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SEAT No. :

P62

Oct./TE/Insem.-181

[Total No. of Pages : 2

T.E. (Chemical)

CHEMICAL ENGINEERING MATHEMATICS

(2015 Course) (Semester - I) (309341)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) *Answer any 3 questions.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Assume suitable data, if necessary.*
- 4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is permitted.*

Q1) Perform four iterations of the Newton Raphson method to find the smallest positive root of the equation $f(x) = x^3 - 5x + 1 = 0$. **[10]**

OR

Q2) Find the root of equation $f(x) = x^3 - 4x - 9$ using bisection method in 4 stages. **[10]**

Q3) Solve the following system of equations using the Gauss elimination with partial pivoting **[10]**

$$\begin{aligned}x_1 + 10x_2 - x_3 &= 3 \\2x_1 + 3x_2 + 20x_3 &= 7 \\10x_1 - x_2 + 2x_3 &= 4\end{aligned}$$

OR

P.T.O.

- Q4)** Find the solution of the system of equations correct to three decimal places, using the Gauss-Seidel iteration method. **[10]**

$$45x_1 + 2x_2 + 3x_3 = 58$$

$$-3x_1 + 22x_2 + 2x_3 = 47$$

$$5x_1 + x_2 + 20x_3 = 67$$

- Q5)** The outflow chemical concentration from a completely mixed reactor is measured as

$t, \text{ min}$	0	2	4	6	8	12	16	20
$C, \text{ mg/m}^3$	10	20	30	40	60	72	70	50

For an outflow of $Q = 12 \text{ m}^3/\text{min}$, estimate the mass of chemical that exits the reactor from $t = 0$ to 20 min. Use Trapezoidal Rule. **[10]**

OR

- Q6)** What is regression? Explain Linear Regression with example. **[10]**

