WEEK ONE TERM ONE 2025

Uganda Advanced Certificate of Education

S.5 PURE MATHEMATICS

Paper 1

3 hours

INSTRUCTIONS TO CANDIDATES:

*Answer **all** the **eight** questions in section A and any **five** from section **B**.*

*Any additional question(s) answered will **not** be marked.*

Silent non-programmable scientific calculators and mathematical tables with alist of formulae may be used.

SECTION A (40 MARKS)

*Answer **all** questions in this section.*

1. Solve the equation: $\log_n 4 + \log_4 n^2 = 3$ *(05 marks)*

2. find the values of k for which the equation $\frac{x^2-x+1}{x-1} = 3$ has repeated roots. what are the repeated roots?   *(05 marks)*

3. Show that $x = -2$ is a root of the equation $2x^3 - x^2 - 8x + 4 = 0$. hence find other real roots.   *(05 marks)*

4. The sum of the first 10 terms of an A.P is 20. The sum of the next 8 term is 240. find the first term and the common diffference.   *(05 marks)*

5. find the Cartesian equation of the line passing through the points $A(3, 0, -2)$ and $B(4, -2, 1)$ *(05 marks)*

6. Given the function $y = \frac{3x-6}{x^2+6x}$, find the range of values within which y does not lie.   *(05 marks)*

7. Solve the equation $2(3^{2x}) - 5(3^x) + 2 = 0$ *(05 marks)*

8. find the equation of the tangent and normal to the circle $x^2 + y^2 + 2x - 8y + 4 = 0$ at the point $(2,2)$ *(05 marks)*

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9. *Express the following into partial fractions;*

(a) $\dfrac{1}{x^2-2x-3}$ *(04 marks)*

(b) $\dfrac{3x^2+x+1}{(x-2)(x+1)^3}$ *(04 marks)*

(c) $\dfrac{x^3-3}{x^3-2x^2+x-2}$ *(04 marks)*

10. (a) *The first term of an arithmetic progression is* 3; *the sum of the second term and the fifth term is* 26. *find the common difference and the sum of the first* 10 *terms of the series.*

(06 marks)

(b) *The third and fourth terms of a G.P are* 32 *and* 64 *respectively. find the common ratio and the sum of the first* 10 *terms of the geometric progression.* *(06 marks)*

11. (a) *Find the equation of the plane containing*

$r = \begin{pmatrix} 1 \\ 2 \\ 1 \end{pmatrix} + t\begin{pmatrix} 1 \\ -1 \\ 2 \end{pmatrix}$ *and parallel to* $\begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$ *(05 marks)*

(b) *Find the Cartesian equation of the lines of intersection of the plane* $3x - 5y + z = 8$ *and* $2x - 3y + z = 3$ *(07 marks)*

12. (a) *The roots of the equation* $ax^2 + bx + c = 0$ *are* α *and* β

form the equation whose roots are $\dfrac{\alpha}{\beta}$ *and* $\dfrac{\beta}{\alpha}$ *(06 marks)*

(b) *By row reducing the appropriate matrix to echelon form.*

solve the system of equations

$x + 2y = 2z$

$2x + y - 4z = -1$

$4x - 3y + z = 11$ *(06 marks)*

13. (a) The polynomial $x^4 + px^3 - x^2 + qx - 12$ has a factor $x^2 + 3x + 2$. find the values of p and q and hence factorize the polynomial completely. *(06 marks)*

(b) The polynomial $px^3 + qx^2 - rx - 2$ is divisible by $x + 2$. when divided by $x - 1$ it leaves a remainder of 18 and when divided by $x + 3$, it leaves a remainder of -50. Determine the values of p, q and r. *(06 marks)*

14. (a) Find the centre and the radius of the circle circumscribing triangle ABC with vertices $A(3, -2), B(1,5)$ and $C(-1, -1)$. *(05 marks)*

(b) Find the equation of the circle passing through the points $A(1,1), B(2,0)$ and $C(3,1)$. *(04 marks)*

(c) Prove that the following points $A(1,2), B(13,7)$ and $C(6,14)$ are vertices of an isosceles triangle. *(03 marks)*

15. (a) Express without a surd in the denominator each of the following

(i) $\dfrac{1 + \tan 30°}{1 - \tan 30°}$ *(03 marks)*

(ii) $\dfrac{1 + \tan 60°}{1 - \tan 60°}$ *(03 marks)*

(b) Solve for x

$$(3 - x)^{1/2} = (7 + x)^{1/2} + (16 + 2x)^{1/2}$$ *(06 marks)*

…. End……

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