

(An Autonomous Institution)

DEPARTMENT OF MATHEMATICS

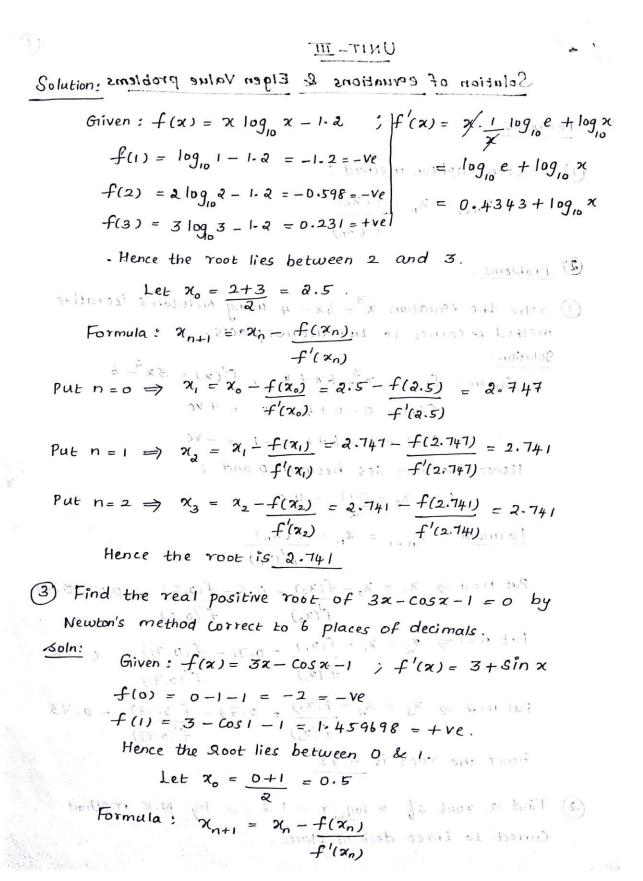


 (\mathcal{D}) UNIT-I Solution of equations & Elgen Value problems Formulas : E LES I SI A (SI A (SI A) SI A) () Newton Raphson method : $\frac{x_{n+1}}{F'(x_n)} = \frac{f(x_n)}{F'(x_n)}$. Henry the west live balances a Problems : () Solve the equation $x^3 = 6x - 4$ using Newton's iterative method & correct to two decimal places. Solution : Given: $f(x) = x^3 - 6x + 4$, $f'(x) = 3x^2 - 6$ f(0) = 0 - 0 + 4 = 4 = + ve Hence the root lies between 0 and 1. THE CHILLER XO = 0+1 = 0.5 - x - x C C - L INA Formula: $x_{n+1} = x_n - \frac{f(x_n)}{-f'(x_n)}$ Put $n=0 \Rightarrow x_1 = x_0 - \frac{f(x_0)}{-f'(x_0)} = 0.5 - \frac{f(0.5)}{-f'(0.5)} = 0.5 - 10.71$ Put $n=1 \Rightarrow x_2 = x_1 - \frac{f(x_1)}{-f'(x_1)} = 0.71 - \frac{f(0.71)}{-f'(0.71)} = 0.73$ Put $n = 2 \implies x_3 = x_2 - f(x_2) = 0.73 - f(0.73) = 0.73$ $f'(x_2) = f'(0.73) = 0.73$ Hence the root is 0.73Find a root of x log x - 1.2 = 0 by N.R method Correct to three decimal places .



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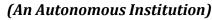
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Put $n=0 \Rightarrow x_1 = x_0 - \frac{f(x_0)}{f'(x_0)} = 0.5 - \frac{f(0.5)}{f'(0.5)} = 0.608519$ (2) Put $n=1 \Rightarrow x_2 = x_1 - \frac{f(x_1)}{f'(x_1)} = 0.608519 - \frac{f(0.608519)}{f'(0.608519)} = 0.607102$ Put $n=2 \implies x_3 = x_2 - \frac{f(x_2)}{f'(x_2)} = 0.607102 - \frac{f(0.607102)}{f'(0.607102)} = 0.607102$ Hence the root is 0.607102. 5) Obson (1) Find the iterative formula for finding the value of 1 where N is a real number, using N-R method. Hence evaluate 1 Correct to 4 decimal places. Solution : Let $x = \frac{1}{N}$ $N = \frac{1}{x} \Rightarrow \frac{1}{x} - N = 0$ $f(x) = \frac{1}{x} - N$; $f'(x) = -\frac{1}{x^2}$. Formula: $x_{n+1} = \pi_n - f(\pi_n)$ a. - 2. sia with mile chat and f (xn) $= \chi_n - \frac{\left(\frac{1}{\chi_n} - N\right)}{-\frac{1}{\chi_n^2}} = \chi_n + \chi_n^2 \left(\frac{1}{\chi_n} - N\right)$ $= \chi_n + \chi_n - N\chi_n^2$ $x_{n+1} = 2\chi_n - N\chi_n^2$ is the iterative formula. $\Rightarrow (1)$ 6215 .0 To find 1/26:000 Let x = 0.06 (i.e., 1/26 = 0.038 20.04) Here N = 26. Put n=0 in () =) $x_1 = 2x_0 - Nx_0^2 = 2(0.06) - 26(0.06)^2$ (421PM) & = 0.0384 Mena the value of viez = 10 9164







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Put n=1 in () = $\chi_{aug} = 2\chi_1 - N\chi_1^2 = 2(0.0384) - 26(0.0384)$ $\chi_{2} = 0.0385$ put n=2 in (1, =) $\chi_3 = 2\chi_2 - N\chi_2^2 = 2(0.0385) - 26(0.0385)^2$ $\chi_3 = 0.0385$ Hence the value of $\frac{1}{26} = 0.0385$. (5) Obtain Newton's iterative formula for finding \sqrt{N} where N is a positive real number. Hence evaluate J142. $\frac{\mathcal{S}olution}{\chi^2 = N}$ $\chi^2 - N = 0$ assignments a of an is $f(x) = x^2 - N \qquad ; \quad f'(x) = ax$ Formula: $\chi_{n+1} = \chi_n - \frac{f(\chi_n)}{f'(\chi_n)}$ $= \chi_n - \chi_n^2 - N = \frac{2\chi_n^2 - \chi_n^2 - N}{2\chi_n}$ $x_{n+1} = \frac{x_n^2 - N}{2x_n}$ is the iterative formula. To find 5142 : Let Xo = 12. Here N = 142. Put n=0 in (D), $\alpha_1 = \frac{\alpha_0^2 - 142}{2 \alpha_0} = \frac{12^2 - 142}{2 (12)} = 11.9167$ Put n = 10 in $(1)_{1} = \chi_{2}^{2} = \chi_{1}^{2} - 142 = 11.9167 - 142 = 11.9164 = 11.9164 = 11.9164$ Put n = 2 in (1), $\chi_3 = \frac{\chi_2^2 - 142}{2\chi_2} = \frac{11.9164^2 - 142}{2\chi_2} = 11.9164$ Hence the value of V142 = 11.9164