## CHAPTER-11

## THREE DIMENSIONAL GEOMETRY 02 MARKS TYPE QUESTIONS

Q. NO	QUESTION	MARK			
1.	Find the distance between the two planes: 2x+3y+4z=4 and 4x+6y+8z=12				
2.	Show that the planes: 2x-y+4z=5 and 5x-2.5y+10z=6 are parallel.				
3.	Find the angle between the planes whose vector equations are $\vec{r}$ .(2 i + 2j - 3k)=5 and $\vec{r}$ .(3 i - 3j + 5k)=3	2			
4.	If the lines $\frac{x-1}{-3} = \frac{y-2}{2k} = \frac{z-3}{2}$ and $\frac{x-1}{3k} = \frac{y-1}{1} = \frac{z-6}{-5}$ are perpendicular, find the value of k.	2			
5.	Find the foot of perpendicular drawn from the point (4,2,3) to the line joining (1,-2,3) and (1,1,0).	2			
6.	Check whether the given two lines are coincident, skew, parallel or perpendicular? $\vec{r} = (6\hat{\imath} + 4\hat{\jmath} + 1\hat{k}) + \beta (2\hat{\imath} + \hat{\jmath} - 3\hat{k})$ $\vec{r} = (-2\hat{\imath} - \hat{\jmath} + 3\hat{k}) + \alpha (6\hat{\imath} + 3\hat{\jmath} - 9\hat{k})$	2			
7.	Find the direction cosines of the sides of the triangle with vertices A (1, 3, 5), B (2, 5, 7) and C (-1, -4, 3)	2			
8.	Show that the line passing through two points (2, 3, 5) and (5, 6, 8) is parallel to the line through the points (1, 6, -5) and (4, 9, -2).	2			
9.	Find the angle between the pair of lines: $\vec{r} = (8\hat{\imath} + 4\hat{\jmath} + 9\hat{k}) + \beta (2\hat{\imath} + \hat{\jmath} - 3\hat{k})$ $\vec{r} = (7\hat{\imath} - 3\hat{\jmath} + 1\hat{k}) + \alpha (6\hat{\imath} + 3\hat{\jmath} - 9\hat{k})$	2			
10.	Find the value of 'm' so that the given lines are perpendicular. $\frac{-x+1}{1} = \frac{y+2}{2} = \frac{z-7}{4}  \text{and}  \frac{x-8}{2} = \frac{y-2}{m} = \frac{z+2}{6}$	2			
11.	Find the acute angle which the line with direction cosines $1/\sqrt{2}$ , ½, n makes with positive direction of Z-axis.	2			
12.	Find the direction cosine of a line equally inclined to the three co-ordinate axes.	2			
13.	The cartesian equation of motion of a rocket is $\frac{x-2}{5} = \frac{y+4}{7} = \frac{6-z}{2}$	2			

	Write the vector equation of the line.	
14.	An insect is crawling along the line passing through two points (-2,-3,4) and ( 2,-1,3). Find the direction cosine of the line of an insect.	2
	If the x-co-ordinate of a point P on the join of Q (2,2,1) and R (5,1,-2) is 3 then find its y –	2
15.	co-ordinate.	
15. 16.	co-ordinate.  Show that the lines given by $\frac{x-5}{2} = \frac{2y+5}{4} = \frac{3z+8}{5}$ and $\frac{3-x}{1} = \frac{y-2}{3} = \frac{8-5z}{6}$	2
	Show that the lines given by $\frac{x-5}{2} = \frac{2y+5}{4} = \frac{3z+8}{5}$ and $\frac{3-x}{1} = \frac{y-2}{2} = \frac{8-5z}{6}$ Find the angle between the lines whose direction ratios are $(a, b, c)$	2
16.	Show that the lines given by $\frac{x-5}{2} = \frac{2y+5}{4} = \frac{3z+8}{5}$ and $\frac{3-x}{1} = \frac{y-2}{2} = \frac{8-5z}{6}$ Find the angle between the lines whose direction ratios are $(a, b, c)$ and $(b-c, c-a, a-b)$ .  Find the equation of a line parallel to $x-axis$ and passing through the point P $(1,2,3)$ .	
