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 2018
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. Any cyclic group is abelian. Prove.
2. Define a normal subgroup.
3. Define Laplace Transform of a function $f(t), t > 0$.
4. Find $L\{Sin^2 t\}$.
5. Find $L^{-1}\left\{\frac{s-3}{s^2-6s+13}\right\}$.
6. Find $L^{-1}\left\{\frac{1}{(s+a)^2}\right\}$.
7. Define Fourier series of a function$f(x)$.
8. If $f(x)$is defined by
$$f(x) = \begin{cases} x \ \ in\ (0,\pi) \\ (2\pi - x) in\ (\pi, 2\pi) \end{cases}$$ finda_0.
9. Define correlation.
10. Define probable error of correlation coefficient.

SECTION – B

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

11. A non-empty subset H of a group G is a subgroup of G iff $a, b \in H \Longrightarrow ab^{-1} \in H$
12. Let G be a group and let a be an element of order n in G. Then $a^m = e$ iff n divides m.
13. Find $L\{t^2 cosat\}$
14. Find $L^{-1}\left\{\frac{1}{s(s^2-2s+5)}\right\}$.
15. Express $f(x) = \frac{(\pi - x)}{2}$ as a Fourier series with period 2π to be valid in the interval 0 to 2π.
16. Write a note on Scatter diagram.
17. The marks obtained by 10 students in Mathematics and Statistics are given below. Find Karl Pearson's coefficient of correlation between the two subjects.

RollNumber		1	2	3	4	5	6	7	8	9	10
Marks in	Mathematics	75	30	60	80	53	35	15	40	38	48
	Statistics	85	45	54	91	58	63	35	43	45	44

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SECTION – C

ANSWER ANY TWO QUESTIONS: (2X20=40)

18. (a) State and prove Lagrange's theorem.

(b) Prove $L\{f''(t)\} = s^2L\{f(t)\} - sf(0) - f'(0)$ .Hence find $L\{t^2 sinat\}$ `

19. (a) Solve the following differential equation using Laplace Transform

$\frac{d^2y}{dt^2} + 4\frac{dy}{dt} - 5y = 0$ given that $y(0) = 0$ and $y'(0) = 2$.

(b) If $f(x) = \begin{cases} -x \ in(-\pi < x < 0) \\ x \ in \ (0 < x < \pi) \end{cases}$ expand $f(x)$ as a Fourier series in the interval $-\pi$ to π. Deduce that $\frac{\pi^2}{8} = 1 + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \cdots$

20. (a)Obtain the correlation coefficient of the following data:.

X / Y	0-10	10-20	20-30	30-40
0-5	1	3	2	0
5-10	7	10	8	1
10-15	10	13	10	8
15-20	5	8	10	7
20-25	0	1	5	4

(b) Ten competitors in a music competition were ranked in the following manner by three judges A,B,C.

Rank By A	1	6	5	10	3	2	4	9	7	8
Rank By B	3	5	8	4	7	10	2	1	6	9
Rank By C	6	4	9	8	1	2	3	10	5	7

Using rank correlation method discuss which pair of judges have the nearest common approach to beauty.