

**B.Tech. SEM -V (Chemical 2014 Course (CBCS) : SUMMER - 2019**  
**SUBJECT: CHEMICAL ENGINEERING MATHEMATICS**

Day: Monday  
 Date: 13/05/2019

Time: 10.00 AM TO 01.00 PM  
 Max. Marks: 60

S-2019-2641

**N.B:**

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

**Q.1** Find root of the equation using Muller's method using initial guesses as 1, 2 and 3. (10)  
 $x^3 - 2x - 5 = 0$ .

**OR**

a) Solve by Picard's method  $\frac{dy}{dx} = 1 + xy, y(0) = 1$  for  $x = 0.1$  correct to four decimal places. (05)

b) Find root of equation using Bisection method if root lies between 0 and 0.5. (05)  
 $x^3 - 7x^2 + 10x - 2 = 0$

**Q.2** Apply fourth order Runge- Kutta method to find an approximate value of  $y$  when  $x = 0.2$ , given that  $y = 1$  when  $x = 0$ . Take  $h = 0.5$   $\frac{dy}{dx} = x + y$ . (10)

**OR**

Find  $y$  at  $x = 2$  using modified ruler method when  $y(0) = 1$ . Take  $h = 0.5$ . (10)  
 $\frac{dy}{dx} = x^2 + y$ .

**Q.3** a) Evaluate using Cauchy's integral formula (05)  
 $\oint_C \frac{e^{2z} dz}{(z-1)(z-2)}$  Where  $C$  is circle  $|z| = 3$ .

b) Employ Stirling's formula to compute  $y$  at 12.2 from the following table. (05)

x	10	11	12	13	14
y	0.23967	0.28060	0.31788	0.35209	0.38368

**OR**

a) Solve by Simpson's 1/3<sup>rd</sup> and 3/8<sup>th</sup> rule. (06)

$$I = \int_0^6 \frac{dx}{1+x^2}$$

b) Evaluate  $f(9)$  using LaGrange method. (04)

x	5	7	11	13	17
f(x)	150	392	145	2366	5202

**P.T.O.**

- Q.4** Solve the following equations using Jacobian method. (10)  
 $20x + y - 2z = 17$   
 $3x + 20y - z = -18$   
 $2x - 3y + 20z = 25$

**OR**

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

- Q.5** Fit a straight line to x and y values of following table: (10)

x	1	2	3	4	5	6	7
y	0.5	2.5	2	4	3.5	6	5.5

**OR**

- a) The mean weekly salary paid to 300 employees of a firm is Rs. 1470. There are 200 male employees and remaining are females. If mean salary of males is 1505 Rs. Obtain the mean salary of females. (05)  
b) Calculate the mean for following data: (05)

Size of item	6	7	8	9	10	11	12
Frequency	3	6	9	13	8	5	4

- Q.6** Using Simplex technique solve the following L.P.P. (10)  
Maximize :  $z = 3x_1 + 6x_2 + 2x_3$   
Subject to:  $3x_1 + 4x_2 + x_3 \leq 2$   
 $x_1 + 3x_2 + 2x_3 \leq 1$   
 $x_1, x_2, x_3 \geq 0$ .

**OR**

- Solve the following LPP by graphical method: (10)  
Maximize:  $3x_1 - x_2$   
 $x_1 \geq 0, x_2 \geq 0$   
 $-3x_1 + 5x_2 \leq 2$   
 $-2x_1 - 3x_2 \leq 3$   
 $x_1 + x_2 \leq 5$

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