CHAPTER-11

THREE DIMENSIONAL GEOMETRY

01 MARK TYPE QUESTIONS

Q. NO	**QUESTION**	**MARK**
1.	If a line makes angles 90°,60° And 130° with the positive direction of x,y and z axis respectively, then its direction cosines. (a)0, $\frac{1}{2}, \frac{\sqrt{3}}{2}$ (b) 1, $\frac{1}{2}, \frac{\sqrt{3}}{2}$ (c) 1, $\frac{\sqrt{3}}{2}, \frac{1}{2}$, (d) 1, $\frac{\sqrt{3}}{2}, -\frac{1}{2}$,	1 MARK
2.	Two lines with direction ratios a_1 ,b_1 ,c_1 and a_2 ,b_2 , c_2 are parallel if (a) $\frac{a1}{a2} = \frac{b1}{b2} = \frac{c1}{c2}$ (b) $\frac{a1}{a2} = \frac{b1}{b2} \neq \frac{c1}{c2}$ (c) $\frac{a1}{a2} \neq \frac{b1}{b2} = \frac{c1}{c2}$ (d) $\frac{a1}{a2} \neq \frac{b1}{b2} \neq = \frac{c1}{c2}$	1 MARK
3.	The distance 0f a point(2 ,5,7) from the X axis is (a) 2 (b) $\sqrt{74}$ (c) $\sqrt{29}$ (d) $\sqrt{53}$	1 MARK
4.	If the direction cosines of a given line are $\frac{1}{k}, \frac{1}{k}, \frac{1}{k}$ then the value of k is (a) $\frac{1}{\sqrt{2}}$ (b) $\pm\frac{1}{\sqrt{3}}$ (c) 1 (d) $\pm\sqrt{3}$	1 MARK
5.	What are the direction cosines of a line, which makes equal angles with the coordinate axes. (a) $\pm\frac{1}{\sqrt{3}}, \pm\frac{1}{\sqrt{3}}, \pm\frac{1}{\sqrt{3}}$ (b) $\pm\frac{1}{\sqrt{2}}, \pm\frac{1}{\sqrt{2}}, \pm\frac{1}{\sqrt{2}}$ (c) $\pm\frac{1}{\sqrt{5}}, \pm\frac{1}{\sqrt{5}}, \pm\frac{1}{\sqrt{5}}$ (d) $\pm\sqrt{3}, \pm\sqrt{3}, \pm\sqrt{3}$	1 MARK
6.	The equation of y axis in space are x=0 , y =0 (b) $x = 0, z = 0$ (c) y=0 , z =0 (d) y =0	1 MARK
7.	Find the direction cosines of the line $\frac{4-x}{2} = \frac{y}{6} = \frac{1-z}{3}$ (a) $\frac{-2}{7}, \frac{6}{7}, \frac{-3}{7}$ (b) $\frac{2}{7}, \frac{6}{7}, \frac{-3}{7}$ (c) $\frac{-2}{7}, \frac{6}{7}, \frac{3}{7}$ (d) $\frac{-2}{7}, \frac{-6}{7}, \frac{-3}{7}$	1 MARK
8.	Angle between the lines with direction ratios 2,1,2 and 3,2,-6 is a) $\cos^{-1}(-4)$ (b) $\cos^{-1}\frac{-4}{21}$ (c) $\frac{-4}{21}$ (d) none of these	1 MARK
9.	Find the vector equation of a line $\frac{x-1}{1} = \frac{4-y}{2} = \frac{z+1}{3}$ (a) $\vec{r} = \frac{i-4j-k}{\sqrt{14}}$ (b) $\frac{i-4j-k}{\sqrt{6}}$ (c) $\frac{i+4j+k}{\sqrt{14}}$ (d) none of these	1 MARK
10.	Find the vector equation of the line passing through the points A(3,4,-7) and B(1,-1,6). (a) $\vec{r} = 3i + 4j - 7k + \mu(-2i - 5j + 13k)$	1 MARK

