SUBJECT CODE : 15MT/AC/MC15

B. Sc. DEGREE EXAMINATION, NOVEMBER 2015
BRANCH IV - CHEMISTRY
FIRST SEMESTER

COURSE   : ALLIED – CORE
PAPER   : MATHEMATICS FOR CHEMISTRY – I
TIME   : 3 HOURS   MAX. MARKS : 100

SECTION – A   **(10 X 2 = 20)**
ANSWER ALL THE QUESTIONS

1. Define Similar Matrices.

2. Calculate A^2 when $A = \begin{pmatrix} -1 & 3 \\ -1 & 4 \end{pmatrix}$.

3. If α, β, γ be the roots of the equation $x^3 + 2x^2 + 5x + 7 = 0$, find the values of $\alpha^2 + \beta^2 + \gamma^2$.

4. Remove the fractional coefficient from the equation $x^3 - \frac{1}{4}x^2 + \frac{1}{3}x - 1 = 0$.

5. Prove that $cosh^2 x + sinh^2 x = cosh 2x$.

6. If $y = log(4 - x^2)$, find y_n.

7. Obtain a partial differential equation by eliminating a, b from $a(x^2 + y^2) + bz^2 = 1$.

8. Solve $p = y^2 q^2$.

9. Prove that $E\nabla = \nabla E = \Delta$.

10. Evaluate $\Delta(tan^{-1} x)$.

SECTION – B   **(5 X 8 = 40)**
ANSWER ANY FIVE QUESTIONS

11. Prove that the matrix $A = \begin{pmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{pmatrix}$ satisfies its own characteristic equation and

    hence find its inverse.

12. Diminish the roots of the equation $x^4 - 4x^3 - 7x^2 + 22x + 24 = 0$ by 1 and hence solve the equation.

13. Differentiate with respect to x the following functions:

    (i) $y = sinh^{-1}\left(\frac{1-x}{1+x}\right)$ (ii) $y = log\left(cosech\left(\frac{x}{3}\right)\right)$

14. Evaluate $\int (x - 3)(7 - x)dx$.

15. Find the complete and singular integral of $z = px + qy + \sqrt{1 + p^2 + q^2}$.

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16. Using Newton's interpolation formula, find the value of $y = e^x$ when $x = 0.38$ from the following table:

x	0	0.1	0.2	0.3	0.4
e^x	1	1.1052	1.2214	1.3499	1.4918

17. The following table gives the normal weight of a baby during the six months of life:

Age in months	0	2	3	5	6
Weight in lbs	5	7	8	10	12

Estimate the weight of a baby at the age of 4 months using Lagrange's formula.

SECTION – C   (2 X 20 = 40)
ANSWER ANY TWO QUESTIONS

18. (a) Diagonalise the matrix $A = \begin{pmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{pmatrix}$.

(b) Solve the equation $x^3 - 12x^2 + 39x - 28 = 0$ whose roots are in arithmetical progression.   (15+5)

19. (a) Solve $6x^6 - 35x^5 + 56x^4 - 56x^2 + 35x - 6 = 0$.

(b) (i) If $y = \left(x + \sqrt{1 + x^2}\right)^m$, prove that $(1 + x^2)\frac{d^2y}{dx^2} + x\frac{dy}{dx} - m^2y = 0$.

(ii) Evaluate $\int \frac{dx}{(x+1)\sqrt{x^2+x+1}}$.   (10+5+5)

20. (a) Solve (i) $p^2 + q^2 = x^2 + y^2$ (ii) $xp + yq = x$.

(b) Find the missing value in the following table:

x	45	50	55	60	65
y	3.0	?	2.0	?	2.4

(10+10)

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