B.Tech. CIVIL ENGINEERING (BTCLEVI)

Term-End Examination

December, 2017

ロロ302

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. Explain the following : 　　　　　　 $4 \times 2\frac{1}{2} = 10$

   (a) Fixed Decimal Number

   (b) Floating Point Number

   (c) Pseudo Code

   (d) Absolute and Relative Error

2. Describe the following in detail : 　　　　 *10*

   (a) Simpson's 1/3rd rule

   (b) Ill-conditional system of equation

3. (a) Use the power method to calculate an approximation to the dominant eigen pair for

$$A = \begin{pmatrix} -7 & 2 \\ -8 & -1 \end{pmatrix}.$$ *5*

(b) Find F(2) for the data F(0) = 1, F(1) = 3 and F(3) = 55 by Newton's divided difference formula. *5*

4. Solve the following equations by LU decomposition method : *10*

$5x + 3y + 7z = 9$

$3x + 2y + 3z = 16$

$3x + 4y + 2z = 18$

5. (a) Find the real root of the equation

$5x - 2 \cos x - 1 = 0$ (upto two decimal accuracy) using Newton-Raphson method. *5*

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

6. (a) Write an algorithm for trapezoidal rule for a known function. **5**

(b) Consider an ordinary differential equation

$$\frac{dx}{dt} = 4t + y \text{ . If } x = x_0 \text{ at } t = 0,$$

find the increment in x calculated using Runge-Kutta fourth order multistep method with a step size of $\Delta t = 0.2$. **5**

7. Evaluate

$$\int_0^6 \frac{dx}{1 + x}$$

by using Newton's method for integration, Trapezoidal method, Simpson's $1/3^{rd}$ method and Simpson's $3/8^{th}$ method. **10**

8. Derive a formula for Decomposition method. Also write down its algorithm. **10**

9. Why is non-linear considered to be much more difficult to optimize than linear programming ? Give the main reasons. **10**

10. Discuss the difference between Linear and Non-linear programming problems. **10**