	(b) $\vec{r} = 3i + 4j - 7k + \mu(i - j + 6k)$ (c) $\vec{r} = i - 4j - k + \mu(i - 4j - k)$ (d) none of these	
11.	If a bullet shot from the gun travels a straight line path which makes angles 90°, 60° and 30° with the positive direction of x-axis, y-axis and z-axis respectively, find its direction cosines. (a) $1, \frac{\sqrt{3}}{2}, \frac{1}{2}$ (b) $\frac{\sqrt{3}}{2}, \frac{1}{\sqrt{2}}, \frac{1}{2}$ (c) $0, \frac{1}{2}, \frac{\sqrt{3}}{2}$ (d) none of these	1
12.	An electricity straight wire has direction ratios 2,–3, 4, determine its direction cosines. (a) 2, -3, 4 (b) 4, -6, 8 (c) $\frac{2}{\sqrt{29}}, \frac{-3}{\sqrt{29}}, \frac{4}{\sqrt{29}}$ (d) $\frac{4}{\sqrt{29}}, \frac{-6}{\sqrt{29}}, \frac{8}{\sqrt{29}}$	1
13.	Three stars in sky are positioned at A (2, -4, 6), B (4, 6, -8) and C (6, 16, -22) with respect to a common reference point O (0, 0, 0). A student is confused whether those three stars are in same line or not. He asks his teacher to help him to solve this problem. Help him to answer this question. (a) Three stars are collinear (b) Three stars are not in a same line (c) Only A and B are collinear, not C (d) None of these	1
14.	Find the direction ratios of a ray of light passing through the points (1, 2, 3) and (-1, -3, 5). (a) -2, 5, 2 (b) -2, -5, 2 (c) -2, -5, 8 (d) 2, -5, 8	1
15.	What are direction ratios of the line $\vec{r} = (3\hat{i} + 4\hat{j} - 5\hat{k}) + m(0\hat{i} + 7\hat{j} + 3\hat{k})$? (a) 3, 4, -5 (b) -3, -4, 5 (c) 3, 11, -2 (d) 0, 7, 3	1
16.	What are the direction cosines of the line having direction ratios 0, -3, 4? (a) 0, -3, 4 (b) 0, -8, 10 (c) 0, 3/5, 4/5 (d) 0, -3/5, 4/5	1
17.	Find the Cartesian equation of a line parallel to y-axis and passing through the point (1, -2, 7) (a) $\frac{x-1}{1} = \frac{y+2}{-2} = \frac{z-7}{7}$ (b) $\frac{x-1}{1} = \frac{y+2}{0} = \frac{z-7}{1}$ (c) $\frac{x+1}{1} = \frac{y-2}{-2} = \frac{z+7}{7}$ (d) $\frac{x-1}{0} = \frac{y+2}{1} = \frac{z-7}{0}$	1
18.	Write down the vector form of the following equation of line $\frac{x-6}{2} = \frac{y-4}{1} = \frac{z-1}{-3}$ (a) $\vec{r} = (6\hat{i} + 4\hat{j} + 1\hat{k}) + \alpha(2\hat{i} + \hat{j} - 3\hat{k})$ (b) $\vec{r} = (2\hat{i} + \hat{j} - 3\hat{k}) + \alpha(6\hat{i} + 4\hat{j} + 1\hat{k})$ (c) $\vec{r} = (-2\hat{i} - \hat{j} + 3\hat{k}) + \alpha(6\hat{i} + 4\hat{j} + 1\hat{k})$ (d) $\vec{r} = (-6\hat{i} - 4\hat{j} - 1\hat{k}) + \alpha(2\hat{i} + \hat{j} - 3\hat{k})$	1
19.	Two lines with direction ratios a, b, c and p, q, r respectively are said to be …… if ap + bq	1

	+ cr = 0. (a) Parallel (b) Perpendicular (c) coincident (d) Skew	
20.	For what value of p, given two lines are parallel? $\frac{x-1}{1} = \frac{y+2}{-2} = \frac{z-7}{7}$ and $\frac{x-8}{2} = \frac{y-2}{p} = \frac{z+2}{14}$ (a) p = -2 (b) p = 4 (c) p = -4 (d) can't be determined	1
21.	P is a point on the line joining the points A (1,5,-2) and B (3,-1,2). If the X co-ordinates of P is 5 , then its Y co-ordinate is -5 (b) -6 (c) -7 (d) -8	1
22.	The sum of the direction cosines of X-axis is (a) 0 (b) 1 (c) 2 (d) 3	1
23.	The cartesian equation of a line is given by $\frac{3x-1}{\sqrt{3}} = \frac{y+2}{2} = \frac{z-3}{3}$, the direction cosines of the line is (a) $\frac{\sqrt{3}}{2\sqrt{30}}, \frac{3}{\sqrt{30}}, \frac{9}{2\sqrt{30}}$ (b) $\frac{\sqrt{3}}{2\sqrt{30}}, \frac{\sqrt{5}}{2\sqrt{30}}, \frac{\sqrt{3}}{\sqrt{30}}$ (c) $\frac{\sqrt{3}}{2\sqrt{30}}, \frac{3}{2\sqrt{30}}, \frac{9}{2\sqrt{30}}$ (d) $\frac{\sqrt{3}}{2\sqrt{30}}, \frac{\sqrt{3}}{2\sqrt{30}}, \frac{\sqrt{5}}{2\sqrt{30}}$	1
24.	The point where the line joining the points (2,5,4) and (1,3,6) meets YZ- plane (a)(0,2,7) (b) (0,3,8) (c) (1,2,8) (d)(0,1,8)	1
25.	Assertion (A) : Let P be a point on the line joining the pints A(1,5,-4) and B(4,-2,1) . If X-co-ordinate of P is 3, then its Y co-ordinate is $\frac{1}{3}$. Reason (R) : The equation of line passing through two points A (x_1,y_1,z_1) and B (x_2,y_2,z_2) is given by $(x-x_1)/(x_2-x_1) = (y-y_1)/(y_2-y_1) = (z-z_1)/(z_2-z_1)$. (a)Both A and R are true and R is the correct explanation of A . (b) Both A and R are true but R is not the correct explanation of A (c) A is true but R is false (d)A is false but R is true.	1
26.	If a line makes an angle α , β, γ with X-axis, Y – axis and Z – axis respectively, then cos 2α + cos $2\beta + cos\ 2\gamma$ is (a) 1 (b) -1 (c) 0 (d) 2	1
27.	The co-ordinates of the point where the line $\frac{x+4}{4} = \frac{y-3}{-3} = \frac{z-5}{-5}$ cuts the XZ plane is (a) (0,0,0) (b) (1,1,1) (c)(2,2,2) (d) (3,3,3)	1

