2. Determine the first term of the series. **(4 marks)**

(ii) Which term of the series
2187, 729, 243,….is 1/9? **(4 marks)**

c) Solve for x in
$$\frac{x}{4} + \frac{-3}{x} = 2$$
(5 marks)

d) (i) Estimate the median using the interpolation method for the following data which represents the ages of a set of 130 representatives who took part in a statistical survey.

Age in years	20 – 25	25 – 30	30 – 35	35 – 40	40 – 45	45 – 50
Number of representation	2	14	29	43	33	9

e) A firm is independently working on two separate jobs A and B. There probability that A is not finished on time is 0.3 while the probability that B is not finished on time is 0.3. If the two jobs are independent, find the probability that:
(i) Both **(2 marks)**
(ii) Neither **(2 marks)**
(iii) Just one **(2 marks)**
Of the jobs will be finished on time.

SECTION B (Answer any TWO questions from this section)

Question Two

a) Prove that
$$\frac{1 + \cot\theta}{1 + \tan\theta} = \cot\theta$$
(4 marks)

b) Estimate the mode of the following distribution of ages:

Age in years	20 – 25	25 – 30	30 – 35	35 – 40	40 – 45	45 – 50
Number of representation	2	14	29	43	33	9

(4 marks)

c) In a triangle XYZ, $\angle X = 51^{o}$, $\angle Y = 67^{o}$ and $XY = 15.2$ cm. Solve the triangle and find its area. **(8 marks)**

d) Express in surd form and rationalize the denominator of:
$$\frac{1 + \tan 60^{o}}{1 - \tan 60^{o}}$$
(4 marks)

Question Three

a) (i) By completing square method find the greatest value of $-7 + 12x - 3x^{2}$ **(5 marks)**

(ii) Given $ax^2 + bx + c = 0$ where a, b and c are constants, derive the quadratic formula. **(6 marks)**

b) Expand $\left(\dfrac{2}{x} + 3\sqrt{x}\right)^4$ using binomial theorem. **(5 marks)**

c) Find the 5th term in the expansions of $(2x - 5y)^6$ **(4 marks)**

Question Four

a) Suppose that 3 people are selected at random from a group that consists of 6 men and 4 women. What is the probability that 1 man and 2 women are selected? **(5 marks)**

b) Simplify:

(i) $\dfrac{\frac{1}{2}x^{\frac{1}{2}}(1+x)^{-\frac{1}{2}} - \frac{1}{2}x^{-\frac{1}{2}}(1+x)^{\frac{1}{2}}}{x}$ **(4 marks)**

(ii) $\dfrac{x^{-\frac{2}{3}} \times y^{-\frac{1}{3}}}{\left(x^4 y^2\right)^{-\frac{1}{6}}}$ **(4 marks)**

c) Given the data below:

Class	f
10 – 15	11
15 – 20	20
20 – 25	35
25 – 30	20
30 – 35	8
35 – 40	6

Calculate the:
(i)   Mode
(ii) Standard deviation **(7 marks)**

Question Five

a) Solve $5 + \sqrt{x+7} = x$ **(4 marks)**

b) Solve by method indicated:

(i) $2x^2 - 1 = 3x....$ (completing the square method) **(5 marks)**

(ii) $2x^2 - 6x - 1$ by quadratic formula **(4 marks)**

c) Solve $3^x = 20$ **(4 marks)**

d) In how many distinguishable ways can the letters of the word CINCINNATI be arranged? **(3 marks)**