P425/1
Pure Mathematics
Paper 1
Aug. 2024
3 Hours

OWOBUSOBOZI BISAKA ITAMBIRO MODERN SECONDARY SCHOOL

MOCK EXAMINATIONS 2024

Uganda Advanced Certificate of Education

PURE MATHEMATICS

Paper 1

3hours

INSTRUCTIONS TO CANDIDATES:

- *Attempt all the **eight** questions in Section A and any **five** from Section B.*
- *Any additional question(s) will **not** be marked*
- *All working must be shown clearly*
- *Silent non-programmable calculators and mathematical tables with a list of formulae may be used.*

FOR EXAMINERS USE ONLY		
QUESTION		MARKS OBTAINED
SECTION A		
SECTION B		
Indicate Questions attempted		
	Total Marks	

Turn Over

SECTION A (40 MARKS)

1. Solve the simultaneous equations
$2x + y - 3z = 7$
$4x - 2y + z = 15$
$3x + 3y + 2z = 1$ *(05 marks)*

2. Evaluate $\int_0^{\frac{\pi}{2}} sin3xsin5xdx$ *(05 marks)*

3. Show that the locus of appoint p(x,y) which moves such that it divides the line joining A(2,3) and B(3,4) in the ratio 1:2 is a circle. State its radius and centre. *(05 marks)*

4. Find the perpendicular distance of the point p(3,-1,2) from the line
$r = \underline{i} + \underline{j} + 3\underline{k} + \mu(2\underline{i} + 4\underline{j} - \underline{k})$ *(05 marks)*

5. If $y = \sqrt{5x^2 + 3}$, show that $y\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^2 = 5$

6. If Z is a complex number, find the locus described by $\left|\frac{z-1}{z+1}\right| = 2$ *(05 marks)*

7. Find the values of k for which the quadratic $x^2 + kx - 6k = 0$ and $x^2 - 2x - k = 0$ have a common root. *(05 marks)*

8. Solve the inequality $\frac{x+3}{x-2} \geq \frac{x+1}{x-2}$ *(05 marks)*

SECTION B (60 MARKS)

9. (a) Find the angle between the lines $x = \frac{y-1}{2} = \frac{z-2}{3}$ and $\frac{x}{2} = \frac{y+1}{3} = \frac{z+2}{4}$ *(04 marks)*
(b) Prove that L_1 and L_2 intersect and find the point of intersection of the two lines. *(08 marks)*

10. Express the function $f(x) = \frac{3x^{3+}2x^2-3x-1}{x(x^2-1)}$, as the sum of partial fractions and hence find
$\int_1^2 f(x)dx$ *(12 marks)*

11. Sketch the curve given by $y = \frac{x^2 - 6x+5}{x^2-2x-3}$ starting clearly the asymptotes. *(12 marks)*

12. (a) If $x^2 + 3y^2 = k$ where k is a constant, find $\frac{dy}{dx}$ at the point (1,2) *(04 mark)*
(b) A rectangular field area 720m² is to be fenced using a wire. On one side of the field, is a straight river. This side of the field is not to be fenced. Find the dimensions of the field that will minimize the amount of wire to be used. *(08 marks)*

13.(a) Prove by induction that for all positive integer $\sum_{r=1}^{n}(3r+1)(r+2) = n(n+2)(n+3)$

(05 marks)

(b) A credit society gives a compound interest of 4.5% per annum. Oscar deposits shs 300,000 at the beginning of each year. How much money will he have at the end of 4 years. If there are no withdraw during this period *(07 marks)*

14. (a) Given that $cot^2\theta + 3cosec^2\theta = 7$, show that $\tan\theta = \pm 1$.

(b) Express the function y =3cos x - $\sqrt{3}$sinx in the Rcos(x+α) where R is a constant and $0 \leq \alpha \leq 2\pi$. Hence find the coordinates of the minimum point of y.

(c) State the values of x at which the curve cuts the x-axis *(08 marks)*

15.(a) A circle that passes through the points A(3,4) and B(6,1) and the equation of the tangent to this circle at A is the line 2y = x + 5. Find:

(i) The coordinates of the centre of circle *(04 marks)*

(ii) The radius of the circle *(04 marks)*

(iii) The equation of the circle *(04 marks)*

16.(a) Evaluate $\int_0^{\frac{\pi}{4}} \frac{4}{1+cos2x}$ dx *(04 marks)*

(b) Show that $\int_2^4 xlnx$dx = 14ln2-3 *(04 marks)*

(c) The polynomial p(x) = $\alpha x^3 - \mu x^2 + \beta$x +2 gives a remainder -60 when divided by x +2 and f(3) = 35. Given that 2x-1 is a factor of the polynomial. Find the values of α, μ *and* β. Hence p(x) = 0 *(04 marks)*

END