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**School of Engineering****M.Tech Structural Engineering  
Mid Term Examination - Nov 2023****Duration : 90 Minutes  
Max Marks : 50****Sem I - C1PC120T - Advanced Numerical and Statistical Methods**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) Explain Crout LU decomposition method. K2 (2)
- 2) Find, whether the system  $1.01x+2y=2.01$ ,  $x+2y=2$  is well conditioned or not? K1 (3)
- 3) Estimate whether the system  $4x+3y=5$ ,  $2x+2y=3$  is well conditioned or not? K2 (4)
- 4) Estimate the value of  $\int_{-1}^1 \frac{\sin x dx}{1+x^2}$  using Gauss formula for  $n=2$  and  $n=3$ . K2 (6)
- 5) Compare Jacobi method and Gauss Seidel method results for the given example:  $x+3y=16$ ,  $x+4y=18$ . K3 (6)
- 6) Solve the following equations by using Gauss Seidel method: , , . K3 (9)
- 7) Classify the values of  $x$ ,  $y$  and  $z$  from the following equations by Crout's method:  $4x + y + z = 4$ ,  $x + 4y - 2z = 4$ ,  $3x + 2y - 4z = 6$  K4 (8)
- 8) Analyze the system of nonlinear equations:  $x^2 + y = 11$ ,  $y^2 + x = 7$  with the help of Newton Raphson method. K4 (12)

**OR**

Classify advanced Newton-Raphson method and solve the system of equations  $x^2 + y^2 - 1 = 0$ ,  $y - x^2 = 0$  taking initial approximation  $(x_0, y_0) = (0.7071, 0.7071)$  K4 (12)