

B.Tech. SEM -V (Chemical 2014 Course (CBCS) : WINTER - 2018

SUBJECT: CHEMICAL ENGINEERING MATHEMATICS

Day: Tuesday
Date: 27/11/2018

W-2018-2376

Time: 02.30 PM TO 05.30 PM
Max. Marks: 60

N.B:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.

- Q.1**
- a) Find out the root $x^3 - 7x^2 + 10x - 2 = 0$ if root lies between 0 and 0.5 using bisection method. **(05)**
 - b) Find out the real root of the equation $x^3 - 2x - 5 = 0$, by Regula-falsi method correct to three decimal places. **(05)**

OR

- a) If volume of sphere is 100m^3 , find radius of sphere using Newton Rapshon method using 2 and 3 as initial guesses. **(05)**
- b) Find root of the equation $x^3 - 2x - 5$ with initial guesses 1, 2 and 3 using Muller's method. **(05)**

- Q.2** Find $y(2)$ if $y(x)$ is the solution of $\frac{dy}{dx} = \frac{x+y}{2}$ given that **(10)**

x	0	0.5	1	1.5
y	2	2.636	3.595	4.968

OR

Using Runge-Kutta method of order 4, find y for $x = 0.1, 0.2$ and 0.3 given that

$$\frac{dy}{dx} = xy + y^2, y(0) = 1.$$

- Q.3** Use Romberg's method to compute **(10)**

$$I = \int_0^1 \frac{1}{1+x} dx \text{ correct to three decimal places, if}$$

$$I(0.5) = 0.7084$$

$$I(0.25) = 0.6970$$

$$I(0.125) = 0.6941$$

OR

The pressure 'P' of wind corresponding to velocity V is given by following data. Estimate 'P' when $V = 25$. **(10)**

V	10	20	30	40
P	1.1	2	4.4	7.9

P.T.O.

- Q.4** Solve following simultaneous equations using matrix inversion method. **(10)**
 $3x + y + 2z = 3$
 $2x - 3y - z = -3$
 $x + 2y + z = 4$

OR

- Solve following equations using LU decomposition method. **(10)**
 $2x + 3y + z = 9$
 $x + 2y + 3z = 6$
 $3x + y + 2z = 8$

- Q.5** Obtain straight line fit for following data. **(10)**

x	2	3	5	7	9	10	12	15
y	2	5	8	10	12	14	15	16

OR

- Calculate mean, median and mode of the following data resulting to weight of 120 articles. **(10)**

Weight	0-10	10-20	20-30	30-40	40-60	50-60
No. of articles	14	17	22	26	23	18

- Q.6** Use Golden section search method to find maximum of: **(10)**

$$f(x) = 2\sin x - \frac{x^2}{10}$$

Within $x_l = 0$ and $x_u = 4$

OR

- Use Simplex method to minimize objective function. **(10)**

$$Z_{\min} = x + y$$

Subject to:

$$2x + y \geq 12$$

$$5x + 8y \geq 74$$

$$x + 6y \geq 24$$

$$x \geq 0$$

$$y \geq 0$$

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