LOYOLA COLLEGE (AUTONOMOUS), CHENNAI - 600 034

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

FIRSTSEMESTER – APRIL 2018

MT 1102- MATHEMATICS FOR CHEMISTRY

Date: 28-04-2018 Time: 09:00-12:00 Dept. No.

Max.: 100 Marks

PART-A

(10 x 2=20)

- 1. If $y = e^{3\sin 2x}$, find $\frac{dy}{dx}$
- 2. Evaluate $\int_{-\infty}^{1} (5+3x+x^3) dx$.
- 3. Write $\cosh x$ in terms of exponential function.
- 4. Expand the series $(1+x)^{\stackrel{a}{c} p \stackrel{o}{\to} \stackrel{o}{+}}$.
- 5. Write any two properties of Arithmetic mean.
- 6. Write the expansion of $sin 3\theta$.
- 7. Define Fourier series.
- 8. Expand the series $\log(1+x)$.
- 9. Define Poisson distributions.

10. Find the complementary function of $\frac{d^2 y}{dx^2} + 2\frac{dy}{dx} + y = 0$.

PART-B

Answer any FIVE questions:

11. Find the equation of the tangent to the curve $y = x^3 - 6x^2 + 3x + 1$ at the point (1, -1).

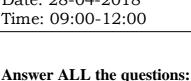
12. Solve $\int x^3 \cos x \, dx$.

13. Prove that $\frac{\sin 7\theta}{\sin \theta} = 64\cos^6 \theta - 80\cos^4 \theta + 24\cos^2 \theta - 1.$

14. Show that $\frac{e^2 - 1}{e^2 + 1} = \frac{\frac{1}{1!} + \frac{1}{3!} + \frac{1}{5!} + \dots}{1 + \frac{1}{2!} + \frac{1}{4!} + \dots}$.

15. Evaluate:
$$\int \frac{3x-1}{(1-x)^2(1+x)} dx.$$

1





 $(5 \times 8 = 40)$

16. Evaluate $I = \int_{1}^{7/2} \log \sin x dx$

Answer any TWO questions:

- 17. Ten coins are thrown simultaneously. Find the probability of getting at least seven heads.
- 18. 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.

PART-C

 $(2 \times 20 = 40)$

19. a) Sum the series $1 - \frac{1}{4} + \frac{1.3}{4.8} - \frac{1.3.5}{4.8.12} + \cdots \infty$

b) Show that $\log \sqrt{12} = 1 + \left(\frac{1}{2} + \frac{1}{3}\right)\frac{1}{4} + \left(\frac{1}{4} + \frac{1}{5}\right)\frac{1}{4^2} + \dots + (10+10)$

20. Given below is the distribution of 140 candidates obtaining marks X or higher in a certain examination:

Х	10	20	30	40	50	60	70	80	90	100
Y	140	133	118	100	75	45	25	9	2	0

Calculate the mean, median and mode of the distribution.

21. (a) Find the eigen values and eigenvectors of the matrix. $\begin{array}{c} x \\ c \\ c \\ c \end{array} = \begin{array}{c} 2 \\ c \\ c \\ c \end{array} = \begin{array}{c} 0 \\ c \\ c \\ c \\ c \end{array}$

(b) Verify Euler's theorem for the function $u = x^3 + y^3 + z^3 + 3xyz$.

(15+5)

(20)

22. a) Solve the equation $(D^2 + 5D + 4)y = 7x + 9$.

b) Determine the Fourier series expansion of $y = x + x^2$ in the interval $(-\pi, \pi)$ and hence determine the sum of series $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \cdots$

(8+12)
