

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT  
TEST-2 EXAMINATION Mar- Apr 2017  
M.Tech(CSE) IV Semester

COURSE CODE: 15M1WCI432

MAX. MARKS: 25

COURSE NAME: Advanced Computational Techniques in Engineering

COURSE CREDITS: 3

MAX. TIME: 90Min

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

Q.1. [ 10 Marks. Each part is 2 marks]

- Define the problem of least squares.
- Define the inner product  $\langle x, y \rangle$  and list its properties .
- What is an orthogonal matrix?
- What is an overdetermined system?
- Explain properties of Matrix Norm.

Q.2. [3+2 marks]

- Consider a perturbed linear system  $(A+dA).x=(b+db)$ . Find an expression for perturbation  $dx/x$ .
- Discuss the importance of condition number in perturbed systems.

Q.3. [3+2 marks]

- Solve the overdetermined system given below.

$$3x+4y=6$$

$$4x+5y=7$$

$$5x+5y=8$$

- For the above solution calculate the residue with the method of least squares.

Q.4. [3+2 marks]

- Solve this system of equations using Gaussian Elimination.

$$-7x - 3y + 3z = 12$$

$$2x + 2y + 2z = 0$$

$$-x - 4y + 3z = -9$$

- What do you understand from sensitivity of the solution?