CHAPTER – : THREE DIMENSIONAL GEOMETRY

MARKS WEIGHTAGE – 11 marks

NCERT Important Questions

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MISC. EXERCISE.
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SOLVED EXAMPLES.
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OBJECTIVE TYPE QUESTIONS (1 MARK)

1. The coordinates of the foot of the perpendicular drawn from the point (2, 5, 7) on the x-axis are given by
   (a) (2, 0, 0) (b) (0, 5, 0) (c) (0, 0, 7) (d) (0, 5, 7)

2. P is a point on the line segment joining the points (3, 2, –1) and (6, 2, –2). If x co-ordinate of P is 5, then its y co-ordinate is
   (a) 2 (b) 1 (c) –1 (d) –2

3. If α, β, γ are the angles that a line makes with the positive direction of x, y, z axis, respectively, then the direction cosines of the line are.
   (a) $\sin\alpha, \sin\beta, \sin\gamma$ (b) $\cos\alpha, \cos\beta, \cos\gamma$
   (c) $\tan\alpha, \tan\beta, \tan\gamma$ (d) $\cos^2\alpha, \cos^2\beta, \cos^2\gamma$

4. The distance of a point P (a, b, c) from x-axis is
   (a) $\sqrt{a^2+c^2}$ (b) $\sqrt{a^2+b^2}$ (c) $\sqrt{b^2+c^2}$ (d) b^2+c^2

5. The equations of x-axis in space are
   (a) x = 0, y = 0 (b) x = 0, z = 0 (c) x = 0 (d) y = 0, z = 0

6. A line makes equal angles with co-ordinate axis. Direction cosines of this line are

(a) $\pm(1,1,1)$ (b) $\pm\left(\frac{1}{\sqrt{3}},\frac{1}{\sqrt{3}},\frac{1}{\sqrt{3}}\right)$ (c) $\pm\left(\frac{1}{\sqrt{3}},\frac{-1}{\sqrt{3}},\frac{-1}{\sqrt{3}}\right)$ (d) $\pm\left(\frac{1}{3},\frac{1}{3},\frac{1}{3}\right)$

7. Distance of the point (α, β, γ) from y-axis is

(a) β (b) $|\beta|$ (c) $|\beta|+|\gamma|$ (d) $\sqrt{\alpha^2+\gamma^2}$

8. If the directions cosines of a line are k, k, k, then

(a) k>0 (b) 0<k<1 (c) k=1 (d) k = $\frac{1}{\sqrt{3}}$ or $-\frac{1}{\sqrt{3}}$

9. The distance of the plane $\vec{r}.(\frac{2}{7}\hat{i}+\frac{3}{7}\hat{j}+\frac{6}{7}\hat{k})=1$ from the origin is

(a) 1 (b) 7 (c) $\frac{1}{7}$ (d) None of these

10. The reflection of the point (α, β, γ) in the xy– plane is

(a) (α, β, 0) (b) (0,0, γ) (c) ($-\alpha$,$-\beta$, γ) (d) (α, β,$-\gamma$)

11. The area of the quadrilateral ABCD, where A(0,4,1), B (2, 3, –1), C(4, 5, 0) and D (2, 6, 2), is equal to

(a) 9 sq. units (b) 18 sq. units (c) 27 sq. units (d) 81 sq. units

12. The locus represented by xy + yz = 0 is

(a) A pair of perpendicular lines (b) A pair of parallel lines
(c) A pair of parallel planes (d) A pair of perpendicular planes

13. The equation of a straight line parallel to the x-axis is given by

(a) $\frac{x-a}{1}=\frac{y-b}{1}=\frac{z-c}{1}$ (b) $\frac{x-a}{0}=\frac{y-b}{1}=\frac{z-c}{1}$
(c) $\frac{x-a}{0}=\frac{y-b}{0}=\frac{z-c}{1}$ (d) $\frac{x-a}{1}=\frac{y-b}{0}=\frac{z-c}{0}$

14. The plane 2x – 3y + 6z – 11 = 0 makes an angle $\sin^{-1}(\alpha)$ with x-axis. The value of α is equal to

(a) $\frac{\sqrt{3}}{2}$ (b) $\frac{\sqrt{2}}{3}$ (c) $\frac{2}{7}$ (d) $\frac{3}{7}$

15. Which one of the following is best condition for the plane ax + by + cz + d = 0 to intersect the x- and y-axis at equal angle?

(a) |a| = |b| (b) a = -b (c) a = b (d) $a^2 + b^2 = 1$

16. If P(2, 3, -6) and Q(3, -4, 5) are two points, the direction cosines of the line PQ are

(a) $-\frac{1}{\sqrt{171}},-\frac{7}{\sqrt{171}},-\frac{11}{\sqrt{171}}$ (b) $\frac{1}{\sqrt{171}},-\frac{7}{\sqrt{171}},\frac{11}{\sqrt{171}}$
(c) $\frac{1}{\sqrt{171}},\frac{7}{\sqrt{171}},-\frac{11}{\sqrt{171}}$ (d) $-\frac{7}{\sqrt{171}},-\frac{1}{\sqrt{171}},\frac{11}{\sqrt{171}}$

17. The ratio in which yz-plane divides the line joining the points A(3, 1, -5) and B(1, 4, -6) is

(a) -3 : 1 (b) 3 : 1 (c) -1 : 3 (d) 1 : 3

18. A straight line is inclined to the axes of x and z at angles 45° and 60°, respectively, then the inclination of the line to the y-axis is
(a) 30° (b) 45° (c) 60° (d) 90°

19. The points (4, 7, 8), (2, 3, 4), (-1, -2, 1) and (1, 2, 5) are
(a) The vertices of a parallelogram (b) Collinear
(c) The vertices of a trapezium (d) Concyclic

