

**B.Tech. CIVIL ENGINEERING (BTCLEVI)****Term-End Examination****June, 2017**

00154

**BICE-022 : COMPUTER APPLICATIONS IN CIVIL  
ENGINEERING***Time : 3 hours**Maximum Marks : 70*

**Note :** Attempt any **seven** questions. All questions carry equal marks. Use of scientific calculator is allowed.

1. (a) What is an error ? Explain absolute and relative errors in detail. Also explain the meaning of approximation and round-off errors in detail. 5
- (b) What are fixed and floating point errors ? Write down the difference between them. 5
2. (a) Using Jacobi's method, find the eigenvalue and eigenvectors of the following matrix : 5

$$\begin{bmatrix} 3 & 2 & 1 \\ 2 & 3 & 2 \\ 1 & 2 & 3 \end{bmatrix}$$

(b) Compute  $f(0.3)$  for the data

X	0	1	3	4	7
f	1	3	49	129	813

using Lagrange's interpolation formula. 5

3. (a) Derive the formula for decomposition method. Also, write down its algorithm. 5

(b) Explain successive substitution method with its derivation and algorithm. 5

4. (a) The function  $f(x) = e^x - 1$  is to be solved using Newton-Raphson method. If the initial value of  $x_0$  is taken as 1.0, then the absolute error observed at 2<sup>nd</sup> iteration is 2. 5

(b) Develop a computer algorithm for finding the root  $f(x) = 0$ , using bisection method. 5

5. Apply Runge-Kutta fourth order method to find an approximate value of  $y$ , where  $x = 0.2$ , given that  $\frac{dy}{dx} = x + y$ , and  $y = 1$ , when  $x = 0$ . 10

6. Use Gauss elimination method to solve

$$2x + y + z = 10$$

$$3x + 2y + 3z = 18$$

$$x + 4y + 9z = 16 \quad 10$$

7. What is the importance of numerical methods in Civil Engineering ? Explain with the help of an example. 10
  8. Write an algorithm for Simpson's  $\frac{1}{3}$ <sup>rd</sup> rule for a known function. 10
  9. Non-linear programming is inherently much more difficult to optimize. Specify the main reasons. 10
  10. Discuss the difference between linear and non-linear programming problems. 10
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