LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIRSTSEMESTER – APRIL 2017

MT 1102- MATHEMATICS FOR CHEMISTRY

Date: 24-04-2017 Dept. No. Max. : 100 Marks
01:00-04:00

PART-A

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

1. Find $\frac{d^2y}{dx^2}$, if $y = a\cos 2x + b\sin 3x$.
2. Define De Moivre's theorem.
3. Find $\frac{d}{dx}\left(e^{3x+5}\right)$.
4. Evaluate $\int \sqrt{1+3x}\,dx$.
5. Show that $\cosh^2 x - \sinh^2 x = 1$.
6. Expand the series $(1+x)^n$.
7. Find the complementary function of $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = 0$.
8. Define Fourier series expansion.
9. Write any two properties of Arithmetic mean.
10. Define Binomial distribution.

PART-B

Answer any FIVE questions: **(5 x 8=40)**

11. Prove that $\sin^6\theta = \frac{1}{32}\left[\cos 6\theta - 6\cos 4\theta + 15\cos 2\theta - 10\right]$.
12. Solve $px + qy = z$.
13. Evaluate $\int \frac{3x+4}{(x-7)(2x+3)}dx$..
14. If $u = (x-y)^4 + (y-z)^4 + (z-x)^4$, show that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$.
15. Show that $\log\sqrt{12} = 1 + \left(\frac{1}{2}+\frac{1}{3}\right)\frac{1}{4} + \left(\frac{1}{4}+\frac{1}{5}\right)\frac{1}{4^2} + \ldots..$
16. Evaluate $\int x\log x\,dx$

17. The average salary of male employees in a firm was Rs. 520 and that of females was Rs. 420. The mean salary of all the employees was Rs. 500. Find the percentage of male and female employees.
18. Four cards are drawn from a pack of cards. Find the probability that (i) all are diamonds (ii) there is one card of each suit and (iii) there are two spades and two hearts.

PART-C

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

19. a) Sum the series $1+\frac{3}{4}+\frac{3.5}{4.8}+\frac{3.5}{4.8}\frac{7}{12}+.....$

    b) Find the maximum or minimum of the function $2\left(x^2-y^2\right)-x^4+y^4$. **(10+10)**

20. a) Expand $sin^4\theta.cos^2\theta$ in a series of cosines of multiples of θ.

    b) Calculate the mean for the following table.

Class interval	0-10	10-20	20-30	30-40	40-50	50-60
frequency	12	18	27	20	17	6

(10+10)

21. a)Find the eigenvalues and eigenvectors of the matrix $\begin{bmatrix}3&1&4\\0&2&6\\0&0&5\end{bmatrix}$.

    b) Evaluate $\int_0^{\frac{\pi}{2}}\frac{\sin^n x}{\sin^n x+\cos^n x}.dx$ **(12+8)**

22. a) Solve $\left(D^2-4D-5\right)y=e^{-x}+\cos x.$

    b) Determine the Fourier series expansion of $f(x)=\left(\pi^2-x^2\right)$ in the interval$(-\pi,\pi)$.

(10+10)

$$$$$$$$$