sns academy
a fingerprint school
Sincerity, Nobility and Service

Class: XII **THREE DIMENSIONAL GEOMETRY**

1. Find the equation of the plane passing through the points (-1,2,0), (2,2,-1) and parallel to the line $\frac{x-1}{1}=\frac{2y+1}{2}=\frac{z+1}{-1}$.

2. Find the equation of a plane passes through the point (3,2,0) and contains the line $\frac{x-3}{1}=\frac{y-6}{5}=\frac{z-4}{4}$.

3. If lines $\frac{x-1}{2}=\frac{y+1}{3}=\frac{z-1}{4}$ and $\frac{x-3}{1}=\frac{y-k}{2}=\frac{z}{1}$ intersect, then find the value of k and hence find the equation of the plane containing these lines.

4. Find the distance of the point P(3,4,4) from the point, where the line joining the points A(3,-4,-5) and B(2,-3,1) intersects the plane 2x+y+z=7.

5. Find the distance of the point (1,-2,3) from the plane x – y +z = 5 measured parallel to the line whose direction cosines are proportional to 2, 3, -6.

6. Write the vector equation of the plane passing through the point (a,b,c) and parallel to the plane $\vec{r}.\left(\vec{i}+\vec{j}+k\right)=2$.

7. If the Cartesian equation of the line is $\frac{3-x}{5}=\frac{y+4}{7}=\frac{6z-4}{4}$, write the vector equation for the line.

8. Find a vector $\vec{a}$ of magnitude $5\sqrt{2}$, making an angle of $\frac{\pi}{4}$ with x-axis, $\frac{\pi}{2}$ with y-axis and acute angle θ with z-axis.

9. Find the angle between the lines $\vec{r} = 2i - 5j + k + \lambda(3i + 2j + 6k)$ and $\vec{r} = 7i - 6k + \mu(i + 2j + 2k)$.

10. Show that the lines $\frac{x+1}{3} = \frac{y+3}{5} = \frac{z+5}{7}$ and $\frac{x-2}{1} = \frac{y-4}{3} = \frac{z-6}{5}$ intersect. Also find their point of intersection.

11. A line passes through (2, -1, 3) and is perpendicular to the lines $\vec{r} = (i + j - k) + \lambda(2i - 2j + k)$ and $\vec{r} = (2i - j - 3k) + \mu(i + 2j + 2k)$.

12. Find the value of p, so that the lines $l_1 : \frac{1-x}{3} = \frac{7y+14}{p} = \frac{z-3}{2}$ and $l_2 : \frac{7-7x}{3p} = \frac{y-5}{1} = \frac{6-z}{5}$ and perpendicular to each other. Also find the equations of a line passing through a point (3, 2, -4) and parallel to line l_1.

13. Find the vector and Cartesian equations of the line passing through the point (2, 1, 3) and perpendicular to the lines $\frac{1-x}{-3} = \frac{y-2}{2} = \frac{z-3}{3}$ and $\frac{x}{-3} = \frac{y}{2} = \frac{z}{5}$.

14. Find the shortest distance between the lines whose vector equations are $\vec{r} = (i + j) + \lambda(2i - j + k)$ and $\vec{r} = (2i + j - k) + \mu(3i - 5j + 2k)$.

15. Find the equation of the plane that contains the point (1, -1, 2) and is perpendicular to both the planes 2x+3y-2z = 5 and x+2y-3z = 8. Hence, find the distance of point P(-2, 5, 5) from the plane obtained above.

16. Find the distance of the point P(-1, -5, -10) from the point of intersection of the line joining the points A(2, -1, 2) and B(5, 3, 4) with the plane x – y + z = 5.

17. Find the distance between the point (7, 2, 4) and the plane determined by the points A(2, 5, -3), B(-2, -3, 5) and C(5, 3,-3).

18. Find the distance between the lines: $\frac{x+1}{7}=\frac{y+1}{-6}=\frac{z+1}{1}$;

$\frac{x-3}{1}=\frac{y-5}{-2}=\frac{z-7}{1}$.

19. Find the distance of the point (-1, -5, -10) from the point of intersection of the line $\vec{r}=(2i-j+2k)+\lambda(3i+4j+2k)$ and the plane

$\vec{r}.(i+j+k)=5$.

20. Show that the lines $\frac{5-x}{-4}=\frac{y-7}{4}=\frac{z+3}{-5}$ and $\frac{x-8}{7}=\frac{2y-8}{2}=\frac{z-5}{3}$ are coplanar.

21. Show that the lines $\vec{r}=(i+j-k)+\lambda(3i-j)$ and $\vec{r}=(4i-k)+\mu(2i+3k)$ intersect. Also find their point of intersection.

22. Find the equation of the plane through the line of intersection of the planes x + y+ z = 1 and 2x+3y+4z = 5 which is perpendicular to the plane x – y +z = 0. Also find the distance of the plane obtained above from the origin.

23. Find the distance of the point (2, 12, 5) from the point of intersection of the line $\vec{r}=(2i-4j+2k)+\lambda(3i+4j+2k)$ and the plane $\vec{r}.(i-2j+k)=0$

24. Find the distance between the lines l_1 and l_2 given by

$l_1:\vec{r}=(i+2j-4k)+\lambda(2i+3j+6k)$;

$l_2:\vec{r}=(3i+3j-5k)+\mu(4i+6j+12k)$.

25. If a unit vector $\vec{a}$ makes angles $\frac{\pi}{3}$ with $\vec{i}, \frac{\pi}{4}$ *with* $\vec{j}$ and an acute angle θ with $\vec{k}$, then find the value of θ.

