STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86

B.Sc. DEGREE: BRANCH I- MATHEMATICS

(Effective from the academic year 2019-2020)

SUBJECT CODE: 19MT/AC/MC15

TITLE: MATHEMATICS FOR CHEMISTRY - I

CORE: ALLIED CORE **TIME: 1 ½ HOURS**

MAX: 50 MARKS

Section A

Answer all the questions **3×2=6**

1. If $A = \begin{pmatrix} 3 & 5 \\ 4 & 7 \end{pmatrix}$, evaluate $3A^3 - 23A^2 + 10I$, by way of characteristic equation.
2. Evaluate $\int_4^{16} \frac{dx}{x\sqrt{x}}$
3. Find the solution for the Clairaut's form $(p+q)(z - xp - yq) = 1$.

Section B

Answer any three questions **3×8=24**

4. Find the inverse of $A = \begin{pmatrix} 1 & 1 & 1 \\ 2 & 2 & 3 \\ 1 & 4 & 9 \end{pmatrix}$ through its characteristic equation
5. Solve $2x^4 - 9x^3 + 6x^2 + 11x - 6 = 0$ given that the product of two of the roots is 1
6. Find y_n, where $y = \log(4 - x^2)$
7. Using Lagrange's formula, find $f(x)$ when x =2 for the given data:

x	0	1	3	4
y	-12	0	6	12

Section C

Answer any one question **1×20=20**

8. a) Find the eigenvalues and eigenvectors of $A = \begin{pmatrix} 18 & -1 & -19 \\ -6 & 7 & 13 \\ 6 & 1 & -5 \end{pmatrix}$

   b) Solve the equation $10x^6 - 77x^5 + 140x^4 - 140x^2 + 77x - 10 = 0$

(10+10)

9. a) Solve the PDE (i) $py + qx = pq$; (ii) $pq = z^2$

   b) Find $f(x)$ when x =1.85 for the following data, using Newton's forward formula:

x	1.7	1.8	1.9	2.0	2.1	2.2	2.3
y	5.4739	6.0496	6.6859	7.3891	8.1662	9.0250	9.9742

(10+10)