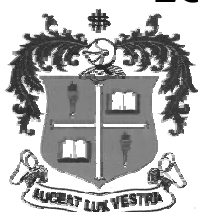# LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – CHEMISTRY

THIRD SEMESTER – NOVEMBER 2013

MT 3103 - MATHEMATICS FOR CHEMISTRY

Date : 18/11/2013   Dept. No. _____   Max. : 100 Marks
Time : 1:00 - 4:00

Part A

Answer **ALL** questions   (10 x 2 = 20)

1. Find y' if $y = log(4x + 8)$.
2. Prove that $cosh^2 x - sinh^2 x = 1$.
3. Evaluate $xe^x dx$.
4. Write the auxiliary equation of $\frac{d^2 y}{dx^2} - 5\frac{dy}{dx} + 4y = 0$.
5. Find the coefficient of x^n in the expansion of e^{a+bx}.
6. Form partial differential equation by eliminating constants from $z = ax^2 + by^3$.
7. Write down the expansion for $\tan n\theta$.
8. Show that $1 - tanh^2 x = sech^2 x$.
9. What is the chance of that the leap year selected at random will contain 53 Sundays?
10. If the mean and variance of Binomial distribution is 4 and 4/3. Find $P(X = 0)$.

Part B

Answer any **Five** questions   (5 x 8 = 40)

11. Find the angle of intersection of the cardioids $r = a(1+\cos\theta)$ *and* $r = b(1-\cos\theta)$.
12. Solve $yzp + zxq = xy$.
13. Evaluate $\int x^3 \cos 2x dx$.
14. Sum the series: $1 + \frac{1+2}{1!} + \frac{1+2+3}{2!} + \frac{1+2+3+4}{3!} + ...$
15. Determine the Fourier expansion of the function $f(x) = x, -\pi < x < \pi$.
16. Expand $\sin^4\theta \cos^2\theta$ in a series of cosines of multiples of θ.
17. Calculate the mean for the following distribution:

class interval :	0 – 8	8 – 16	16 – 24	24 – 32	32 – 40	40 – 48
frequency :	8	7	16	24	15	7

18. If X is a Poisson variate such that $P(X = 2) = 9P(X = 4) + 90P(X = 6)$, find (i) λ (ii) the mean of X.

PART C

Answer any **TWO** questions   (2 x 20 = 40)

19. Find the maxima and minima of. $f(x, y) = 2(x^2 - y^2) - x^4 + y^4$.   (20)

20. (i) Evaluate $\int \dfrac{dx}{\sqrt{x+1}+\sqrt{x-1}}$.

(ii) Solve: $(D^2+5D+6)\, y = e^{-2x} + \sin x$.   (**10 + 10**)

21. (i) Verify Cayley-Hamilton theorem for $\begin{pmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{pmatrix}$ and hence find it's inverse.

(ii) Separate into real and imaginary parts $\tan (x + iy)$.   (**12 + 8**)

22. (i) Find the M.G.F. of Binomial Distribution and hence find its mean and variance.

(ii) If X is a Poisson variate such that P (X =1) =P (X =2), find the mean and the variance

(**10 + 10**)