STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI - 600 086
(For candidates admitted from the academic year 2019-20 & thereafter)

SUBJECT CODE : 19MT/AC/MC25

B. Sc. DEGREE EXAMINATION, APRIL 2023
BRANCH IV - CHEMISTRY
SECOND SEMESTER

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

SECTION – A

ANSWER ANY TEN QUESTIONS: **(10 × 2 = 20)**

1. Find $L(\sin^2 t)$.
2. Find $L(e^{-2t}\sin 5t)$.
3. Find $L^{-1}\left(\frac{s}{(s^2+4)^2}\right)$.
4. Write the formula for $L(y'(t))$, $L(y''(t))$.
5. Define Fourier Series for the function $f(t)$ in the interval $(0,2\pi)$.
6. Define Half range Fourier Series.
7. State the formula for finding Karl Pearson's Coefficient of Correlation.
8. Find the rank correlation for 10 students in two subjects whose square of deviations of ranks is 36.
9. Define coset of a group.
10. Define Cyclic group.
11. Find $L(\sin 2t \cos 3t)$.
12. Define Probable error of correlation coefficient.

SECTION – B

ANSWER ANY FIVE QUESTIONS: **(5 × 8 = 40)**

13. Find $L(\sin^3 2t)$.
14. Find $L^{-1}\left(\frac{s}{(s+3)^2+16}\right)$.
15. Find the Fourier series for the function $f(x) = x^2$ in $0 < x < 2\pi$.
16. Calculate Karl Pearson's coefficient of Correlation for the following data:

X	35	34	40	43	56	20	38
Y	32	30	31	32	53	20	33

17. Check whether the subset $S = \{1, -1\}$ is a subgroup of $G = \{1, -1, i, -i\}$ under multiplication.

18. Find the Laplace transform of $f(t) = \begin{cases} e^{-t} & 0 < t < 4 \\ 0 & t > 4 \end{cases}$.

19. Find the Fourier sine series for $f(x) = xsinx$, $0 < x < \pi$.

SECTION – C

ANSWER ANY TWO QUESTIONS: (2 × 20 = 40)

20. (a) Find the Laplace transform of $t^2 sinat$.

(b) Solve using Laplace transform $y'' - 2y' + 2y = 0$ $with$ $y(0) = y'(0) = 1$.

(10+10)

21. (a) Obtain the Fourier series for $f(x) = \left(\frac{\pi - x}{2}\right)^2$ in $0 < x < 2\pi$.

(b) Calculate Spearman's Rank Correlation Coefficient for the given data.

X	92	89	87	86	86	77	71	63	53	50
Y	86	83	91	77	68	85	52	82	37	57

(10+10)

22. (a) State Lagrange 's theorem and hence show that $[G: H] = [G: K][K: H]$ where H and K are subgroups of a finite group G and $H \subseteq K$.

(b) Given $\alpha = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 1 & 3 \end{pmatrix}$, $\beta = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 4 & 1 & 2 \end{pmatrix}$. Find $\beta, \beta\alpha, \alpha^{-1}, \beta^{-1}$.

(10+10)

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