LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FOURTH SEMESTER – APRIL 2017

MT 4204- ADVANCED MATHS FOR CHEMISTRY

Date: 29-04-2017 Dept. No. Max. : 100 Marks
09:00-12:00

Part A

(Answer ALL the questions) **(10x2=20)**

1. Evaluate: $\int_0^{\frac{\pi}{2}} sin^{10}\,\theta d\theta$.
2. Show that $\beta(m,n) = \beta(n,m)$
3. Find $L\left(\frac{1}{s^2+1}\right)$
4. Find $L(t^3)$
5. Find the sum and product of the roots of equation $3x^3+6x^2+12x+15=0$.
6. Find the equation whose roots are the roots of $x^5 - 6x^4 + 6x^3 + 9x^2 + 2x - 7 = 0$ with signs changed.
7. Find the regression coefficient of Y on X is 0.665 and the regression coefficient of X on Y is 0.54, then what is the coefficient of correlation?
8. Write the normal equations for the curve $y = ax + b$.
9. Solve the system of equations $5x-y+6=0$ & $x-2y+3=0$.
10. Write down Newton backward formula.

Part B

(Answer any FIVE questions) (5x8=40)

11. By changing the order of integration, evaluate $\int_0^{\infty}\int_x^{\infty} \frac{e^{-y}}{y}\,dxdy$.
12. Evaluate $\int_0^{\infty} e^{-x^2}\,dx$ and $\int_0^{\infty} x^7(1-x)^8\,dx$.
13. Find the Laplace transform of $f(t) = \begin{cases} e^t, & 0 < t < 1 \\ 0, & t > 1 \end{cases}$
14. Solve the equation $x^4 + 4x^3 + 5x^2 + 2x - 2 = 0$ of which one root is $-1 - \sqrt{-1}$.
15. Find $L(te^t \sin t)$.
16. Calculate the Correlation coefficient of

X	65	66	67	67	68	69	70	72
Y	67	68	65	68	72	72	69	71

17. Solve the following equations by Gauss-Seidel method: $27x + 6y - z = 85, 6x + 15y + 2z = 72, x + y + 54z = 110.$

18. Solve the following system of equations $2x + y + 4z = 12, 8x - 3y + 2z = 20, 4x + 11y - z = 33$ using Cramer's rule.

Part C

(Answer any TWO questions) (2x20=40)

19. (a) Evaluate: $\iiint_V dx + dy + dz$ for the plane $x + y + z = a$.

(b) Prove that $\beta(m,n) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$. (8+12)

20. (a) Find $L^{-1}\left(\frac{s+2}{(s^2+4s+5)^2}\right)$.

(b) Solve: $Y'' + 2Y' - 3Y - \sin t$ using Laplace transformation with the conditions $y(0) = 0, y'(0) = 0$.

(8+12)

21. (a) Solve the equation $6x^6 - 35x^5 + 56x^4 - 56x^2 + 35x - 6 = 0.$

(b) Find the condition that the roots of the equation $ax^3 + 3bx^2 + 3cx + d = 0$ may be in geometric progression. Hence solve the equation $27x^3 + 42x^2 - 28x - 8 = 0$. (10+10)

22. (a) Obtain the equations of two lines of regressions for the following data.

X :	65	66	67	67	68	69	70	72
Y :	67	68	65	68	72	72	69	71

(b) Find a root of the equation $x^3 - 4x - 9 = 0$ correct to three decimal places by using bisection method. (10+10)

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