

B. Tech. (Civil Engineering)
BTCLEVI

Term-End Examination

June, 2013

BICE-022 : BACHELOR OF TECHNOLOGY (CE)

Time : 3 Hours

Maximum Marks : 70

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- Note :** (i) *All answers are to be written in English only.*
(ii) *Attempt any seven questions.*
(iii) *Non programmable calculators are allowed.*
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1. (a) Explain the types of errors in numerical methods. 5
(b) Find a root of the equation $x^3 - 4x - 9 = 0$, using the bisection method correct to the three decimal places. 5
2. (a) Develop a computer algorithm for finding roots of $f(x) = 0$ using method of false position. 5
(b) Using Jacobi's method, find all the eigen values of the matrix. 5

$$\begin{bmatrix} 1 & \sqrt{2} & 2 \\ \sqrt{2} & 3 & \sqrt{2} \\ 2 & \sqrt{2} & 1 \end{bmatrix}$$

3. Apply Gauss elimination method to solve the equations $x + 4y - z = -5$; $x + y - 6z = -12$, $3x - y - z = 4$ 10

4. (a) Explain Newton's forward interpolation formula for any function $y = f(x)$. 5

- (b) Given the values : 5

x :	5	7	11	13	17
$f(x)$:	150	392	1452	2366	5202

Evaluate $f(g)$ using Lagrange's formula.

5. From the table below, for what value of x, y , is minimum ? Also find the value of y : 10

x :	3	4	5	6	7	8
y :	0.205	0.240	0.259	0.262	0.250	0.224

6. Explain : 10
- (a) Trapezoidal rule
- (b) Simpson's rule

7. Using Runge-Kutta method of fourth order solve 10

$$\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2} \text{ with } y(0) = 1 \text{ at } x = 0.2, 0.4.$$

8. A firm making castings uses electric furnace to melt iron with the following specifications : 10

	Minimum	Maximum
Carbon	3.20%	3.40%
Silicon	2.25%	2.35%

Specifications and costs of various raw materials used for this purpose are given below :

Material	Carbon%	Silicon%	Cost(Rs)
Steel scrap	0.4	0.15	850/ton
Cast iron scrap	3.80	2.40	900/ton
Remelt from foundary	3.50	2.30	500/ton

If the total charge of iron metal required is 4 tonnes, find the weight in kg of each raw material that must be used in the optimal mix at minimum cost.

9. Explain one dimensional minimization methods. 10
10. Explain unconstrained optimization problem of non linear programming. 10