STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086

(For candidates admitted during the academic year 2019-2020)

SUBJECT CODE: 19MT/AC/MT35

B.Com. Degree Examination, November 2021

THIRD SEMESTER

COURSE : ALLIED CORE

PAPER : MATHEMATICS FOR COMMERCE

TIME : 3 HOURS

MAXIMUM MARKS: 100

SECTION-A

ANSWER ALL THE QUESTIONS (3 × 4 = 12)

1. Prove that the matrix $\begin{pmatrix} \frac{1}{\sqrt{2}} & \frac{-1}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \end{pmatrix}$ is orthogonal.
2. If α, β, γ are the roots of the equation $x^3 - 5x^2 + 6x + 3 = 0$ then find the value of $\frac{1}{\alpha^2\beta^2} + \frac{1}{\beta^2\gamma^2} + \frac{1}{\gamma^2\alpha^2}$.
3. Write the characteristics of a standard linear programming problem.

SECTION – B

ANSWER ANY THREE OF THE FOLLOWING (3 × 16 = 48)

4. Verify Cayley-Hamilton theorem for the matrix $\begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix}$ and hence find A^{-1}.
5. Solve the equation $x^3 - 9x^2 + 14x + 24 = 0$ if two of whose roots are in the ratio $3:2$.
6. Find the real root of $x\log_{10} x = 1.2$ to three places of decimals by Newton-Raphson method.
7. Find the value of $\left(1 + \frac{1}{2}\right) + \left(\frac{1}{3} + \frac{1}{4}\right)\frac{1}{9} + \left(\frac{1}{5} + \frac{1}{6}\right)\frac{1}{9^2} + \cdots to\ \infty$

SECTION – C

ANSWER ANY ONE OF THE FOLLOWING (1 × 40 = 40)

8. a) Find the eigen values and eigen vectors for the matrix $A = \begin{bmatrix} 2 & -2 & 3 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$.

   b) Solve the following system of equations by Gauss-Seidal method.

$$27x + 6y - z = 85$$
$$6x + 15y + 2z = 72$$
$$x + y + 54z = 110$$

(20+20)

9. a) Solve

Minimize $Z = 9x_1 + 10x_2$

Subject to the constraints
$$2x_1 + 4x_2 \geq 50$$
$$4x_1 + 3x_2 \geq 24$$
$$3x_1 + 2x_2 \geq 60$$
$$x_1, x_2 \geq 0$$

b) Form the equation one of whose root is $\sqrt{2} + \sqrt{7}$.

c) Find the co-efficient of x^n in the expansion of $\frac{(1+2x)}{e^x}$. (25+10+5)

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