TANZANIA HEADS OF ISLAMIC SCHOOLS COUNCIL

FORM SIX INTER ISLAMIC MOCK EXAMINATION

BASIC APPLIED MATHEMATICS

141 **(For Both School and Private Candidates)**

TIME: 3 Hours **Wednesday, 4th March 2026 a.m.**

Instructions

1. This paper consists of **ten (10)** compulsory questions.
2. Answer **all** questions. Each question carries **ten (10)** marks.
3. All work done in answering each question must be shown clearly.
4. Mathematical tables and Non-programmable calculators may be used.
5. All writing must be in **blue** or **black** ink **except** drawing which must be in pencil.
6. Communication devices and any unauthorized materials are **not** allowed in the examination room.
7. Write your **Examination Number** on every page of your answer booklet(s).

1. (a) Use non-programmable calculator to evaluate

(i) $\frac{5.23\times ln\sqrt{7}\div ln\sqrt{3}}{186\ log2021}$ Correct to 4 significant figures.

(ii) $\frac{\sqrt[3]{0.5677}}{\pi Sec^{-1}(2.34)+\sqrt{5.7\times10^{-2}}}$ Correct to 3 significant figures.

(b) Use non – programmable calculator to find the mean, standard deviation and sum of squares of data from the following:

Data	65	66	67	68	69	70
Frequency	2	8	12	17	7	4

2. (a) If $f(x) = \frac{ax+b}{x+1}$ and f(2) = 1, f(1) = 2. Find the value of a and b.

(b) Sketch the graph of g(x) = $\frac{x}{x+2}$ and state its domain and range.

3. (a) An arithmetic progression has the property that the sum of the first 10 terms is 210 and the sum of the next 10 terms is 410.

(i) Find the first term and common difference

(ii) Find the 25th term.

(b) The intensity of sound varies directly as the amplitude and inversely as the square of the distance from the source. If the intensity is 50 units for amplitude 5 at a distance of 2 meters, find the intensity for amplitude 8 at a distance of 4 meters.

4. (a) Differentiate the following expressions with respect to x.

(i) $\frac{x^3-4}{2-x^2}$

(ii) $x^2y - xy^{-2} = 2x$ at (1, -1)

(b) Find the derivative of $y = 1+ Cos^2x$.

(c) The position of a particle on a line is given by $S(t) = t^3 – 2t^2 + 6t + 5$, where t is measured in seconds and S in metres. Find the velocity and acceleration of the particle at the end of 2 seconds.

5. (a) Find $\int \left(4x^3 + 7x^2 - \frac{3}{2}Cosx\right) dx.$

(b) Find the area enclosed by the curve $y = 4x - x^2$ and the x-axis.

(c) The velocity V of a particle is 4m/s. Given that S = 5m when t = 2 seconds

(i) Find the expression of displacement S in terms of t.

(ii) Find the distance moved by the particle between t = 1 and t = 3.

6. The frequency distribution table below indicates the marks for Basic Applied Mathematics examination at Kwale Secondary School.

Marks (%)	20-29	30-39	40-49	50 -59	60-69	70 -79
Number of students	26	36	44	42	28	24

Calculate:

(a) The mean and variance using assumed mean method taking A = 44.5

(b) The median

(c) The percentage of students who passed examination if the pass mark is 50%

7. (a) In how many ways can we arrange the letters of the word TANZANIA?

(b) In a class of 10 pupils, 6 are boys and 4 are girls. If 3 pupils are taken at random from the class, find the probability that:

(i) All are boys

(ii) One boy obtained

(c) In a survey of 100 people it was found that 65 like tea, 55 like coffee and 30 like both tea and coffee. Find the probability that a randomly chosen person likes;

(i) Tea or coffee

(ii) Neither tea nor coffee

8. (a) Find the value of X if Sin x= 4Cos x for $0^o \leq x \leq 360^o$.

(b) A man whose eye is 180cm above the ground is standing 8m from a tree 7m tall. What is the angle of elevation of the top of the tree from his eye?

(c) In projectile motions, the time of flight (T) for a projectile on an inclined plane is modelled by an equation $T = \frac{2uSin(\theta-\alpha)}{gCos\alpha}$, where u is the speed of the projectile, θ is the projection angle, α is the angle of inclination of the plane and g is an acceleration due to gravity. Show that the formula can be expressed as $T = \frac{2u}{g}\left(Sin\theta - \frac{Cos\theta}{Cot\alpha}\right)$

9. (a) On the same xy-plane draw the graph of $f(x) = 2^x$ and $g(x) = log_2^x$

(b) The population of a colony of insects with a restricted food supply is recorded and is modeled by the equation $N = 50 + 30e^{t/100}$.Where t is the time in days after the start of the observations and N is the number of insects in the colony.

(i) Find the size of population at the start of the observation period.

(ii) Find how long would it take for the population to reach 120 insects.

10. (a) Find k such that the given matrix A is singular. $A = \begin{pmatrix} 1 & k & 2 \\ 3 & 4 & 5 \\ 6 & 7 & 8 \end{pmatrix}$

(b) A furniture manufacturing company manufactures dining room table and chairs. The relevant manufacturing data per month are given in the table below:

Department	Labour – Hour per unit		Minimum labour hour available
	Tables	Chairs	
Assembly	8	2	400
Finishing	2	1	120
Profit per unit	Tsh 90	Tsh 25	

Formulate a linear programming problem to determine the number of tables and chairs that should be manufactured each month in order to maximize profit.

Wabillah Tawfiiq