# JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
## TEST -1 EXAMINATION- Feb-Mar 2018
## Ph D and M.Tech(CSE) IV Semester

COURSE CODE: 15M1WCI432                    MAX. MARKS: 15
COURSE NAME: Advanced Computational Techniques in Engineering
COURSE CREDITS: 3                          MAX. TIME: 1 HR

*Note: You may use your calculator. All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.*

**Q.1.** **[ 3 Marks. Each part is 1 mark]**

  a)   What are computational advantages of matrix partitioning?
  b)   Describe complexity of matrix matrix multiplication algorithms?
  c)   Explain backward substitution algorithm?

**Q.2. [4 marks]**

If $A = \begin{bmatrix} 16 & 4 & 4 & -4 \\ 4 & 10 & 4 & 2 \\ 4 & 4 & 6 & -2 \\ -4 & 2 & -2 & 4 \end{bmatrix}$ and $b = \begin{bmatrix} 32 \\ 26 \\ 20 \\ -6 \end{bmatrix}$

Find the Cholesky Factor for A and solve the linear system A.x=b

**Q.3. [4 marks]**

$A = \begin{bmatrix} 1 & 1 \\ 1 & 0.999 \end{bmatrix}$ and $b = \begin{bmatrix} 2 \\ 1.999 \end{bmatrix}$ represent a linear system A.x=b. As a result of perturbation in b to b+ $\Delta$b, x is perturbed to $x + \Delta x = \begin{bmatrix} 5 \\ -3.002 \end{bmatrix}$, find the condition number K(A).

**Q.4. [4 marks]** Define common matrix norms and list their properties. For the matrix A below find the one, two and max norms.

If $A = \begin{bmatrix} 1 & 3 & -6 \\ -2 & 4 & 2 \\ 2 & 1 & -1 \end{bmatrix}$