LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

THIRDSEMESTER – APRIL 2018

MT 3103- MATHEMATICS FOR CHEMISTRY

Date: 05-05-2018 Dept. No. Max. : 100 Marks

Time: 09:00-12:00

Part A

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

1. Find the equation of the tangent to the curve $y = \frac{6x}{x^2-1}$ at the point (2, 4).
2. Differentiate $e^{5x} + 8$ with respect to *x*.
3. Evaluate $\int \frac{dx}{a^2+x^2}$.
4. Solve $(D^2 + 3D + 2)y = 0$.
5. Prove that $\frac{e-1}{e+1} = \frac{\frac{1}{2!}+\frac{1}{4!}+\frac{1}{6!}+\cdots}{\frac{1}{1!}+\frac{1}{3!}+\frac{1}{5!}+\cdots}$.
6. Solve $pq = 1$.
7. Prove that $cosh^2x - sinh^2x = 1$.
8. Find real and imaginary parts of $\sin(x + iy)$.
9. What is an Independent event of the probability?
10. If X has the probability distribution

x	3	4
P(*x*)	$\frac{1}{2}$	$\frac{1}{2}$

Find the expectation of *x* (E(x)).

Part B

Answer any FIVE questions: **(5 x8 = 40)**

11. Find the angle of intersection of the cardioids $r = a(1 + cos\theta)$ and $r = b(1 - cos\theta)$.
12. Evaluate: a) $\int 5x^2e^{3x}$.

    b) $\int (e^x + 5)^n e^x dx$.
13. Evaluate $\int \frac{dx}{x^2+2x+5}$
14. a) Solve $pq + p + q = 0$.

    b) Obtain partial differential equation by eliminating *a*, *b* from $z = ax + by + cxy$.

15. Sum the series $\frac{5}{2!}+\frac{7}{3!}+\frac{9}{4!}+\cdots\infty$.

16. Prove that $sin^5\theta cos^2\theta=\frac{1}{2^6}(sin7\theta-3sin5\theta+sin3\theta+5sin\theta)$.

17. Two cards are drawn successively with replacement from well shuffled deck of 52 cards. Find the probability distribution of number of kings.

18.Find mean and variance of poission distribution.

Part C

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

19.(a) Find the maxima and minima of the function $2x^3-3x^2-36x+10$.

b) Differentiate *i*) $y=(sinx)^x$ *ii*) $y=e^{2x}sin5x$ (12+4+4)

20.(a) Sum the series $1+\frac{1+3}{2!}+\frac{1+3+3^2}{3!}+\frac{1+3+3^2+3^3}{4!}+\cdots\infty$.

(b) Find Eigen value and Eigen vectors $\begin{bmatrix}3&1&4\\0&2&6\\0&0&5\end{bmatrix}$. (10+10)

21.(a) Prove that $\int_0^{\frac{\pi}{4}}\log(1+tan\theta)\,d\theta=\frac{\pi}{8}log2$.

(b) Solve $\int x^3e^{3x}\,dx$

(c) $\frac{d^2y}{dx^2}-5\frac{dy}{dx}+6y=x^2+3$. (8+4+8)

22.(a) Obtain the Fourier series for the function $f(x)=x^2$, $(-\pi\le x\le\pi)$.

(b) Show that $\frac{sin6\theta}{sin\theta}=32\,cos^5\theta-32\,cos^3\theta+6cos\theta$.

(12+ 8)

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