16. 17.	Show that the lines given by $\frac{x-5}{2} = \frac{2y+5}{4} = \frac{3z+8}{5}$ and $\frac{3-x}{1} = \frac{y-2}{2} = \frac{8-5z}{6}$ Find the angle between the lines whose direction ratios are $(a, b, c)$ and $(b-c, c-a, a-b)$ .	2 2 2
16. 17. 18. 19. 20.	Show that the lines given by $\frac{x-5}{2} = \frac{2y+5}{4} = \frac{3z+8}{5}$ and $\frac{3-x}{1} = \frac{y-2}{2} = \frac{8-5z}{6}$ Find the angle between the lines whose direction ratios are $(a, b, c)$ and $(b-c, c-a, a-b)$ .  Find the equation of a line parallel to $x-axis$ and passing through the point P $(1, 2, 3)$ .  Find equation of a line passing through points P $(3, 4, -1)$ and Q $(-2, 0, 4)$ .  Find the angle between the lines joining the points A $(1, -2, 3)$ , B $(2, -1, 1)$ and C $(0, -2, 2)$ , D $(0, 3, 4)$	2 2 2 2
16. 17. 18. 19.	Show that the lines given by $\frac{x-5}{2} = \frac{2y+5}{4} = \frac{3z+8}{5}$ and $\frac{3-x}{1} = \frac{y-2}{2} = \frac{8-5z}{6}$ Find the angle between the lines whose direction ratios are $(a, b, c)$ and $(b-c, c-a, a-b)$ .  Find the equation of a line parallel to $x-axis$ and passing through the point P $(1, 2, 3)$ .  Find equation of a line passing through points P $(3, 4, -1)$ and Q $(-2, 0, 4)$ .  Find the angle between the lines joining the points A $(1, -2, 3)$ , B $(2, -1, 1)$ and C $(0, -2, 2)$ , D $(0, 3, 4)$	2 2 2
16. 17. 18. 19. 20.	Show that the lines given by $\frac{x-5}{2} = \frac{2y+5}{4} = \frac{3z+8}{5}$ and $\frac{3-x}{1} = \frac{y-2}{2} = \frac{8-5z}{6}$ Find the angle between the lines whose direction ratios are $(a, b, c)$ and $(b-c, c-a, a-b)$ .  Find the equation of a line parallel to $x-axis$ and passing through the point P $(1, 2, 3)$ .  Find equation of a line passing through points P $(3, 4, -1)$ and Q $(-2, 0, 4)$ .  Find the angle between the lines joining the points A $(1, -2, 3)$ , B $(2, -1, 1)$ and C	2 2 2 2
16. 17. 18. 19. 20.	Show that the lines given by $\frac{x-5}{2} = \frac{2y+5}{4} = \frac{3z+8}{5}$ and $\frac{3-x}{1} = \frac{y-2}{2} = \frac{8-5z}{6}$ Find the angle between the lines whose direction ratios are $(a,b,c)$ and $(b-c,c-a,a-b)$ .  Find the equation of a line parallel to $x-axis$ and passing through the point P $(1,2,3)$ .  Find equation of a line passing through points P $(3,4,-1)$ and Q $(-2,0,4)$ .  Find the angle between the lines joining the points A $(1,-2,3)$ , B $(2,-1,1)$ and C $(0,-2,2)$ , D $(0,3,4)$ Find the vector equation of the line $\frac{x-5}{3} = \frac{y-5}{3} = \frac{z+1}{5}$ cuts YZ-plane.  A line makes angles $60^{\circ}$ and $45^{\circ}$ with the x and y axes respectively, find the angle which it	2 2 2 2 2
