

Uganda Advanced Certificate of Education

End of term one S.5 exam

P425/1 Pure mathematics

3 hours

INSTRUCTIONS

*Answer **all** questions in this paper.*

***All** working **must** be clearly shown.*

***Neat work** is a **must**.*

SECTION A

1. Solve the simultaneous equations below

$$2a - b + 3c = 14$$

$$a + 4b - c = -5$$

$$3a + b + 4c = 17$$

(05 marks)

2. Solve for x in $\log_4 x^2 - 6 \log_x 4 - 1 = 0$

(05 marks)

3. Simplify $\frac{\sqrt{2}}{\sqrt{2} + \sqrt{3 - \sqrt{5}}}$

(05 marks)

4. Prove that $\frac{\operatorname{cosec} \theta}{\operatorname{cosec} \theta - \sin \theta} = \sec^2 \theta$

(05 marks)

5. Solve $9^{x+1} - 3^{x+3} - 3^x + 3 = 0$

(05 marks)

6. Simplify $\frac{x^2(x^2+1)^{-\frac{1}{2}} - (x^2+1)^{\frac{1}{2}}}{x^2}$

(05 marks)

7. Given that $6^x = \frac{10}{3} - 6^{-x}$, show that $x = \pm \log_6 3$

(05 marks)

8. Solve for θ in $2 \cot^2 2\theta + 8 = 7 \operatorname{cosec} 2\theta$ for $0^\circ \leq \theta \leq 360^\circ$

(05 marks)

SECTION B

Attempt all questions in this section

9. (a) Solve for x in $\sqrt{4-x} - \sqrt{6+x} = \sqrt{14+2x}$ hence verify your answer. (05 marks)
- (b) Use the substitution $p = x + \frac{1}{x}$ to show that $2x^4 + x^3 - 6x^2 + x + 2 = 0$ reduces to $2p^2 + p - 10 = 0$ hence solve $2x^4 + x^3 - 6x^2 + x + 2 = 0$ (07 marks)
10. (a) Solve the equation $\sec^2 \theta = 3 \tan \theta - 1$ for $0^\circ \leq \theta \leq 360^\circ$ (06 marks)
- (b) Prove the following identities.
- (i) $\cos^4 \theta - \sin^4 \theta = (\cos \theta + \sin \theta)(\cos \theta - \sin \theta)$
- (ii) $\sec^4 \theta - \operatorname{cosec}^4 \theta = \frac{\sin^2 \theta - \cos^2 \theta}{\cos^4 \theta \sin^4 \theta}$ (06 marks)
11. (a) If $a^2 + b^2 = 23ab$, show that $\log a + \log b = 2 \log \left(\frac{a+b}{5} \right)$ (05 marks)
- (b) Given that $x = \log_a bc, y = \log_b ac, z = \log_c ab$. Show that $x + y + z = xyz - 2$ (07 marks)
12. (a) Solve for x and y in the equations
- $$5^{x+2} + 7^{y+1} = 3468$$
- $$5^x - 7^y = 76$$
- (b) Solve for y in $y^{\frac{2}{3}} - y^{\frac{1}{3}} - 2 = 0$ (12 marks)

END