20. The equation of the plane parallel to the plane 4x - 3y + 2z + 1 = 0 and passing through the point (5, 1, - 6) is
(a) $4x - 3y + 2z - 5 = 0$ (b) $3x - 4y + 2z - 5 = 0$
(c) $4x - 3y + 2z + 5 = 0$ (d) $3x - 4y + 2z + 5 = 0$

21. A plane is passed through the middle point of the segment A(-2, 5, 1) and B(6, 1, 5) and is perpendicular to this line. Its equation is
(a) $2x - y + z = 4$ (b) $2x + y + z = 4$
(c) $x - 3y + z = 5$ (d) $x - 4y + 2z = 5$

22. The sum of the direction cosines of a straight line is
(a) Zero (b) One (c) Constant (d) None of these

23. The equation of the plane that contains the line of intersection of the planes x + y + z - 6 = 0 and 2x + 3y + z + 5 = 0 and perpendicular to the xy-plane is
(a) x - 2y + 11 = 0 (b) x + 2y + 11 = 0
(c) x + 2y - 11 = 0 (d) x - 2y - 11 = 0

24. The planes: 2x – y + 4z = 5 and 5x – 2.5y + 10z = 6 are
(a) Perpendicular (b) Parallel (c) intersect y-axis (d) passes through $\left(0, 0, \frac{5}{4}\right)$

25. The image of the point (1, 3, 4) in the plane 2x - y + z + 3 = 0 is
(a) (-3, 5, 2) (b) (3, 2, 5) (c) (-5, 3, -2) (d) (-2, 5, 3)

26. Distance between the planes 2x + 3y + 4z = 4 and 4x + 6y + 8z =12 is
(a) 4 units (b) 8 units (c) $\frac{2}{\sqrt{29}}$ units (d) 2 units

27. If direction ratios of a line are proportional to 1, 2, –3; then its direction cosines are
(a) $\frac{1}{\sqrt{14}}, \frac{2}{\sqrt{14}}, -\frac{3}{\sqrt{14}}$ (b) $-\frac{1}{\sqrt{14}}, \frac{2}{\sqrt{14}}, -\frac{3}{\sqrt{14}}$
(c) $-\frac{1}{\sqrt{14}}, -\frac{2}{\sqrt{14}}, \frac{3}{\sqrt{14}}$ (d) $\frac{1}{\sqrt{14}}, -\frac{2}{\sqrt{14}}, -\frac{3}{\sqrt{14}}$

28. If a line makes and angle $\frac{\pi}{3}$ and $\frac{\pi}{4}$ with x-axis and z-axis respectively, then the angle made by the line with y-axis is
(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{4}$ (d) $\frac{5\pi}{12}$

29. The lines $\frac{x-2}{1} = \frac{y+4}{2} = \frac{z-3}{3}$ and $\frac{x}{2} = \frac{y-1}{4} = \frac{z+3}{6}$ are
(a) skew (b) Parallel (c) intersecting (d) coincident

30. The straight line $\frac{x-3}{3}=\frac{y-2}{1}=\frac{z-1}{0}$ is

(a) parallel to x-axis (b) parallel to y-axis
(c) parallel to z-axis (c) perpendicular to z-axis

31. The equation of the plane which cuts equal intercepts of unit length on the coordinate axes is

(a) x + y – z = 1 (b) x + y + z = 0 (c) x + y + z = 2 (d) x + y + z = 1

32. The intercepts made by the plane 2x – 3y + 4z = 12 on the coordinate axes are

(a) 6, –4, 3 (b) 2, –3, 4 (c) $\frac{1}{6},-\frac{1}{4},\frac{1}{3}$ (d) 1, 1, 1

33. If a line has direction ratios 2, –1, –2 then its direction cosines are

(a) $\frac{2}{3},\frac{1}{3},\frac{2}{3}$ (b) $\frac{2}{3},\frac{1}{3},-\frac{2}{3}$ (c) $\frac{2}{3},-\frac{1}{3},-\frac{2}{3}$ (d) $-\frac{2}{3},-\frac{1}{3},-\frac{2}{3}$

34. If a line makes angles α, β, γ with the positive direction of co-ordinate axes, then the value of $\sin^2\alpha + \sin^2\beta + \sin^2\gamma$ is

(a) 2 (b) 1 (c) –1 (d) –2

35. If a line makes angles 90^0, 60^0 and θ with x, y and z-axis respectively, where θ is acute angle, the value of θ is

(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{4}$ (d) $\frac{\pi}{6}$

36. If a line makes angles $\frac{\pi}{2},\frac{3\pi}{4}$ *and* $\frac{\pi}{4}$ with x, y, z axis, respectively, then its direction cosines are _____

37. If a line makes angles α, β, γ with the positive directions of the coordinate axes, then the value of $\sin^2\alpha + \sin^2\beta + \sin^2\gamma$ is _____

38. The vector equation of the line passing through the points (3,5,4) and _____ is $\vec{r}=3\hat{i}+5\hat{j}+4\hat{k}+\lambda(2\hat{i}+3\hat{j}+7\hat{k})$

39. A plane passes through the points (2,0,0) (0,3,0) and (0,0,4). The equation of plane is _____.

40. The direction cosines of the vector $(2\hat{i}+2\hat{j}-\hat{k})$ are _____.

41. The vector equation of the line $\frac{x-5}{3}=\frac{y+4}{7}=\frac{z-6}{2}$ is _____.

42. The vector equation of the line through the points (3,4,–7) and (1,–1,6) is _____.

43. The cartesian equation of the plane $\vec{r}.(\hat{i}+\hat{j}-\hat{k})=2$ is _____.