16. 17. 18. 19. 20. 21.	Show that the lines given by $\frac{x-5}{2} = \frac{2y+5}{4} = \frac{3z+8}{5}$ and $\frac{3-x}{1} = \frac{y-2}{2} = \frac{8-5z}{6}$ Find the angle between the lines whose direction ratios are $(a,b,c)$ and $(b-c,c-a,a-b)$ .  Find the equation of a line parallel to $x-axis$ and passing through the point P $(1,2,3)$ .  Find equation of a line passing through points P $(3,4,-1)$ and Q $(-2,0,4)$ .  Find the angle between the lines joining the points A $(1,-2,3)$ , B $(2,-1,1)$ and C $(0,-2,2)$ , D $(0,3,4)$ Find the vector equation of the line $\frac{x-5}{3} = \frac{y-5}{3} = \frac{z+1}{5}$ cuts YZ-plane.  A line makes angles $60^{\circ}$ and $45^{\circ}$ with the x and y axes respectively, find the angle which it makes with the z-axis  Find the direction cosines of the line passing through the following points: $(-2,4,-5)$ ,	2 2 2 2 2 2

## **ANSWERS:**

1. $\frac{2}{\sqrt{29}}$ units  2. $\frac{A_1}{A2} = \frac{B_1}{B2} = \frac{C_1}{C_2}$ for parallel condition  3. $\cos^{-1}\frac{15}{\sqrt{731}}$ 4. $k = \frac{-10}{7}$ 5. $(1,0,1)$ 6. These are parallel lines because their direction ratios are proportional.  2 Direction cosines of AB are: $\frac{1}{3}, \frac{2}{3}, \frac{3}{3}$ Direction cosines of BC are: $\frac{-1}{70}, \frac{-9}{70}, \frac{-4}{7010}$ Direction cosines of PC are: $\frac{2}{70}, \frac{7}{3}, \frac{9}{70}$ 8. Direction ratios of $1^{18}$ line: $3, 3, 3$ Direction ratios of $2^{18}$ line: $3, 3, 3$ Since direction ratios of both lines are same/ proportional, hence the lines are parallel.  9. These are parallel lines is because their direction ratios are proportional. So, angle between the given lines is $0^{9}$ 10. $m = -11$ , using condition of perpendicularity i.e. sum of product of direction ratios of two perpendicular lines is zero.  11. $ ^{12} + m^{2} + n^{2} = 1$ $(1/2)^{3} + (1/\sqrt{2})^{2} + n^{2} = 1$ $(1/2)^{3} + (1/2)^{3} + (1/2)^{3} = 1$ $(1/2)^{3} + (1/2)^{3} + (1/2)^{3} = 1$ $(1/2)^{3} + (1/2)^{3} + (1/2)^{3} = 1$ $(1/2)^{3} + (1/2)^{3} + (1/2)^{3} = 1$ $(1/2)^{3} + (1/2)^{3} + (1/2)^{3} = 1$ $(1/2)^{3} + (1/2)^{3} + (1/2)^{3} = 1$ $(1/2)^{3} + (1/2)^{3} + (1/2)^{3} = 1$ $(1/2)^{3} + (1/2)^{3} + (1/2)^{3} = 1$ $(1/2)^{3} + (1/2)^{3} + (1/2)^{3} = 1$ $(1/2)^{3} + (1/2)^{3} + ($	Q. NO	ANSWER	MARKS				
2. $\frac{A_1}{A2} = \frac{B_1}{B2} = \frac{C1}{C2} \text{ for parallel condition}$ 3. $\frac{\cos^{-1} \frac{15}{\sqrt{731}}}{\sqrt{731}}$ 4. $k = \frac{-10}{7}$ 5. $(1,0,1)$ 6. These are parallel lines because their direction ratios are proportional. 