LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIRST SEMESTER – **NOVEMBER 2016**

MT 1102 – MATHEMATICS FOR CHEMISTRY

Date: 09-11-2016 Dept. No. Max. : 100 Marks

Time: 01:00-04:00

PART-A

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

1. Write the expansion of $\cos q$ in ascending powers of θ.
2. Write $\sinh x$ in terms of exponential function.
3. Evaluate $\int \sqrt{3+5x}\,dx$.
4. Write any two properties of definite integrals.
5. Expand the series $(1+x)^{\frac{p}{q}}$.
6. Define ordinary and partial differential equations.
7. Define Fourier series.
8. Find the order and degree of the equation $\left[1+\left(\frac{dy}{dx}\right)\right]^{3/2} = a\frac{d^2y}{dx^2}$.
9. Find the complementary function of $\frac{d^2y}{dx^2}+2\frac{dy}{dx}+y=0$.
10. Define Poisson distributions.

PART-B

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

11. Find the maxima and minima of the function $2\left(x^2 - y^2\right) - x^4 + y^4$.
12. Show that $\log\sqrt{12} = 1+\left(\frac{1}{2}+\frac{1}{3}\right)\frac{1}{4}+\left(\frac{1}{4}+\frac{1}{5}\right)\frac{1}{4^2}+.....$
13. Prove that $\frac{\sin 6q}{\sin q} = 32\cos^5 q - 32\cos^3 q + 6\cos q$.
14. Solve $\frac{d^2y}{dx^2}+7\frac{dy}{dx}+12y = e^{2x}+6$.
15. Solve $\int x^4 e^{2x}\,dx$.
16. Form the differential equation by eliminating the arbitrary constant from $z = \left(x^2+a\right)\left(y^2+b\right)$.

17. Determine the Fourier series expansion of $f(x)=\frac{1}{2}(\pi - x)$ in the interval $(0,2\pi)$.

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 employees.

PART –C

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

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

    b) Sum the series $1+\frac{3}{4}+\frac{3.5}{4.8}+\frac{3.5.7}{4.8.12}+.....$

(8+12)

20. a) Evaluate $\int \frac{3x+4}{(x-7)(2x+3)}dx.$

    b) Evaluate $\int \log x\, dx.$ **(12+8)**

21. a) Calculate the mean and standard deviation for the following table giving the age distribution of 542 members.

Age in Years	20-30	30-40	40-50	50-60	60-70	70-80	80-90
No of members	3	61	132	153	140	51	2

    b) A bag contains 3 red, 6 white and 7 blue balls. What is the probability that two balls are drawn are white and blue?

(16+4)

22. a) Find the eigenvalues and eigenvectors of the matrix $\begin{pmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{pmatrix}$

    b) Show that $\frac{e-1}{e+1}=\frac{\frac{1}{2!}+\frac{1}{4!}+\frac{1}{6!}+....}{1+\frac{1}{3!}+\frac{1}{5!}+...}$. **(15+5)**

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