

Dr V S Krishna Govt. Degree College

DEPARTMENT OF MATHEMATICS

MODEL PAPER - II SEMESTER - II

THREE DIMENSIONAL ANALYTICAL SOLID GEOMETRY

Time: 3 Hrs

Max. Marks : 60

SECTION - A

Answer any Five questions . Each question carries 04 Marks.

5 x 4M = 20M

1. Find the equation of the plane through the points (2,2,-1), (3,4,2) and (7,0,6).
2. Find the equation of the plane through the intersection of the planes $x-y+3z+5 = 0$, $2x+y-2z+6 = 0$ and passing through the point (3,1,1).
3. Find the foot of the perpendicular from (2,-2,3) to the plane $2x-y-2z-9=0$.
4. Find the equations of the line through the point (1,1,1) and intersecting the lines
 $2x-y-z-2 = 0 = x+y+z-1$; $x-y-z-3 = 0 = 2x+4y-z-4$
5. Find the equation of a sphere passing through the circle $x^2+y^2+z^2 = 4$, $z=0$ and is intersected by the plane $x+2y+2z=0$ in a circle of radius 3.
6. Find the centre and radius of the circle $x^2+y^2+z^2-2y-4z-11 = 0$; $x+2y+2z-15 = 0$.
7. Find the value of 'a' for which the plane $x+y+z = a\sqrt{3}$ touches the sphere
 $x^2+y^2+z^2-2x-2y-2z-6 = 0$.
8. Find the equation to the right circular cone whose vertex is (3,2,1), axis line
 $\frac{x-3}{4} = \frac{y-2}{1} = \frac{z-1}{3}$ and semi vertical angle 30° .
9. Find the vertex of the cone $2x^2+2y^2+7z^2-10yz-10zx+2x+2y+26z-17 = 0$.
10. Prove that the cones $\frac{x^2}{a} = \frac{y^2}{b} = \frac{z^2}{c} = 0$, $ax^2+by^2+cz^2 = 0$ are reciprocal.

SECTION - B

Answer all questions , Each question carries 08 marks.

5 x 8M = 40M

11. (a). A variable plane is at a constant distance 'P' from the origin meets the axis in A,B,C. Show that the locus of the tetrahedron OABC is $x^2+y^2+z^2 = 16p^2$.

OR

(b) Find the equations of the planes bisecting the angle between the planes $x+2y+2z-3 = 0$, $3x+4y+12z+1 = 0$ and specify the one which bisects the acute angle.

12. (a). Find the image of the line $\frac{x-1}{2} = \frac{y-2}{1} = \frac{z-3}{4}$ in the plane $2x+y+z = 6$.

OR

(b) Find the shortest distance and the equations of the line of S.D between the lines $3x-9y+5z = 0 = x+y-z$ and $6x+8y+3z = 0 = x+2y+z-3$.

13. (a). Show that the two circles $x^2+y^2+z^2-y+2z = 0$, $x-y+z = 2$ and $x^2+y^2+z^2+x-3y+z-5 = 0$, $2x-y+4z-1 = 0$ lie on the same sphere and find its equation.

OR

(b) A plane through a fixed point (a,b,c) and cuts the axis in A,B,C show that the locus of centre of the sphere OABC is $\frac{a}{x} + \frac{b}{y} + \frac{c}{z} = 2$.

14. (a). Find the limiting points of a coaxial system of spheres given by

$$x^2+y^2+z^2-20x+30y-40z+29+\lambda(2x-3y+4z) = 0$$

OR

(b) If the line $\frac{x}{1} = \frac{y}{2} = \frac{z}{1}$ represents one of the three mutually perpendicular generators of the cone $11yz+6zx-14xy = 0$. Find the equations of the other two.

15. (a). Find the equation of the tangent plane at the point (-3,0,-1) of the cone

$$4x^2-y^2+2z^2+2xy-3yz+12x-11y+6z+4=0$$

OR

(b) Find the equation to the right circular cone whose vertex is P(2,-3,5), axis PQ which makes equal angles with coordinate axes and which passes through A(1,-2,3).