

School of Mathematics, Thapar Institute of Engineering & Technology, Patiala  
Mid Semester Examination

Name

Roll Number

30<sup>th</sup> September, 2019

Course Code: UMA061,

(B.E. 3<sup>rd</sup> & 4<sup>th</sup> year)

Course Name: Advanced Numerical Analysis

Time: 2 Hours, M. Marks: 30

Faculty Name: Dr. Sapna Sharma

1. Find the solution of the system of nonlinear equations  $3x^2 + y^2 = 4$ ,  $x^2 + xy + y^2 = 3$ . using Newton Rapshon method. Perform two iterations, starting with  $(x_0, y_0) = (0.8, 0.8)$ . [8M]
2. Solve the following system of linear equations using Choleski method.  
 $4x_1 - x_2 - x_3 = 3$ ,  $-x_1 + 4x_2 - 3x_3 = -0.5$ ,  $-x_1 + 3x_2 + 5x_3 = 0$ . [6M]
3. Check whether the matrix  $A = \begin{bmatrix} 3 & 5 \\ 1 & 7 \end{bmatrix}$  is positive definite or not ? Justify. [4M]
4. Using Birge Vieta method, find the smallest positive root of the polynomial equation  $3x^3 - 8x^2 - 31x + 60 = 0$ . Do only two iterations and take the midpoint of the integral interval as initial approximation. [6M]
5. Transform the matrix  $A = \begin{bmatrix} 1 & 2 & 4 \\ 2 & 1 & 2 \\ 4 & 2 & 1 \end{bmatrix}$  to tridiagonal form by Givens method and hence find the interval of unit length containing eigen values of A. [6M]