



TECHNICAL UNIVERSITY OF MOMBASA
Faculty of Applied & Health
Sciences

DEPARTMENT OF MATHEMATICS & PHYSICS

CERTIFICATE IN MEDICAL LABORATORY SCIENCES

AMA 1105: FOUNDATION MATHEMATICS

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: OCTOBER 2013

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*
- *Scientific Calculator*

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

a) Evaluate the following and express your answer in standard form:

$$\frac{4}{3} \text{ of } \frac{7}{9} \times \frac{1}{2} - \frac{1}{3} \left(\frac{2}{5} + \frac{3}{8} \right)$$

(i) (3 marks)

$$0.99 \times \frac{4.9}{0.7} + \frac{0.2 \times 0.5}{0.4} - 1.3$$

(ii) (4 marks)

$$\log_3 500000$$

(iii) (3 marks)

b) Calculate the electric bill for 370 kwh's of electricity from TUM, with charges of 0.094 shillings per kilowatt- hour with surcharge of 0.005 shillings per kwh and 75 shilling facility change

(4 marks)

c) Determine the solution to the equations given by graphical method:

$$x + y = 8 \dots (i)$$

$$x - y = 2 \dots (ii)$$

(5 marks)

SECTION B (Answer any TWO questions from this section)

Question Two

$$\log_a x = \frac{\log_b x}{\log_b a}$$

a) Show that (3 marks)

b) Solve the following:

$$\log_5(2y - 1) = 1 + \log_5(y - 8)$$

(i) (3 marks)

$$2 \log_2^3 + y = \frac{6}{\log_3^2}$$

(ii) (4 marks)

c) Solve for x in the equations given below:

$$81^x = 27^{3x-5}$$

(i) (3 marks)

$$2^{2x+1} - 3(2^x) + 1 = 0$$

(ii) (4 marks)

$$2^x \times 3^x = 5^{x+1}$$

- d) Use logarithm to solve for x in **(3 marks)**

Question Three

- a) A straight line graph passes through a point (1, 4) has a slope of Y determine:
 (i) The equation of the line **(3 marks)**
 (ii) the x and y intercepts **(3 marks)**
- b) Two students bought some books and pens from a certain supermarket. The first student bought 3 pens and 1 book, while the second one bought 2 pens and 3 books. If each paid 25 and 40 shillings respectively. Determine the price of each pen and a book **(5 marks)**
- c) Draw a graph and clearly indicate the points of intersection for the system of equation given:
 $x^2 + y^2 = 25$(i)
 $4y = 3x$(ii) **(6 marks)**

$$2x - 3y = 9$$

- d) A line with an equation another line cuts through the line with the equation above making an angle of 90° and passes through point (4, -1). Determine the equation of the second line. **(3 marks)**

Question Four

- a) The ratio of force applied against the displacement of a certain stretching material is always a constant. If a boy pulled the material 3m by applying a force of 30N determine how far the material is stretched when its pulled by a force of 25N. If the ratio is a direct proportionality. **(3 marks)**
- b) The accuracy of measuring equipment has an accuracy precision of ± 0.05 . A man used the equipment to measure 16.5 units, what is the percentage error in the measurement. **(4 marks)**
- c) If y varies inversely as x^2 and $y = 8$ when $x = 2$ find the value of y when $x = 0.4$ **(3 marks)**
- d) Determine the expression that directly varies the price of the item with supply and inversely with the demand raised to power n **(4 marks)**
- e) Estimate the area under the curve marked by $3x^2 - 4x + 3 = 0$ between $0 \leq x \leq 2$ **(6 marks)**

Question Five

- a) Differentiate the following expressions:
 $3x^4 + 3x - 5x^2 + x^3$
 (i) **(3 marks)**
 $\sin(x^2 + 4)$
 (ii) **(4 marks)**

$$4x^2 + 3x - 5 = y$$

b) Determine the following from

(i) Slope

(3 marks)

(ii) Y- intercept

(2 marks)

c) Express the integral form of the following:

$$6x^2 + 2x$$

(i)

(3 marks)

$$\sin x - \cos(x^2 - 1) + x^2$$

(ii)