# BAMENDA ARCHDIOCESAN EXAMINATION BOARD (BAEBOC)
# MOCK G.C.E. EXAMINATION

**MARCH 2026** **ADVANCED LEVEL**

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| Subject Title | **PURE MATHS WITH MECHANICS**<br>**PURE MATHS WITH STATISTICS** |
| Paper Number | **PAPER 2** |
| Subject Code | 0765/0770 |

**DURATION: THREE HOURS**

**Full marks may be obtained for answers to ALL questions.**

Mathematical formulae booklets published by the Board are allowed.

*In calculations, you are advised to show all the steps in your working, giving the answer at each stage.*

*Calculators are allowed.*

**Start each question on a fresh page.**

TURN OVER

1. a) Given that $g(x) = (x-2)(x+3)Q(x) + ax + b$ is a polynomial function. When $g(x)$ is divided by $(x+3)$, the remainder is 8, and when $g(x)$ is divided by $(x-2)$ the remainder is 3. Find the remainder when $g(x)$ is divided by
$(x-2)(x+3)$. **(7marks)**

b) Show that the quadratic equation $x^2 + x(2p+q) + pq = 0$ has real roots for all real values of p and q. **(5marks)**

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2. i) The first term of an AP is 17, and the sum of the first 16 terms is -16. Find the sixteenth term and the common difference of the progression. **(6marks)**

ii) Using the binomial expansion, show that $\left(\sqrt{7}+2\right)^4 + \left(\sqrt{7}-2\right)^4 = 466$ **(5marks)**

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3. Given that $f(x) = \dfrac{7}{(3x-1)(x+2)}$,

a) Express f(x) in partial fractions **(3marks)**
b) State the domain of f(x) **(2mark)**
c) State the equations of the asymptotes to the curve y = f(x) **(3marks)**
d) Determine the turning point of the function y = f(x) **(2marks)**
e) Sketch the curve of y = f(x), showing the behavior of the curve as it approaches the asymptotes and the point where the curve crosses the coordinate axes. **(3marks)**

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4. i) Given that $y = \dfrac{\cos x + \sin x}{\cos x - \sin x}$, show that $\dfrac{d^2y}{dx^2} = 2y\dfrac{dy}{dx}$ **(5marks)**

ii) Evaluate $\int_0^{\frac{\pi}{3}} \sin 2x \cos x dx$ **(4marks)**

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5. i) Given that $z$ is a complex number, find the Cartesian equation of the loci $\left\{z : \arg(z-i) = \frac{\pi}{4}\right\}$. **(2marks)**

ii) Show that $\frac{COS3A-COSA}{Sin3A+sinA} = -tanA$ **(3marks)**

iii) Show that the matrix M is invertible where M= $\begin{pmatrix} 2 & 1 & 0 \\ 1 & -1 & 1 \\ 5 & 1 & 0 \end{pmatrix}$

hence find $M^{-1}$, the inverse of M **(5marks)**

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6. i) Obtain the centres of the circles, $s_1 : x^2 + y^2 - 2x + 4y - 5 = 0$
$s_2 : x^2 + y^2 - 10x - 8y + 2 = 0$.

Hence, find the lucus of the point which moves so that it is always equidistant from the centres of $S_1$ and $S_2$ **(6marks)**

ii) The lines $l_1$ and $l_2$ have equations

$l_1 : r_1 = \begin{pmatrix} 3 \\ 1 \\ 2 \end{pmatrix} + \mu \begin{pmatrix} 5 \\ -2 \\ 3 \end{pmatrix}$, $l_2 : r_2 = \begin{pmatrix} -3 \\ 5 \\ 2 \end{pmatrix} + \lambda \begin{pmatrix} 1 \\ 0 \\ 2 \end{pmatrix}$ respectively. Show that the lines $l_1$ and $l_2$ are skew. **(5marks)**

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7. Define a partial order relation. Let B be a set and P(A), the power set of A. Define a relation R on P(A) by $ARB \Leftrightarrow A \subseteq B$, where A, B$\in$P(A). Show that R is a partial order relation. **(8marks)**

8. i) Find the real value of $x$ for which $e^{4x} - 3e^{2x} - 4 = 0$ **(4marks)**

ii) Prove by contradiction that if k is a prime number, then $\sqrt{k}$ is irrational **(5marks)**

9. i) A delegation of three or four students is to be selected from a class of eight students. Determine the number of different delegations that can be selected. **(3marks).**

ii) Given that the equation $xe^x = 1$ has a root between 0.5 and 0.6, use one iteration of the Newton Raphson method with $x_0 = 0.55$ to determine a better approximation of this root, giving your answer to 3 d.p. **(4marks)**

iii) Find the Cartesian equation of the curve whose parametric equations are $x = 3\cos t - 2$ and $y = 5 - 2\sin t$. **(3marks)**

10. i) Find the set of values of $x$ for which $\frac{x(x-3)}{x-2} > 2$ **(4marks)**

ii) Solve the differential equation $\frac{dy}{dx} = \frac{1+y}{1+x}$ given that y=0 when $x=0$ **(5marks)**