No. of Printed Pages : 4

BICE-022(S)

B.Tech. CIVIL ENGINEERING (BTCLEVI)

Term-End Examination

00108

December, 2016

BICE-022(S) : 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) Find a positive real root of $x - \cos x = 0$ by bisection method, correct to 3 decimal places between 0 and 1. $3\frac{1}{2}$

(b) Using Newton-Raphson method, find the real root of the equation $3x = \cos x + 1$, correct to 4 decimal places. $3\frac{1}{2}$

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

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

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

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

3. Solve the equations

$$x + y + z = 3$$

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

$$3x + y - z = -3$$

by the method of LU decomposition. 7

4. The population of a town (in thousands) was as given below. Estimate the population for the year 1895 using Newton Forward Interpolation Formula. 7

Year (x)	*Population (y) (in thousands)*
1891	46
1901	66
1911	81
1921	93
1931	101

5. Find the cubic Lagrange's interpolating polynomial from the following data : 7

x	0	1	2	5
f(x)	2	3	12	147

6. Determine the largest eigen value and the corresponding eigen vector of the matrix

$$A = \begin{bmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix} \text{ taking } X_0 = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$$

using Power method. 7

7. Find the value of $y(1{\cdot}1)$ using Runge-Kutta method of fourth order given that $\frac{dy}{dx} = y^2 + xy$, $y(1) = 1$, take $h = 0{\cdot}05$. 7

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

(a) Simpson's $\frac{1}{3}$rd rule taking $h = \frac{1}{4}$ 3

(b) Simpson's $\frac{3}{8}$ rule taking $h = \frac{1}{6}$ 3

Hence compute an approximate value of π in each case. 1

9. (a) Use Euler's method to obtain an approximate value of $y(0{\cdot}4)$ for the equation $\frac{dy}{dx} = x + y$, $y(0) = 1$ with $h = 0{\cdot}1$. $3\frac{1}{2}$

(b) Discuss the salient features of the standard form of a linear programming problem with suitable examples. $3\frac{1}{2}$

10. (a) Explain the following terms : $3\frac{1}{2}$

(i) Fixed point numbers

(ii) Floating point numbers

(b) Explain the features of unimodal functions with suitable examples. $3\frac{1}{2}$