26. Find the length of the perpendicular drawn from the origin to the plane $2x-3y+6z+21=0$.

27. Write the Cartesian equation of a plane, bisecting the line segment joining the points A(2, 3, 5) and B(4, 5, 7) at right angles.

28. Find the coordinates of the point, where the line $\frac{x-2}{3}=\frac{y+1}{4}=\frac{z-2}{2}$ intersects the plane x – y + z =5. Also find the angle between the line and the plane.

29. Find the vector equation of the plane which contains the line of intersection of the planes $\vec{r}.(i+2j+3k)-4=0$ and $\vec{r}.(2i+j-k)+5=0$ and which is perpendicular to the plane $\vec{r}.(5i+3j-6k)+8=0.$

30. Show that the lines $\vec{r}=(3i+2j-4k)+\lambda(i+2j+2k)$;
$\vec{r}=(5i-2j)+\mu(3i+2j+6k)$ are intersecting. Hence find their point of intersection.

31. Find the vector equation of the plane through the points (2, 1, -1) and (-1, 3, 4) and perpendicular to the plane x – 2y + 4z = 10.

32. Find the vector equation of the plane passing through three points with position vectors $i+j-2k; 2i-j+k \; and \; i+2j+k$. Also find the coordinates of the point of intersection of this plane and the line $\vec{r}=(3i-j-k)+\lambda(2i-2j+k)$.

33. Find the vector equation of the plane determined by the points

A(3,-1,2), B(5,2,4) and C(-1,-1,6). Also find the distance of point

P(6, 5, 9) from this plane.

34. Find the coordinates of the point where the line through (3, -4, -5) and (2, -3, 1) crosses the plane, passing through the points(2,2,1) and (3,0,1) and (4,-1,0).

35. Find the equation of the plane passing through the line of intersection of the planes $\vec{r}.(i+3j)-6=0$ and $\vec{r}.(3i-j-4k)=0$, whose perpendicular distance from origin is unity.

36. Find the vector equation of the line passing through the point (1,2,3) and parallel to the planes $\vec{r}.(i-j+2k)=5$ and $\vec{r}.(3i+j+k)=6$

37. Find the image of the point having position vector $i+3j+4k$ in the plane $\vec{r}.(2i-j+k)+3=0$.

38. Find the equation of the plane which is at a distance of $3\sqrt{3}$ units from origin and the normal to which is equally inclined to the coordinate axes.

39. If a line has direction ratios 2, -1, -2, then what are its direction cosines?

40. Find the distance of the plane 3x – 4y +12z = 3 from the origin.

41. Find the vector and Cartesian equation of the line passing through the point (1, 2, -4) and perpendicular to the two lines $\frac{x-8}{3}=\frac{y+19}{-16}=\frac{z-10}{7}$ and $\frac{x-15}{3}=\frac{y-29}{8}=\frac{z-5}{-5}$.

42. Find the equation of a line passing through the point P(2, -1, 3) and perpendicular to the lines $\vec{r}=(i+j-k)+\lambda(2i-2j+k)$ and $\vec{r}=(2i-j-3k)+\mu(i+2j+2k)$.

43. Find the equation of the line passing through the point (-1, 3, -2) and perpendicular to the lines $\frac{x}{1}=\frac{y}{2}=\frac{z}{3}$ and $\frac{x+2}{-3}=\frac{y-1}{2}=\frac{z+1}{5}$.

44. Find the coordinates of the point where the line through the points A(3, 4, 1) and B(5, 1, 6) crosses the XY-plane.

45. Find the coordinates of the point where the line through the points (3, -4, -5) and (2, -3, 1) crosses the plane 2x + y +z = 7.

46. Find the coordinates of the point where the line through the points (3, -4, -5) and (2, -3, 1) crosses the plane 3x + 2y + z +14 = 0.

47. Find the vector and Cartesian equation of the line passes through the point (1, 2, 3) and parallel to the planes $\vec{r}.(i-j+2k)=5$ and $\vec{r}.(3i+j+k)=6$.

48. Find the equation of the plane determined by the points A(3, -1, 2), B(5,2,4) and C(-1, -1, 6) and hence find the distance between the plane and the point P(6,5,9).

49. Find the length and the foot of the perpendicular from the point P(7,14,5) to the plane 2x + 4y – z = 2. Also find the image of point P in the plane.

50. Find the coordinates of the foot of perpendicular and the length of the perpendicular drawn from the point P(5, 4,2) to the line $\vec{r} = (-i + 3j + k) + \lambda(2i + 3j - k)$. Also find the image of P in this line.

51. If a line makes angles $90^0, 60^0$ and θ with x, y and z axes respectively, where θ is acute, then find θ.

52. The equations of a line are $5x - 3 = 15y + 7 = 3 - 10z$. Write the direction cosines of the line.

53. Find the sum of the intercepts cut off by the plane $2x + y - z = 5$, on the coordinate axes.

54. Find the distance between the point (-1, -5, -10) and the point of intersection of the line $\frac{x-2}{3} = \frac{y+1}{4} = \frac{z-2}{12}$ and the plane $x - y + z = 5$.

55. Find the equation of a line passing through the point (1, 2, 4) and perpendicular to two lines

$$\vec{r} = (8\vec{i} - 19\vec{j} + 10\vec{k}) + \lambda(3i - 16j + 7k) \, and \, \vec{r} = (15i + 29j + 5k) + \mu(3i + 8j - 5k)$$