28.	 A car race was organized in a town , where the maximum speed limit was set by organizers . No participants are allowed to cross the specified limit , but two cars A and B are running at the speed more than allowed speed on the road along the lines $\vec{r} = \lambda(\hat{\imath} + 2\hat{\jmath} - \hat{k})$ and $\vec{r} = 3\hat{\imath} + 3\hat{\jmath} + \mu(2\hat{\imath} + \hat{\jmath} + \hat{k})$ respectively. The cartesian equation of the line along which motorcycle A is running (a) $\frac{x}{1} = \frac{y}{2} = \frac{z}{-1}$ (b) $\frac{2x}{1} = \frac{y}{3} = \frac{z}{-1}$ (c) $\frac{x}{1} = \frac{y}{2} = \frac{3z}{-1}$ (d) $\frac{x}{1} = \frac{y}{3} = \frac{z}{-1}$	1
29.	 The equation of motion of a missile are x = 3t , y = -4t , z = 2t, where the time t is given in the seconds and the distance is measured in kilometers. Which of the following points lie on the path of the missile at t = 3 s. (a)(6,8,12) (b) (9,-12,6) (c)(5,10, 15) (d) (5,10, -15)	1
30.	If the direction cosines of a line are k,k,k then (a) k>0 (b) 0<k<1 (c) k = 1 (d) k= $\pm\frac{1}{\sqrt{3}}$	1
31.	What is the value of $l^2 + m^2 + n^2$?	1
32.	If equation of a straight line in space is : $\frac{x-3}{2} = \frac{y+1}{3} = \frac{z}{2\sqrt{3}}$ What are its direction cosines.	1
33.	If equations of two straight lines in space are : $\frac{x-3}{2} = \frac{y+1}{3} = \frac{z}{2\sqrt{3}}$ and $\frac{x+1}{1} = \frac{y-2}{2} = \frac{z+2}{2}$, find the angle between these two lines.	1
34.	Show that the line through the points $(4, 7, 8)$, $(2, 3, 4)$ is parallel to the line through the points $(-1, -2, 1), (1, 2, 5)$.	1
35.	The Cartesian equation of a line is $\frac{x+5}{4} = \frac{y-1}{3} = \frac{z-2}{1}$, write it in vector form.	1

36.	Find the value of p so that the lines $\frac{x-1}{-3}=\frac{7y-14}{2p}=\frac{z-3}{2}$ and $\frac{x+1}{2}=\frac{y-3}{7}=\frac{z+5}{5}$ are perpendicular.	1
37.	If a line makes angles $90°, 135°, 45°$ with the x, y and $z-$axes respectively, find its direction cosines.	1
38.	Find the direction cosines of a line which makes equal angles with the co – ordinates axes.	1
39.	Find the direction – cosines of x, y, and z – axis .	1
40.	Find the Vector and Cartesian equation of the line through the point $(5, 2, -4)$ and which is parallel to the vector $3\hat{\imath}+2\hat{\jmath}-8\hat{k}$.	1
41.	$The\ equation\ of\ y-axis\ in\ space\ are$ $(a)x=0, y=0 \quad (b)x=0, z=0$ $(b)y=0, z=0 \quad (d)y=0$	1
42.	$A\ line\ makes\ an\ angle \frac{\pi}{4}, \frac{3\pi}{4}\ with\ xandy - axis\ respectively. Then\ the\ angles\ which\ makes\ with\ z - axis\ can\ be$	1
43.	If the direction cosines of a line are $\frac{k}{3}, \frac{k}{3}, \frac{k}{3}$ then the value of k is?	1
44.	Write the direction cosines of a line parallel to the z-axis.	1
45.	If a line has direction ratios 2, -1, -2, then what are its direction cosines?	1
46.	Using direction ratios, show that the points (2,3,4), (-1, -2,1) and (5,8,7) are collinear	1
47.	Find the direction cosines of the line $\frac{4-x}{2}$, $=\frac{y}{6}=\frac{1-z}{3}$	1
48.	Direction ratios of a line passing through the points (2,1,0) and (3,2, -1) are: (a.) (1,1, -1) (b.) 1,1,-1 (c.) <5,3,-1> (d.) None of these	1
49.	The distance of point (2,5,7) from the x-axis is a.) 2 b.)$\sqrt{74}$ c.) $\sqrt{29}$ d.) $\sqrt{53}$	1
50.	The direction cosines of the y-axis are: a. (9, 0, 0) b. (1, 0, 0) c. (0, 1, 0) d. (0, 0, 1)	1

