| BICE-022 |

B.Tech. CIVIL ENGINEERING (BTCLEVI)
Term-End Examination
June, 2018

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BICE-022 : COMPUTER APPLICATIONS IN CIVIL ENGINEERING

Time : 3 hours   *Maximum Marks : 70*

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

1. (a) Perform five iterations of bisection method to obtain the smallest positive root of equation $f(x) = x^3 - 5x + 1 = 0$. $3\frac{1}{2}$

   (b) Solve $\cos x = 3x - 1$ correct to three decimal places using the method of false position. $3\frac{1}{2}$

2. (a) Find a positive value of $(17)^{1/3}$ correct to six decimal places by Newton-Raphson method. $3\frac{1}{2}$

   (b) What are the various sources of errors in numerical methods ? Explain the terms significant digits and round-off errors. $3\frac{1}{2}$

3. Use Gauss Elimination to solve the following system of equations :   7

$$2x + y - z = 4$$
$$x - y + 2z = -2$$
$$-x + 2y - z = 2$$

4. Solve the following system of equations by the LU factorization method :   7

$$2x + 3y + z = 9$$
$$x + 2y + 3z = 6$$
$$3x + y + 2z = 8$$

5. Evaluate from following table f(3·8) to three significant figures using Gregory-Newton Backward Interpolation formula :   7

x :	0	1	2	3	4
f(x) :	1	1·5	2·2	3·1	4·6

6. Compute the value of f(x) for x = 2·5 from the following table :

x :	1	2	3	4
f(x) :	1	8	27	64

using Lagrange's interpolation method.   7

7. Find

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

approximately using Simpson's 3/8$^{\text{th}}$ rule on integration.   7

8. Given the initial value problem

$$y' = 1 + y^2, y(0) = 0.$$

Find y(0·6) by Runge-Kutta fourth order method taking h = 0·2. 7

9. (a) Explain the features of Unimodal functions with suitable examples. $3\frac{1}{2}$

(b) Discuss the salient features of Fibonacci method. $3\frac{1}{2}$

10. (a) Use Euler's method to obtain an approximate value of y(0·4) for the equation

$$\frac{dy}{dx} = x + y, \ y(0) = 1, \text{ with } h = 0·1. \qquad 3\frac{1}{2}$$

(b) Explain the following terms : $3\frac{1}{2}$

(i) Floating point numbers

(ii) Fixed point numbers

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