

P425/1
PURE MATHS
Paper 1
1³/₄ Hours

END OF TERM II EXAMINATIONS
Uganda Advanced Certificate of Education
S.5 PURE MATHEMATICS
Paper 1
1 Hour 45 Minutes

INSTRUCTIONS:

- Answer ***all*** the questions in section **A** and any ***two (2)*** questions from section **B**.
- Any additional question(s) answered shall ***not*** be marked.
- All the necessary working ***should*** be clearly shown.
- Begin each answer in section **B** on a ***fresh*** sheet of paper.
- Silent, non – programmable scientific calculators and mathematical tables with a list of formulae may be used.

SECTION A (30 MARKS)

Answer **all** questions in this section.

1. Rationalise the denominator of $\frac{1+\sin 45^\circ}{1-\sin 45^\circ}$.
(05 marks)
2. Solve the equation $2\sqrt{2x-12} - \sqrt{2x-3} = 3$.
(05 marks)
3. A(-3,0) and B(3,0) are two fixed points. Find the equation of the perpendicular bisector of the line segment **AB**.
(05 marks)
4. The position vectors of points **A** and **B** are $3\mathbf{i} - 2\mathbf{j} + 5\mathbf{k}$ and $9\mathbf{i} + \mathbf{j} - \mathbf{k}$. Find the position vector of the point C that divides **AB** in the ratio 5: -3. State the meaning of the negative sign.
(05 marks)
5. Prove that
 - (i) $\frac{\sin \theta}{1+\cos \theta} + \frac{1+\cos \theta}{\sin \theta} = \frac{2}{\sin \theta}$. (03 marks)
 - (ii) $\tan^2 A - \sin^2 A = \sin^4 A \sec^2 A$. (02 marks)
6. Differentiate $y = \sqrt{\sin 2x}$ with respect to x .
(05 marks)

SECTION B (20 MARKS)

Attempt only **two (2)** questions from this section. All questions carry equal marks.

7. Given that α and β are the roots of the equation $x^2 - bx + c = 0$,
 - (i) show that $(\alpha^2 + 1)(\beta^2 + 1) = (c - 1)^2 + b^2$.
 - (ii) find, in terms of a and b , a quadratic equation whose roots are $\frac{\alpha}{\alpha^2+1}$ and $\frac{\beta}{\beta^2+1}$.
(10 marks)
8. Simplify:
 - (i) $\frac{27^{n+1} - 6 \cdot 3^{3n+3}}{3^n \cdot 9^{n+2}}$. (04 marks)
 - (ii) $\frac{(x^{\frac{3}{2}} + x^{\frac{1}{2}})(x^{\frac{1}{2}} - x^{-\frac{1}{2}})}{(x^{\frac{3}{2}} - x^{\frac{1}{2}})^2}$. (06 marks)
9. (a) Given that $f(x) = 2x^2 + 2x - 3$, find $f'(2)$. (04 marks)
(b) If $y = \frac{1+x^2}{\sin^2 3x}$, find $\frac{dy}{dx}$. (06 marks)
10. (a) Prove that $\sqrt{\frac{1-\cos \theta}{1+\cos \theta}} = \csc \theta - \cot \theta$. (05 marks)
(b) Solve the equation $4 \cos \theta - 3 \sec \theta = 2 \tan \theta$ for $0 \leq \theta \leq 180$. (05 marks)

*** END ***