



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – CHEMISTRY

FIRST SEMESTER – NOVEMBER 2015

MT 1102 -MATHEMATICS FOR CHEMISTRY

Date : 11/11/2015

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 $\sin 3\theta$ in terms of $\sin \theta$.
2. Evaluate $\int_1^3 \left(3x^2 - \frac{5}{x} \right) dx$
3. Expand the series $(1-x)^{-\left(\frac{p}{q}\right)}$.
4. Expand the series $\log\left(\frac{1+x}{1-x}\right)$.
5. Differentiate $5x^3 - 25$ with respect to x .
6. Write any two properties of Arithmetic mean.
7. Define Binomial distribution.
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 root mean square deviation.

PART-B

Answer any FIVE questions:

(5 x 8=40)

11. Prove that $\frac{\sin 7\theta}{\sin \theta} = 64 \cos^6 \theta - 80 \cos^4 \theta + 24 \cos^2 \theta - 1$.
12. Solve $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = 2e^x$.
13. Solve $\int x^3 \cos x dx$.
14. Solve $(y^2 + z^2)p - xyq = -xz$
15. Determine the Fourier series expansion of $f(x) = \frac{1}{2}(\pi - x)$ in the interval $(0, 2\pi)$.

16. Find the maxima and minima of the function $2x^3 - 3x^2 - 36x + 10$.
17. An irregular six faced die is thrown and the expectation that in 10 thrown it will give five even numbers is twice the expectation that it will give four even numbers. How many times in 10,000 sets of 10 throws each, would you expect it to give no even number.
18. Find the equation of the tangent to the curve $y = \frac{6x}{x^2 - 1}$ at the point (2, 4).

PART-C

Answer any TWO questions:

(2 x 20=40)

19. a) Sum the series $\frac{15}{16} + \frac{15.21}{16.24} + \frac{15.21.27}{16.24.32} + \dots$

b) Show that $\log \sqrt{12} = 1 + \left(\frac{1}{2} + \frac{1}{3}\right)\frac{1}{4} + \left(\frac{1}{4} + \frac{1}{5}\right)\frac{1}{4^2} + \dots$ (12+8)

20. a) Ten coins are thrown simultaneously. Find the probability of getting atleast seven heads.

b) Calculate the mean for the following frequency distribution

<i>Class interval</i>	0-8	8-16	16-24	24-32	32-40	40-48
<i>frequency</i>	8	7	16	24	15	7

(10+10)

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

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

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

b) Show that by Fourier expansion, $x^2 = \frac{\pi^2}{3} + 4 \sum_{n=1}^{\infty} (-1)^n \frac{\cos nx}{n^2}$ in the interval $(-\pi, \pi)$

(10+10)
