

1. Solve the equations by reducing to echelon form. (05 marks)

$$\begin{aligned}x + 3y + z &= 10 \\4x - y + 2z &= 8 \\6x + y - 5z &= -7\end{aligned}$$

2. Given that α and β are the roots of the equation $ax^2 + bx + c = 0$, express $(\alpha^2 - 2\beta)(\beta^2 - 2\alpha)$ in terms of a, b and c . (05 marks)
3. Use binomial expansion to find the first four terms of $\sqrt{1-2x}$. Hence by substituting $x = 0.01$ to evaluate $\sqrt{2}$ correct to 3 decimal places. (05 marks)
4. Given that $\log_3 x = a$ and $\log_{18} x = b$, show that $\log_6 3 = \frac{b}{a-b}$. (05 marks)
5. Differentiate $y = \sqrt{\frac{(2x+3)^2}{1+x^2}}$ with respect to x (05 marks)
6. Solve the equation $8^{(x-y)} = 4^{(x+y)}$ and $5^{(x^2-y^2)} = 15625$. (05 marks)
7. A curve is defined by parametric equations
 $x = 2t^2 - t$

$$y = 4t - 1$$

Find the equation of the tangent to the curve at the point (1,3) (05 marks)

8. The 5th term of an arithmetic progression (A.P) is 12 and the sum of the first five terms is 80. Determine the first term and the common difference. (05 marks)

SECTION B (60 MARKS)

9. (a) Show that $\log_{16}(xy) = \frac{1}{2}\log_4 x + \frac{1}{2}\log_4 y$. Hence or otherwise, solve the simultaneous equations.
 $\log_{16}(xy) = \frac{7}{2}$ and $\frac{\log_4 x}{\log_4 y} = -8$ (07 marks)
- (b) Solve the equation $2^{(2+2x)} + 3(2^x) - 1 = 0$. (05 marks)
10. (a) A financial credit society gives 2% compound interest per annum to its members. If John deposits shs. 100,000 at the beginning of every year beginning with 2004. How much would he collect at the end of 5 years if there was no withdrawal within this period? (06 marks)
- (b) The eighteenth term of an arithmetic progression is twice the third term and the sum of the first eight terms is 39. Find the first three terms of the progression and show that sum of the first n terms is $\frac{3n}{8}(n+5)$. (06 marks)
11. (a) Given that $y = \frac{1}{x^2}$. Find $\frac{dy}{dx}$ from first principle. (06 marks)
- (b) Determine the equation of the tangent to the curve $xy^2 + y + x^4 = 5$ at the point (1,1). (06 marks)
12. (a) Find the term independent of x in the expansion $\left(2x^2 - \frac{1}{2x}\right)^2$ (06 marks)
- (b) The quadratic equation $x^2 + (x+1)^2 = k$ has the roots α and β . show that $\alpha^3 + \beta^3 = \frac{1}{2}(1-3k)$ (06 marks)
13. (a) Solve the inequality; $\frac{(x+3)}{(x-2)} \leq \frac{(x+1)}{(x-2)}$ (06 marks)
- (b) Solve the equation $\log_{25} x + \log_{125} x + \log_{625} x = \frac{13}{2}$ (06 marks)