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

SUBJECT CODE : 19MT/AC/MT35

B. Com. / B.Com.(A&F) DEGREE EXAMINATION, NOVEMBER 2022
THIRD SEMESTER

COURSE : ALLIED – CORE
PAPER : MATHEMATICS FOR COMMERCE
TIME : 3 HOURS **MAX. MARKS : 100**

SECTION – A (10 × 2 = 20)
ANSWER ANY TEN QUESTIONS

1. Define orthogonal matrix.
2. If $\lambda_1, \lambda_2, \lambda_3$ are the eigen values of A. Find λ_3 if $A = \begin{pmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{pmatrix}$, $\lambda_1 = 3$ and $\lambda_2 = 15$.
3. Solve $2x^3 - 15x^2 + 46x - 42 = 0$, given that $3 - i\sqrt{5}$ is a root.
4. Define reciprocal Equation.
5. If $y = x - \frac{x^2}{2} + \frac{x^3}{3} - \cdots$ prove that $x = y + \frac{y^2}{2!} + \frac{y^3}{3!} + \cdots$
6. Write the expansion of $\frac{1}{2+3x}$ in ascending powers of x.
7. Give two indirect methods to solve a system of linear equations.
8. In what form is the coefficient matrix transformed into when $AX = B$ is solved by Gauss-Elimination method.
9. Define non-degenerate basic solution for a linear programming problem.
10. Define Linear Programming Problem.
11. State Cayley Hamilton Theorem.
12. Find the coefficient of x^n in the expansion of $\frac{2+5x}{e^{2x}}$.

SECTION – B (5 × 8 = 40)
ANSWER ANY FIVE QUESTIONS

13. Using Cayley Hamilton theorem find the inverse of the matrix $A = \begin{pmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{pmatrix}$
14. Solve $3x^6 - 16x^5 + 23x^4 - 23x^2 + 16x - 3 = 0$
15. Show that $1 + \frac{1+3}{2!} + \frac{1+3+3^2}{3!} + \frac{1+3+3^2+3^3}{4!} + \cdots = \frac{e(e^2-1)}{2}$
16. Solve the following system of equations using Gaussian Elimination method

$$x + y + z = 9$$
$$2x - 3y + 4z = 13$$
$$3x + 4y + 5z = 40$$

17. Find all the basic solutions to the following problem:
$Maximize\ Z = x_1 + 3x_2 + 3x_3$
Subject to $x_1 + 2x_2 + 3x_3 = 4$
$2x_1 + 3x_2 + 5x_3 = 7$
Also find which of the basic solutions are
i) Basic feasible
ii) Non-degenerate basic feasible
iii) Optimal basic feasible

18. Express $\begin{pmatrix} 2 & 4 & 8 \\ 6 & 2 & 8 \\ 2 & 2 & 2 \end{pmatrix}$ as the sum of a symmetric matrix and a skew symmetric matrix.

19. Solve $x^4 - 11x^2 + 2x + 12 = 0$ given that $\sqrt{5} - 1$ is a root.

SECTION – C **(2 × 20 = 40)**
ANSWER ANY TWO QUESTIONS

20. Diagonalize the matrix $A = \begin{pmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{pmatrix}$.

21. a) Solve the following system of equations by Gauss Seidel method
$28x + 4y - z = 32;\quad x + 3y + 10z = 24;\quad 2x + 17y + 4z = 35$
b) Solve $x^3 + x^2 - 16x + 20 = 0$, the difference between two of its roots being 7.

22. a) Solve Minimise $z = 20x_1 + 10x_2$
Subject to $x_1 + x_2 \geq 10$
$3x_1 + 2x_2 \geq 2$
$x_1, x_2 \geq 0$
b) Show that $\frac{1}{1\cdot2\cdot3} + \frac{1}{3\cdot4\cdot5} + \frac{1}{5\cdot6\cdot7} + \cdots\infty = log2 - \frac{1}{2}$.

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