

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 86
(For candidates admitted from the academic year 2025 – 2026)

B.Sc. DEGREE EXAMINATION, APRIL 2026
BRANCH I - MATHEMATICS
SECOND SEMESTER

COURSE : **CORE**
PAPER : **ANALYTICAL GEOMETRY**
SUBJECT CODE : **25MT/MC/AG25**
TIME : **3 HOURS** **MAX. MARKS: 100**

Q. No.	SECTION A (2 × 5 = 10) Answer ANY TWO questions	CO	KL
1.	Obtain the condition that the pole of $lx + my = 1$ with respect to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ may be on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 4$.	1	1
2.	Find the asymptotes of the hyperbola $3x^2 - 5xy - 2y^2 + 17x + y + 14 = 0$.	1	1
3.	Find the equation of the plane through the points $P(2, 2, -1)$, $Q(3, 4, 2)$ and $R(7, 0, 6)$.	1	1
Q. No.	SECTION B (2 × 5 = 10) Answer ANY TWO questions	CO	KL
4.	Find the equation of the line through the point $(1, 2, 4)$ and parallel to the line $3x + 2y - z = 4$, $x - 2y - z = 5$.	2	2
5.	Obtain the equation of the sphere described on the join of the points $A(2, -3, 4)$, $B(-5, 6, -7)$ as diameter.	2	2
6.	Find the distances of the point $(2, 3, 4)$ and $(1, 1, 4)$ from the plane $3x - 6y + 2z + 11 = 0$.	2	2
Q. No.	SECTION C (2 × 10 = 20) Answer ANY TWO questions	CO	KL
7.	Show that the conjugate lines through the focus of an ellipse are at right angles.	3	3
8.	Show that if a diameter meets a hyperbola in real points, then it will meet the conjugate hyperbola in imaginary points. Also, show that the conjugate diameter will meet the conjugate hyperbola in real points.	3	3

9.	Find the equations of the three planes passing through the points $(1, -2, 4)$, $(3, -4, 5)$ and perpendicular to the XY , YZ and ZX planes.	3	3
Q. No.	SECTION D ($2 \times 20 = 40$) Answer ANY TWO questions	CO	KL
10.	a) Show that the product of the focal distances of a point on an ellipse is equal to the square of the semi-diameter which is conjugate to the diameter through the point. b) Find the equation of the hyperbola which has $3x - 4y + 7 = 0$ and $4x + 3y + 1 = 0$ for asymptotes and which passes through the origin. Find the co-ordinates of its centre. (7+13)	4	4
11.	Find the equation of the sphere through the points $(0, 0, 0)$, $(0, 1, -1)$, $(-1, 2, 0)$, $(1, 2, 3)$.	4	4
12.	a) Find the equation in the symmetrical form of the projection of the line $\frac{x+1}{2} = \frac{y+2}{3} = \frac{z+3}{4}$ on the plane $x - 2y + 3z - 4 = 0$. b) Show that $(\frac{1}{8}, \frac{1}{8}, \frac{1}{8})$ is the incentre of the tetrahedron formed by the four planes $x = 0$, $y = 0$, $z = 0$, $x + 2y + 2z = 1$. (15+5)	4	4
Q. No.	SECTION E ($2 \times 10 = 20$) Answer ANY TWO questions	CO	KL
13.	Show that the lines $\frac{x+3}{2} = \frac{y+5}{3} = \frac{z-7}{-3}$ and $\frac{x+1}{4} = \frac{y+1}{5} = \frac{z+1}{-1}$ are coplanar and find the equations of the plane containing them.	5	5
14.	A point moves so that the sum of the squares of its distances from six faces of the cube is constant. Show that its locus is a sphere.	5	5
15.	Find the equations of the plane which is perpendicular to the plane $5x + 3y + 6z + 8 = 0$ and which contains the line of intersection of the planes $x + 2y + 3z - 4 = 0$, $2x + y - z + 5 = 0$.	5	5

