

B.Tech. CIVIL ENGINEERING (BTCLEVI)**Term-End Examination****December, 2015****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 calculators is allowed.

1. (a) Discuss the different types of errors in Numerical Methods. 5
- (b) Explain the 'pseudocode' and 'floating point numbers'. 5
2. What is the importance of optimization methods in Civil Engineering ? Explain with the help of a suitable example. 10
3. Explain the following :
 - (a) Trapezoidal Rule, and 5
 - (b) Ill-conditioned system of equations. 5
4. (a) Use the Newton-Raphson method to determine a root of the equation $x^3 - 2x - 5 = 0$, correct to three decimal places. 5
- (b) Develop a computer algorithm for finding the roots of $f(x) = 0$, using the Bisection Method. 5

5. Solve the equations,

$$2x + 3y + z = 9$$

$$x + 2y + 3z = 6$$

$$3x + y + 2z = 8$$

by LU decomposition method.

10

6. Given the points $(0, 0)$, $(\pi/2, 1)$ and $(\pi, 0)$ satisfying the function $y = \sin x$ ($0 \leq x \leq \pi$), determine the value of $y(\pi/6)$, using cubic spline method.

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7. (a) Explain Newton's Forward Interpolation formula for any function $y = f(x)$.

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(b) Define eigen values, eigen vectors and conditions of convergence.

5

8. Use Runge-Kutta method of fourth order to solve :

$$\frac{dy}{dx} = 1 + y^2 \text{ with } y(0) = 0 \text{ at } x = 0.2, 0.4 \text{ and } 0.6.$$

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9. Explain the unconstrained optimization problem of non-linear programming.

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10. Discuss the differences between linear and non-linear programming problems.

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