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BICE-022

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

00353

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. All answers are to be written in English only.*

1. (a) Find a root of the equation $x^3 - 4x - 9 = 0$, using Bisection method, correct to three decimal places. *5*

(b) Discuss the following : $2 \times 2\frac{1}{2} = 5$

(i) Significant digits

(ii) Round-off errors

2. Find a real root of the equation $x = e^{-x}$, using the Newton-Raphson method. *10*

3. Apply Gauss elimination method to solve the following equations : *10*

$$x + 4y - z = -5$$

$$x + y - 6z = -12$$

$$3x - y - z = 4$$

4. Solve the following equations by Jacobi's iteration method, correct to two decimal places. *10*

$$10x + y - z = 11{\cdot}19$$

$$x + 10y + z = 28{\cdot}08$$

$$-x + y + 10z = 35{\cdot}61$$

5. The table gives the distances in nautical miles of the visible horizon for the given heights in feet above the earth's surface. Using Newton's forward interpolation formula, find the values of y when x = 218 feet. *10*

x (Height)	y (Distance)
100	10·63
150	13·03
200	15·04
250	16·81
300	18·42
350	19·90
400	21·27

6. Find the polynomial f(x) by using Lagrangian interpolation formula and hence find f(3) for the following : *10*

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

7. (a) Use Trapezoidal rule to estimate the integral $\int_0^2 e^{x^2}\,dx$ taking 10 intervals. *5*

(b) Use Simpson's $\frac{1}{3}$ rule to find $\int_0^{0.6} e^{-x^2}\,dx$ by taking seven ordinates. *5*

8. Use Runge-Kutta method of fourth order to solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with $y(0) = 1$ at $x = 0.2$. *10*

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

(a) Constrained Optimisation Problem

(b) Fibonacci Method

(c) Unimodal Functions

(d) Eigen Vectors

10. (a) Discuss the salient features of Golden Section method with suitable example. *5*

(b) Discuss the salient features of unconstrained minimization problems. *5*