

Total No. of Questions : 4]

SEAT No. :

P-5070

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**T.E. (Mechanical/Sandwich) (In Sem.)**  
**NUMERICAL AND STATISTICAL METHODS**  
**(2019 Pattern) (Semester - I) (302041)**

*Time : 1 Hour]*

*[Max. Marks : 30*

*Instructions to the candidates :*

- 1) Answer Q.1 or Q.2, Q.3 or Q.4.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, wherever necessary.

**Q1) a)** Find the root of the following equation using Newton-Raphson method:

$$f(x) = x^4 - x = 10,$$

correct upto three decimal places. Take initial guess as 2; verify whether initial guess is correct? [7]

**b)** Solve the following set of simultaneous equations using Gauss elimination method. [8]

$$10x_1 + x_2 + x_3 = 12,$$

$$2x_1 + 11x_2 + 2x_3 = 15,$$

$$3x_1 + 4x_2 + 9x_3 = 16$$

OR

**Q2) a)** Draw the flow chart for bisection method on iteration based criteria. [6]

**b)** Solve using Tri diagonal matrix algorithm following set of equations [9]

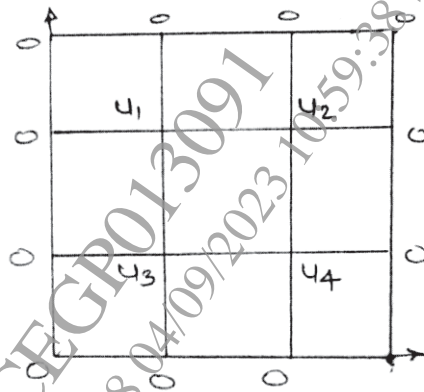
$$2.04 T_1 - T_2 = 40.8$$

$$-T_1 + 2.04 T_2 - T_3 = 0.8$$

$$-T_2 + 2.04 T_3 - T_4 = 0.8$$

$$-T_3 + 2.04 T_4 = 200.8$$

- Q3) a)** Draw the flow chart for Euler's method for solving differential equation. [6]
- b)** Solve the Poisson's equation  $2u = 2x^2y^2$  over the square domain  $0 \leq x \leq 3$  and  $0 \leq y \leq 3$ , with  $u = 0$  on the boundary and Mesh length = 1. [9]



OR

- Q4) a)** Using Runge Kutta fourth order method, solve  $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$  with initial condition  $y(0) = 1$ , at  $x = 0.4$ . Take  $h = 0.2$ . [8]
- b)** Draw flow chart to solve Laplace equation. [7]

