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**School of Basic Sciences****Master of Science in Mathematics  
Mid Term Examination - May 2024****Duration : 90 Minutes  
Max Marks : 50****Sem II - C1PM205B - Advanced Numerical Analysis***General Instructions**Answer to the specific question asked**Draw neat, labelled diagrams wherever necessary**Approved data hand books are allowed subject to verification by the Invigilator*

- 1) Round off the number 3.6252782 upto 3 decimal places and find the relative error. K2 (2)
- 2) Find the absolute, relative, percentage error if the number  $X = 0.00545828$  is truncated to three decimal places K1 (3)
- 3) Explain the power method for approximating Eigen values and eigenvectors K2 (4)
- 4) Find a root of the equation  $x \cdot \log_{10} x = 1.9$  by secant method. Perform three iterations. K2 (6)
- 5) Solve to find a root of  $3x^3 - 9x^2 + 8 = 0$  using the Newton-Raphson method correct to three decimal places K3 (6)
- 6) Apply Muller's method to find the root of the equation  $\cos x = xe^x$  which lies between 0 and 1 K3 (9)
- 7) Using Newton's iterative method, find the real root of  $x \log_{10} x = 1.2$  correct to four decimal places. K4 (8)
- 8) Obtain by power method, the numerically dominant eigen value and eigen vector of the matrix  $A = \begin{bmatrix} 15 & -4 & -3 \\ -10 & 12 & -6 \\ -20 & 4 & -2 \end{bmatrix}$  K4 (12)

**OR**

Using Muller's method, find the root of the following equations, correct to three decimal places  $x^3 - x^2 - x - 1 = 0$  K4 (12)