

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT  
SUMMER SEMSTER (JUNE – JULY 2018)  
MID TERM EXAMINATION

COURSE CODE: 10B11MA312  
COURSE NAME: Numerical Methods  
COURSE CREDITS: 4

MAX. MARKS: 50

MAX. TIME: 2 Hr

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

1. Answer the following in short: (5x2= 10 Marks)

- (a) Give an example of an over determined system of linear equations which is inconsistent?
- (b) Give an example of an ill-conditioned system of linear equations.
- (c) Check whether the following system is balanced/ underdetermined or over determined.

$$2x+4y - z = 8, x - y + 2z = 3, 3x + 3y + z = 11, x+5y - 3z = 5.$$

- (d) What are orthogonal matrices and what is their effect upon multiplication?
- (e) What is the rate of convergence in the method of bisection?

2. Using Cholesky LU decomposition method to solve the following system of linear equations: (7)

$$2x + y + z = 7; x + 2y + z = 8; x + y + 2z = 9.$$

3. Derive Gauss forward Interpolation formula and Gauss backward Interpolation formula. Hence deduce the Stirling's formula. (7)

4. Solve the following system of linear equations using relaxation method: (7)

$$3x + 9y - 2z = 11; 4x + 2y + 13z = 24; 4x - 4y + 3z = -8.$$

5. Use the method of False position to find a real root of  $x^4 - 11x + 8 = 0$  accurate to four decimal places. (7)

6. Prove that  $E \equiv 1 + \frac{1}{2}\delta^2 + \delta\sqrt{1 + \frac{\delta^2}{4}}$ . (5)

7. Deduce the normal equations for the method of least square for curve fitting in case of a parabolic fit. Hence, find the parabolic fit for the following numerical data: (7)

X	1	2	3	4	6	8
Y	2.4	3	3.6	4	5	6

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