STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI 600 086
(For candidates admitted from the academic year 2015-16)

SUBJECT CODE : 15MT/MC/AG25

B. Sc. DEGREE EXAMINATION, APRIL 2016
BRANCH I – MATHEMATICS
SECOND SEMESTER

COURSE : MAJOR CORE
PAPER : ANALYTICAL GEOMETRY
TIME : 3 HOURS **MAX. MARKS : 100**

SECTION A

Answer All Questions: **10 x 2 = 20**

1. Define conic.
2. Write the conditions for the general second degree equation to represent a hyperbola and a rectangular hyperbola.
3. Define equi-conjugate diameters of an ellipse.
4. Find the equation of the hyperbola which passes through the point (2,3) and has the asymptotes $4x+3y-7=0$ and $x-2y-1=0.$
5. Find the equation of the plane through (3,4,5) and parallel to the plane $2x+3y-5=0.$
6. Find the angle between the planes $2x-y+z=6$ and $x+y+2z=3.$
7. Find the equation of the line joining the points (2,1,3) and (1,-2,4).
8. Write down the condition for a line to lie on a plane.
9. Find the centre and radius of the sphere $16x^2+16y^2+16z^2-16x-8y-16z-55=0.$
10. Define right circular cone.

SECTION B

Answer Any Five Questions: **5 x 8 = 40**

11. Find the centre, lengths and equations of the axes of the conic
    $x^2-3xy+y^2+10x-10y+21=0.$
12. Prove that the product of the focal distances of a point on an ellipse is equal to the square of the semi-diameters which is conjugate to the diameter through the point.
13. Obtain the equation of the plane passing through the line
    $\frac{x-1}{1}=\frac{y-2}{-2}=\frac{z-3}{3}$ and passing through the point (4,5, 1).

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14. Find the equation of the plane containing the line of intersection of the planes $x+y+z-6=0, 2x+3y+4z=5$ and passing through the point (1, 1, 1).
15. Express in symmetrical form the line $4x+4y-5z-12=0, 8x+12y-13z-32=0$.
16. Find the equation of the sphere tangential to the plane $x-2y-2z=7$ at (3,-1,-1) and passing through the point (1,1,-3).
17. A right circular cone has its vertex at (2,-3,5). Its axis passes through (3,-2,6) and its semi vertical angle is 30°. Find its equation.

SECTION C

Answer Any Two Questions: **2 x 20= 40**

18. a) Prove that the general second degree equation represents a conic.
    b) Derive the equation of rectangular hyperbola. (10+10)

19. a) Find the equation of the plane passing through the points (-1, 3,2) and perpendicular to the planes $x+2y+2z=5, 3x+3y+2z=8$.
    b) Find the shortest distance and equation to the line of shortest distance between the two given lines $\frac{x+7}{3}=\frac{y+4}{4}=\frac{z+3}{-2}$ and $\frac{x-21}{6}=\frac{y+5}{-4}=\frac{z-2}{-1}$.

(10+10)

20. a) Find the equation of the sphere having the circle $x^2+y^2+z^2=5$, $x-2y+2z=5$ for a great circle. Find also its centre and radius.
    b) Prove that the equation $2x^2+2y^2+7z^2-10yz-10zx+2x+2y+26z-17=0$ represents a cone whose vertex is (2, 2, 1). (10+10)