LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIRSTSEMESTER – APRIL 2018

MT 1102- MATHEMATICS FOR CHEMISTRY

Date: 28-04-2018 Dept. No. Max. : 100 Marks

Time: 09:00-12:00

PART-A

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

1. If $y = e^{3\sin 2x}$, find $\frac{dy}{dx}$
2. Evaluate $\int_0^1 \left(5 + 3x + x^3\right) dx$.
3. Write $\cosh x$ in terms of exponential function.
4. Expand the series $(1+x)^{\frac{p}{q}}$.
5. Write any two properties of Arithmetic mean.
6. Writethe expansion of$sin3\theta$.
7. Define Fourier series.
8. Expand the series $\log(1+x)$.
9. Define Poisson distributions.
10. Find the complementary function of $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = 0.$

PART-B

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

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 $\frac{e^2-1}{e^2+1} = \frac{\frac{1}{1!} + \frac{1}{3!} + \frac{1}{5!} + ...}{1 + \frac{1}{2!} + \frac{1}{4!} + ...}$.
15. Evaluate: $\int \frac{3x-1}{(1-x)^2(1+x)} dx$..

16. Evaluate $I = \int_0^{\pi/2} \log \sin x dx$

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

Answer any TWO questions: **(2 x 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 $\log \sqrt{12} = 1 + \left(\frac{1}{2} + \frac{1}{3}\right)\frac{1}{4} + \left(\frac{1}{4} + \frac{1}{5}\right)\frac{1}{4^2} + \ldots..$ **(10+10)**

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

X	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. **(20)**

21. (a) Find the eigen values and eigenvectors of the matrix. $\begin{pmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{pmatrix}$

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

(15+5)

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

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

(8+12)

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