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BICE-022

B.Tech. CIVIL ENGINEERING (BTCLEVI)
Term-End Examination
June, 2016

00746

BICE-022 : COMPUTER APPLICATIONS IN CIVIL ENGINEERING

Time : 3 hours *Maximum Marks : 70*

Note : *All answers are to be written in English only. Attempt any **seven** questions. Scientific calculator is allowed. All questions carry equal marks.*

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1. (a) What are the various sources of errors in numerical methods ? Explain the terms Significant digits and round-off errors. *5*

(b) Using Bisection method, find a real root of $f(x) = x^3 + x^2 + x + 7 = 0$, correct to three decimal places. *5*

2. (a) Find the real root of the equation $x^3 - 2x - 5 = 0$ by method of False Position, correct up to three decimal places. *5*

(b) Using Newton-Raphson method, find the positive root of $x^4 - x = 10$, correct to three decimal places. *5*

3. Use Gauss Elimination to solve the following system of equations : *10*

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

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

$$x + 4y + 9z = 16$$

4. Solve the equations

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

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

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

by the method of LU Decomposition. *10*

5. Values of x (in degrees) and sin x are given in the following table :

x (in degrees)	*sin x*
15	0·2588190
20	0·3420201
25	0·4226183
30	0·5
35	0·5735764
40	0·6427876

Determine the value of sin 38° using Newton's Backward Difference formula. *10*

6. Determine the largest eigenvalue and corresponding eigenvector of the matrix using the power method $A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$. *10*

7. Apply Runge-Kutta fourth-order method, to find an approximate value of y, when x = 0·2. Given that $\frac{dy}{dx} = x + y$ and y = 0, when x = 0. *10*

8. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using

   (a) Trapezoidal Rule *5*

   (b) Simpson's $\frac{1}{3}$ Rule *2 1/2*

   (c) Simpson's $\frac{3}{8}$ Rule *2 1/2*

9. (a) Discuss the salient features of standard form of linear programming problems with suitable examples. *5*

   (b) Explain the following terms : *5*

   (i) Fixed point numbers

   (ii) Floating point numbers

10. (a) Explain the features of unimodal functions with suitable examples. *5*

(b) Discuss the salient features of Fibonacci methods. What are the limitations of Fibonacci methods ? *5*