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BICE-022

B. Tech. (Civil Engineering)
BTCLEVI

Term-End Examination

June, 2014

00885

BICE-022 : COMPUTER APPLICATIONS IN CIVIL ENGINEERING

Time : 3 Hours *Maximum Marks : 70*

Note : *(i) Attempt **any seven** questions.*
*(ii) Non programmable calculators are **allowed**.*

1. (a) Why is the study of errors important to a Civil Engineer ? **5**

(b) Distinguish between round off errors and truncation errors. **5**

2. (a) Briefly explain the concept of convergence in bisection method. **5**

(b) Develop a computer algorithm for finding roots of $f(x) = 0$ using bisection method. **5**

3. (a) Describe the fundamental difference between 'elimination approach' and 'iterative approach' in system of linear algebric equations. **4**

(b) Solve the system : **6**

$3x_1 + 2x_2 + x_3 = 10$

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

$x_1 + 2x_2 + 3x_3 = 14$

by using LU decomposition method.

4. (a) What are eigenvalue problems ? 3

(b) Find the largest eigenvalue and the corresponding eigenvector of the matrix. 7

$$\begin{bmatrix} 1 & 2 & 0 \\ 2 & 1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$$

using the power method.

5. (a) Write the principle of 'Linear Interpolation'. 3

(b) The table gives square roots for integers. 7

x	1	2	3	4	5
$f(x)$	1	1.4142	1.7321	2	2.2361

Find the square root of 2.5 using the second order Langrange Interpolation method.

6. Evaluate the following integrals using Simpson's 1/3 rule.

(a) $\int_{-1}^{1} e^x \cdot dx$ 5

(b) $\int_{0}^{\pi} \sqrt{\sin x}\ dx$ 5

7. (a) Use the Taylor's method to solve the following equation 6

$$\frac{dy}{dx} = x^2 + y^2$$

for $x = 0.25$ and 0.5, given $y(0) = 1$

(b) Explain Euler's method. 4

8. (a) Develop computer algorithm for 'Finite Difference' method. 4

(b) Given the equation : 6

$$\frac{d^2y}{dx^2} = e^{x^2} \quad \text{with } y(0)=0$$

$$y(1)=0$$

estimate the values of $y(x)$ at $x=0.25$, 0.50.

9. (a) Describe any two applications of optimization in Civil Engineering. 4

(b) List various search methods under unconstrained minimization method. 3

(c) Write down the matrix form of Linear Programming problem. 3

10. A company purchases all the parts of a ball bearing and assembles them. It is engaged in two types of bull bearings, A and B. The respective profits are Rs. 3 and Rs. 2 per ball bearing. Each of A type ball bearing takes twice as much time to assemble, as the type B. If all the ball bearings of type B only would be assembled, the company could make 100 per day. The supply of ball bearing races is sufficient for 80 ball bearings (both A and B combined). For a A type, the supply rate of balls is such that only 40 could be made each day and for B such that only 70 could be made each day. 10

Formulate the linear programming equations for profit maximization.