B.TECH. SEM -V (CHEMICAL 2014 COURSE (CBCS) :
SUMMER - 2018
SUBJECT : CHEMICAL ENGINEERING MATHEMATICS

Day : **Wednesday** | **S-2018-2321** | Time : **10.00 AM TO 01.00 PM**
Date : **23/05/2018** | Max. Marks : 60

N.B.:

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Use of non-programmable **CALCULATOR** is allowed.
4) Assume suitable data if necessary.

Q.1 Use secant method to find the root of following equation with initial guesses of 0.02 and 0.05. **[10]**

$x^3 - 0.165x^2 + 3.993\times10^{-4} = 0$

OR

Using Picard's method, obtain solution upto 5th approximation **[10]**

$\frac{dy}{dx} = y + x$ when $y = 1, x = 0$

Q.2 Determine the value of y for x = 1.5 using modified Euler's method **[10]**

$\frac{dy}{dx} = x^2 + y,\ y(0) = 1.$ Take h = 0.5.

OR

Using Euler's method, find an approximate value of y corresponding to x = 1 **[10]**

given that $\frac{dy}{dx} = x + y,\ y(0) = 1.$ Take h = 0.2.

Q.3 Evaluate : $\int_c \frac{z^2 - z + 1}{z - 1}\, dz$ using Cauchy's integral formula where C is the circle **[10]**

i) | z | = 1 ii) | z | = ½.

OR

Employ Stirling's formula to compute $y_{12.2}$ from the following table: **[10]**

x^0	10	11	12	13	14
$10^5\mu_x$	23967	28060	31788	35209	38368

Q.4 Solve the equations using matrix inversion method **[10]**

$3x + y + 2z = 3$

$2x - 3y - z = -3$

$x + 2y + z = 4$

OR

P.T.O.

Solve using Jacobian method: **[10]**

$20x + y - 2z = 17$

$3x + 20y - z = -18$

$2x - 3y + 20z = 25$

Q.5 **a)** Three cities A, B and C are equidistant from each other. A motorist travels from A to B at 30 km/hr, from B to C at 40 km/hr, from C to A at 50 km/hr. Determine the average speed. **[05]**

b) An incomplete, frequency distribution is given below: **[05]**

Variable	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80
Frequency	12	30	?	65	?	25	18

Compute the missing values.

OR

Fit a straight line to following data: **[10]**

Year, x	1961	1971	1981	1991	2001
Productivity, y in thousands tons	8	10	12	10	16

Find expected production in 2006.

Q.6 Maximize $z = 4x_1 + 3x_2 + 6x_3$ **[10]**

Subject to

$2x_1 + 3x_2 + 2x_3 \leq 440$

$4x_1 + 3x_3 \leq 470$

$2x_1 + 5x_2 \leq 430$

$x_1,\ x_2,\ x_3 \leq 0.$

OR

Solve the following LPP by simplex method: **[10]**

Minimize $z = x_1 - 3x_2 + 3x_3$

Subject to

$3x_1 - x_2 + 2x_3 \leq 7$

$2x_1 + 4x_2 \geq -12$

$-4x_1 + 3x_2 + 8x_3 \leq 10$

$x_1,\ x_2,\ x_3 \geq 0$

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