Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(CE) (2011 Onwards) (Sem.–6)

NUMERICAL METHODS IN CIVIL ENGINEERING

Subject Code : BTCE-604

Paper ID : [A2291]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

Q1) Write briefly :

a) Define transcendental equation.

b) Write normal equations for fitting straight line.

c) Give any two differences between Galerkins method and Collocation method.

d) Write formula of Modified Euler's method for the solution of ordinary differential equation.

e) Give SOR method for the solution of partial differential equation.

f) Find the Eigen values of the following matrix.

$$\begin{bmatrix} 2 & 6 & 6 \\ 2 & 8 & 6 \\ 2 & 6 & 8 \end{bmatrix}$$

g) Write relation between forward operator and shift operator.

h) Write Newton-Raphson formula for the solution of Non-linear equations.

i) Define Interpolation & Extrapolation.

j) Write three different techniques for the solution of Boundary value problem.

SECTION-B

Q2) Using Newton's iterative method, find the real root of $x\log_{10}x = 1.2$. Correct to five decimal places.

Q3) Given log x for $x = 40, 45, 50, 55, 60$ and 65 according to the following table :

x :	40	45	50	55	60	65	70
Log x :	1.60206	1.65321	1.69897	1.74036	1.77815	1.81291	

Find the value of log 5875.

Q4) Use Runga-kutta fourth order method to find the value of y when $x = 1$ given that $y = 1$ when $x = 0$ (taking $n = 2$) and $\frac{dy}{dx} = \frac{y-x}{y+x}$.

Q5) Explain New marks method for the solution for nonlinear problems.

Q6) Given the following experimental values :

X :	0	1	2	3
Y :	2	4	10	15

Fit by the method of least squares a parabola of the type $y = a + bx^2$.

SECTION-C

Q7) Solve $\nabla^2 u = -10(x^2 + y^2 + 10)$ over the square mesh sides $x = 0$, $y = 0$, $x = 3$, $y = 3$ with $u = 0$ on the boundary and mesh length = 1.

Q8) Solve the boundary value problem defined by $y'' - x = 0$ and $y(0) = 0$, $y(1) = -1/2$ by Galerkin's method.

Q9) Solve the following linear equations :

$2x + 8y + 2z = 14$

$6x + 6y - z = 13$

$2x - y + 2z = 5$