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

B.Sc. DEGREE EXAMINATION, APRIL 2026
MATHEMATICS WITH COMPUTER APPLICATIONS
SECOND SEMESTER

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

Q. No.	**SECTION A** ($\mathbf{2 \times 5 = 10}$) **Answer ANY TWO questions**	CO	KL
1.	Find the equation of the straight line joining the points (2, 8, 5) and (-1, 6, 3). Also give its direction ratios.	1	1
2.	Find the angle between the planes $2x - y + z = 6$, $x + y + 2z = 3$.	1	1
3.	Find the radius and the coordinate of the centre of the sphere $x^2 + y^2 + z^2 - 6x - 2y - 4z - 11 = 0$.	1	1
Q. No.	**SECTION B** ($\mathbf{2 \times 5 = 10}$) **Answer ANY TWO questions**	**CO**	**KL**
4.	Find the eccentricity of the ellipse whose conjugate diameters are $y = x \; and \; 3y = -2x$.	2	2
5.	Define conjugate hyperbola. State any two properties of conjugate diameters of hyperbola.	2	2
6.	Find the equation of the plane through the point (1, -2, 3) and the intersection of the planes $2x - y + 4z = 7$ and $x + 2y - 3z + 8 = 0$.	2	2
Q. No.	**SECTION C** ($\mathbf{2 \times 10 = 20}$) **Answer ANY TWO questions**	**CO**	**KL**
7.	Prove that the lines $\frac{x+1}{-3} = \frac{y+10}{8} = \frac{z-1}{2}$; $\frac{x+3}{-4} = \frac{y+1}{7} = \frac{z-4}{1}$ are coplanar. Find also a point of intersection and the plane through them.	3	3
8.	Find the locus of the point whose distance from the plane $3x - 2y + 6z - 3 = 0$ is thrice the distance from the plane $12x + 4y - 3z + 4 = 0$.	3	3
9.	Obtain the equation of the tangent plane to the sphere $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$ at the point (x_1, y_1, z_1).	3	3

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Q. No.	**SECTION D** ($\mathbf{2 \times 20 = 40}$) **Answer ANY TWO questions**	**CO**	**KL**
10.	a) If *P* and *D* are extremities of conjugate diameter of the ellipse, show that the locus of the foot of the perpendicular on *PD* from the center of the ellipse is $a^2x^2 + b^2y^2 = 2(x^2 + y^2)^2$ b) Show that the tangents at the ends of a pair of conjugate diameters form a parallelogram of constant area by stating the appropriate properties of conjugate diameters. (12+8)	4	4
11.	a) Use appropriate result and diagram to show that $CP^2 - CD^2 = a^2 - b^2$ if a pair of conjugate diameters meet the hyperbola and its conjugate is at P and D. b) If *l* is the line $\frac{x}{-1} = \frac{y-1}{2} = \frac{z+2}{1}$, find the equation of the plane through *l* which is parallel to the line of intersection of the planes $5x + 2y + 3z = 4$ and $x - y + 5z + 6 = 0$. (10+10)	4	4
12.	a) A sphere of constant radius k passes through the origin and meets the axes on *A, B, C*. Show that the centroid of the triangle lies on the sphere $9(x^2 + y^2 + z^2) = 4k^2$. b) Find the equation of the sphere having the circle $x^2 + y^2+z^2 - 2x + 4y - 6z + 7 = 0, 2x - y + 2z = 5$ for a great circle. (12+8)	4	4
Q. No.	**SECTION E** ($\mathbf{2 \times 10 = 20}$) **Answer ANY TWO questions**	**CO**	**KL**
13.	Find the equation of the image of the line $\frac{x-1}{2} = \frac{y+2}{-5} = \frac{z-3}{2}$ in the plane $2x - 3y + 2z + 3 = 0$.	5	5
14.	Determine the equation of the plane passing through the points (2, 5, -3), (-2, -3, 5) and (5, 3, -3).	5	5
15.	Prove that the locus of the poles of all normal chords of the rectangular hyperbola $xy = c^2$ is the curve $(x^2 - y^2)^2 + 4c^2xy = 0$.	5	5