LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **CHEMISTRY**

THIRD SEMESTER – NOVEMBER 2016

MT 3103 - MATHEMATICS FOR CHEMISTRY

Date: 12-11-2016   Dept. No.   Max. : 100 Marks
Time: 09:00-12:00

PART – A

Answer ALL questions. $(10 \times 2 = 20)$

1. Differentiate $y = x^3 - 9 + 6x^2$ with respect to x.
2. If $y = cos^3 x$, find $\frac{dy}{dx}$.
3. Evaluate $\int xe^x \, dx$.
4. Solve $(D^2 + 5D + 6)y = 0$
5. Evaluate $\int \log x dx$.
6. Find the coefficient of x^n in the expansion of e^{a+bx}.
7. Obtain the partial differential equation by eliminating a, b from $(x - a)^2 + (y - b)^2 + z^2 = 1$.
8. Solve $p + q + pq = 0$.
9. If $\frac{\sin \theta}{\theta} = \frac{2165}{2166}$, show that the angle θ is 3° approximately.
10. State the axioms of probability.

PART – B

Answer any FIVE questions. $(5 \times 8 = 40)$

11. If $y = x^{x^{x^{...to \infty}}}$, find $\frac{dy}{dx}$.
12. Find the equation of the tangent and normal for $y^2 = 4ax$ at $(at^2, 2at)$.
13. Solve $yzp + zxq = xy$.
14. Find $\frac{dy}{dx}$ for $y = \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + \cdots \cdots \infty}}}$.
15. Sum the series to infinity $1 + \frac{3}{4} + \frac{3.5}{4.8} + \frac{3.5.7}{4.8.12} + \cdots$
16. Prove that $\frac{\sin 6\theta}{\sin \theta} = 32 \cos^5 \theta - 32 \cos^3 \theta + 6 \cos \theta$.
17. Solve $(D^2 - 3D + 2)y = e^{4x}$.
18. Find the standard deviation for the following data:

Age (x)	20-25	25-30	30-35	35-40	40-45	45-50
No of frequencies (f)	170	110	80	45	40	35

PART – C

Answer any TWO questions.   **$(2 \times 20 = 40)$**

19. Show that $\log \overline{12} = 1 + \left(\frac{1}{2} + \frac{1}{3}\right)\frac{1}{4} + \left(\frac{1}{4} + \frac{1}{5}\right)\frac{1}{4^2} + \cdots$ **(20)**

20. (a) Differentiate $e^{\sin^{-1} x}$ with respect to $\sin^{-1} x$.
    (b) Find the maxima and minima of the function $y = 2x^3 - 3x^2 - 36x + 10$.   **(10+10)**

21. (a) Solve $(D^2 + 3D + 2)y = e^{2x} + \sin x$.
    (b) Integrate $\frac{1}{(x+1)(x+2)(x+3)}$ with respect to x.   **(12+8)**

22. (a) Show that $x^2 = \frac{\pi^2}{3} + 4 \sum_{n=1}^{\infty}(-1)^n \frac{\cos nx}{n^2}$ in the interval $-\pi < x < \pi$.
    (b) If X is a Poisson variate such that $P(X = 1) = P(X = 2)$, find the mean and the variance.   (12+8)

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