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**BICE-022**

# B.Tech. CIVIL ENGINEERING (BTCLEVI)

## Term-End Examination

00063 **December, 2018**

## BICE-022 : COMPUTER APPLICATIONS IN CIVIL ENGINEERING

*Time : 3 hours* *Maximum Marks : 70*

***Note :*** *Attempt any **seven** questions. Scientific calculator is allowed. All questions carry equal marks.*

**1.** (a) What do you understand by normalized floating-point for string and representing real numbers ?
Represent $44{\cdot}85 \times 10^6$ in normalized floating-point mode. *5*

(b) Find a root of the equation $x^3 - x - 4 = 0$ between 1 and 2, to three places of decimal by bisection method. *5*

**2.** Use Newton–Raphson method to find the root of the equation $\log_e x - \cos x = 0$, correct to three places of decimal. *10*

3. Solve the following system of linear equations by LU decomposition method : *10*

$$x_1 + 2x_2 + 3x_3 = 14$$

$$2x_1 + 5x_2 + 2x_3 = 18$$

$$3x_1 + x_2 + 5x_3 = 20$$

4. The population of a town is as follows :

| Year | Population : (in Lakhs) |
|---|---|
| 1921 | 20 |
| 1931 | 24 |
| 1941 | 29 |
| 1951 | 36 |
| 1961 | 46 |
| 1971 | 51 |

Using Newton's backward interpolation formula, find the increase in population during the period 1955 to 1961. *10*

5. Find the cubic Lagrange's interpolating polynomial from the following data : *10*

| x : | 0 | 1 | 2 | 5 |
|---|---|---|---|---|
| f(x) : | 2 | 3 | 12 | 147 |

6. The table given below reveals the velocity 'v' of a body during the time 't' specified. Find its acceleration at t = 1·1. *10*

| t : | 1·0 | 1·1 | 1·2 | 1·3 | 1·4 |
|---|---|---|---|---|---|
| v : | 43·1 | 47·7 | 52·1 | 56·4 | 60·8 |

7. (a) Use Simpson's $\frac{1}{3}$ rule to find $\int_0^1 \frac{dx}{1+x}$ by dividing the interval of integration into 8 equal parts. Hence, find $\log_e 2$ approximately. *5*

(b) Using Simpson's $\frac{3}{8}$ rule, evaluate $\int_0^6 \frac{e^x}{1+x}\,dx$. *5*

8. (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, with h = 0·1. *5*

(b) Use Runge–Kutta method of fourth order to approximate y when x = 0·1, given that y = 1 at x = 0 and $\frac{dy}{dx} = 3x + y^2$, with h = 0·1. *5*

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

(a) Statement of an optimization problem

(b) One-dimensional minimization methods

(c) Unimodal Functions

(d) Fibonacci Numbers

10. Discuss the salient features of Golden Section Method and Fibonacci Method. *10*