ANSWERS:

Q. NO	ANSWER	MARKS
1.	a) 0, $\frac{1}{2}, \frac{\sqrt{3}}{2}$	1
2.	a) $\frac{a1}{a2} = \frac{b1}{b2} = \frac{c1}{c2}$	1
3.	(b) $\sqrt{74}$	1
4.	(d) $\pm\sqrt{3}$	1
5.	(a) $\pm \frac{1}{\sqrt{3}}$, $\pm \frac{1}{\sqrt{3}}$, $\pm \frac{1}{\sqrt{3}}$	1
6.	(b) $x = 0$, $z = 0$	1
7.	(a) $\frac{-2}{7}, \frac{6}{7}, \frac{-3}{7}$	1
8.	(b) $\cos^{-1}\frac{-4}{21}$	1
9.	a) $\vec{r} = \frac{i - 4j - k}{\sqrt{14}}$	1
10.	(a) $\vec{r} = 3i + 4j - 7k + \mu(-2i - 5j + 13k)$	1
11.	(c)	1
12.	(c)	1
13.	(a)	1
14.	(b)	1
15.	(d)	1
16.	(d)	1
17.	(d)	1
18.	(a)	1
19.	(b)	1
20.	(c)	1
21.	c	1
22.	b	1
23.	a	1
24.	d	1
25.	a	1
26.	b	1
27.	a	1
28.	a	1
29.	b	1
30.	d	1
31.	1	1
32.	$l = \frac{2}{5}, m = \frac{3}{5}, n = \frac{2\sqrt{3}}{5}$	1
33.	$\cos^{-1}\frac{8 + 4\sqrt{3}}{15}$	1
34.	Direction ratios of both the lines are : $(2, 4, 4)$. Hence, $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$.	1
35.	$\vec{r} = (-5\hat{\imath} + \hat{\jmath} + 2\hat{k}) + \alpha(4\hat{\imath} + 3\hat{\jmath} + \hat{k})$	1
36.	Direction ratios of the lines are : $\left(-3, \frac{2p}{7}, 2\right)$ & $(2, 7, 5)$ and $-3 \times 2 + \frac{2p}{7} \times 7 + 2 \times 5 = 0$ So that, $p = -2$	1

37.	$(0, \frac{-1}{\sqrt{2}}, \frac{1}{\sqrt{2}})$	1
38.	Here, $l = m = n$ so that, $l^2 + m^2 + n^2 = 1 \Rightarrow l = m = n = \frac{1}{\sqrt{3}}$	1
39.	The direction – cosines of x, y, and z – axis are : $(1, 0, 0), (0, 1, 0)$ and $(0, 0, 1)$ respectively.	1
40.	Vector equation is : $\vec{r} = 5\hat{\imath} + 2\hat{\jmath} - 4\hat{k} + \lambda(3\hat{\imath} + 2\hat{\jmath} - 8\hat{k})$. Cartesian equation is : $\frac{x-5}{3} = \frac{y-2}{2} = \frac{z+4}{-8}$	1
41.	$(b) y = 0, z = 0$	1
42.	As	1
43.	As $3 \times \frac{k^2}{9} = 1\ k = \pm\sqrt{3}$	1
44.	$\Rightarrow \alpha + \beta\ + sin^2\gamma$	1
45.	$\Rightarrow 2\alpha + \beta\ + cos\ \ 2\gamma + 1 = 0$	1
46.	Dc's are 0,0,1	1
47.	We got dc's $\frac{2}{7}, \frac{6}{7}, \frac{3}{7}$	1
48.	(a.) (1,1, -1	1
49.	(b.)$\sqrt{74}$	1
50.	c. (0, 1, 0)	1