**SHAHEED BHAGAT SINGH STATE TECHNICAL CAMPUS, FEROZEPUR**

**ROLL No:** | | | | | | | | | | | | | **Total number of pages:[2]**

# B.Tech. || CE || 6th Sem
# Numerical Methods in Civil Engineering
# Subject Code: BTCE-604
# Paper ID:

**Time allowed: 3 Hrs** **Max Marks: 60**

**Important Instructions:**

- **All questions are compulsory**

## PART A (10x 2marks)

Q. 1. Short-Answer Questions:

(a) Write normal equations for fitting straight line.
(b) From two series x and y, Cov(x,y) = 0.64. r = 0.6 ,$\sigma_y$ = 3.5 find $\sigma_x$ ?
(c) Give any two differences between Galerkins method and Collocation method.
(d) Describe fourth order R.K method for solving differential equation.
(e) Explain the fundamental equation of motion for a SDOF system.
(f) Define statically indeterminate structures with example?
(g) Write formula of Modified Euler's method for the solution of ordinary differential equation.
(h) Write three different techniques for the solution of Boundary value problem?.
( I) Write relation between forward operator and shift operator.
(j) Write the difference between Direct method and Iterative methods ?

## PART B (5×8marks)

Q. 2. Solve the equation $x^3 + x - 1 = 0$ by Iteration method. CO1

OR

Solve the following linear equations : CO1

$2x + 8y + 2z = 14$
$6x + 6y - z = 13$
$2x - y + 2z = 5$

Q. 3. Given the following experimental values : CO2

| X : | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Y : | 6 | 11 | 18 | 27 |

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

OR

For 10 observations on price (x) and supply (y) , the following data were obtained. CO2

$\sum x = 130, \sum y = 220, \sum x^2 = 2288, \sum y^2 = 5506, \sum xy = 3467$

Obtain the two lines of regression and estimate the supply when the price is 16 units.

Q. 4. Solve the boundary value problem $y'' - 64y + 10 = 0$ with $y(0) = y(1) = 0$ by Finite difference method .find the value at $x = 0.5$. CO3

OR

Find the value of $y(0.1)$ given that $y(0) = 1$ and $y' = x^2 + y$ by Modified Euler's Method by taking $h = 0.05$ CO3

Q. 5. Solve the boundary value problem defined by $y'' + y - x = 0$ and $y(0) = 0$ $y(1) = 0$ by Galerkin's method CO4

OR

Use Runga – kutta fourth order method to find the value of y when $x = 0.4$ Given $y(0) = 1$ and $y' = -2xy^2$ CO4

Q. 6. Explain the rate of Convergence of Regula – Falsi Method. CO5

OR

Using explicit method to find the displacement, velocity, acceleration at 0.05s. time intervals for up to 0.1 s for SDOF system (without damping) with mass= 31.83 units $k = 100$, $F(0) = 2000$, $F(0.05) = 1500$ $F(0.1) = 1000$. CO5