STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI - 600 086
(For candidates admitted from the academic year 2015-16 & thereafter)

SUBJECT CODE : 15MT/AC/MC25

B. Sc. DEGREE EXAMINATION, APRIL 2017
BRANCH IV - CHEMISTRY
SECOND SEMESTER

COURSE : ALLIED CORE
PAPER : MATHEMATICS FOR CHEMISTRY - II
TIME : 3 HOURS **MAX. MARKS : 100**

SECTION – A

ANSWER ALL THE QUESTIONS: **(10X2=20)**

1. Define the order of an element of a group G.
2. If $2Z$ and $3Z$ are subgroups of $(Z,+)$, Is $2Z \cup 3Z$ a subgroup?
3. Find $L(t^3 - 3t^2 + 2)$.
4. Find $L(3sin4t - 2cos5t)$.
5. Find $L^{-1}\ \frac{1}{(s-3)^5}$.
6. Find $L^{-1}\ \frac{1}{(s+2)^2+16}$.
7. If $f(x) = x^2$ in the interval $-\pi \le x \le \pi$, find a_0.
8. Write the Fourier series expansion for an even function.
9. Show that two independent variables are uncorrelated.
10. Define probable error of Correlation Coefficient.

SECTION – B

ANSWER ANY FIVE QUESTIONS: **(5X8=40)**

11. Let $G = \{1, i, -1, -i\}$. Prove that G is a group under usual multiplication.
12. Let H be a subgroup of G and $a \epsilon H$. Show that aHa^{-1} is a subgroup of G.
13. Find $L(sin^3 2t)$.
14. Find $L(e^{-5t} sin2t\ cost)$.
15. Find $L^{-1}\ \frac{s-3}{s^2+4s+13}$.
16. Express $f(x) = x$ $(-\pi \le x \le \pi)$ as a Fourier series with period 2π.
17. Consider the following probability distribution:

Y		0	1	2
X	0	0.1	0.2	0.1
	1	0.2	0.3	0.1

Calculate $E(X), Var(X), Cov(X,Y)$ and $r(X,Y)$.

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SECTION – C

ANSWER ANY TWO QUESTIONS: (2X20=40)

18. (a) Define a Symmetric group and show that S_3 is a group containing 3! Elements.

(b) Find (i) $L(e^{-at}\ sinbt)$

(ii) $L(sin^2 t)$

19. (a) Using Laplace transform solve $\frac{d^2y}{dt^2} - 3\frac{dy}{dt} + 2y = 4$ given that $y(0) = 2, y^1(0) = 3$.

(b) Express $f(x) = \frac{1}{2}(\pi - x)$ as a Fourier series with period 2π to be valid in the interval 0 to 2π.

20. (a) Calculate the Pearson's coefficient of correlation between x and y for the following data:

X	10	12	13	16	17	20	25
Y	19	22	26	27	29	33	37

(b) The ranks of 16 students in Mathematics and Physics are as follows:

Maths	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Physics	1	10	3	4	5	7	2	6	8	11	15	9	14	12	16	13

Calculate the rank correlation coefficient.