2. Direction cosines of AB are: $\frac{1}{3}, \frac{2}{3}, \frac{2}{3} = \frac{1}{3}$ Direction cosines of BC are: $\frac{1}{\sqrt{108}}, \frac{1}{\sqrt{106}}, \frac{1}{\sqrt{106}}$ Direction cosines of CA are: $\frac{1}{\sqrt{57}}, \frac{2}{\sqrt{57}}, \frac{2}{\sqrt{57}}$ 8. Direction ratios of $1^{10}$ line: 3, 3, 3 Since direction ratios of of $1^{10}$ lines are same/ proportional, hence the lines are parallel. 9. These are parallel lines because their direction ratios are proportional. So, angle between the given lines is $0^{10}$ 10. $m = 11$ , using condition of perpendicularity i.e. sum of product of direction ratios of two perpendicular lines is zero. 11. $1^{2} + m^{2} + n^{2} = 1$ $1^{2} (1/2)^{2} + (1/\sqrt{2})^{2} + n^{2} = 1$ $1^{2} (1/2)^{2} + (1/\sqrt{2})^{2} + n^{2} = 1$ $1^{2} = 1 \cdot 3/4$ $1^{2} $	1.	$\frac{2}{\sqrt{29}}$ units					
$\frac{\cos^{-1} \sqrt{731}}{\sqrt{731}}$ 4. $k = \frac{-10}{7}$ 5. $(1,0,1)$ 6. These are parallel lines because their direction ratios are proportional. 2 7. Direction cosines of AB are: $\frac{1}{3}, \frac{2}{3}, \frac{2}{3}$ Direction cosines of SC are: $\frac{1}{\sqrt{36}}, \frac{2}{\sqrt{36}}, \frac{2}{\sqrt{36}}$ Direction ratios of $1^{10}$ line: 3, 3, 3 Direction ratios of $1^{10}$ line: 3, 3, 3 Since direction ratios of $2^{10}$ line: 3, 3, 3 Since direction ratios of both lines are same/ proportional, hence the lines are parallel. 9. These are parallel lines because their direction ratios are proportional. So, angle between the given lines is $0^{9}$ 10. $m = -11$ , using condition of perpendicularity i.e. sum of product of direction ratios of two perpendicular lines is zero.  11. $ 1/2 ^2 + (1/\sqrt{2})^2 + n^2 = 1$ $(1/2)^2 + (1/\sqrt{2})^2 + n^2 = 1$ $n^2 = 1 - 3/4$ $n^2 = 14$ 12. Let direction cosine of a line equally inclined to co-ordinate axes are $1/1$ , $1/1$	2.	$\frac{A1}{A} = \frac{B1}{A} = \frac{C1}{A}$ for parallel condition					
4. $k = \frac{-10}{7}$ 5. $\{1,0,1\}$ 6. These are parallel lines because their direction ratios are proportional.  7. Direction cosines of AB are: $\frac{1}{3}, \frac{2}{3}, \frac{2}{3}, \frac{2}{3} = \frac{4}{9}$ Direction cosines of BC are: $\frac{1}{\sqrt{30}}, \frac{2}{\sqrt{106}}, \frac{4}{\sqrt{106}}$ Direction ratios of $1^{81}$ line: 3, 3, 3 Direction ratios of $1^{81}$ line: 3, 3, 3 Direction ratios of $1^{81}$ line: 3, 3, 3 Since direction ratios of both lines are same/proportional, hence the lines are parallel.  9. These are parallel lines because their direction ratios are proportional. So, angle between the given lines is $0^{9}$ 10. $m = -11$ , using condition of perpendicularity i.e. sum of product of direction ratios of two perpendicular lines is zero.  11. $ 1^{2} + m^{2} + n^{2} = 1$ $(1/2)^{2} + (1/\sqrt{2})^{2} + n^{2} = 1$ $(1/2)^{2} + (1/\sqrt{2})^{2} + n^{2} = 1$ $n^{2} = 1 \cdot 3/4$ $n^{2} = \frac{1}{4}$ 12. Let direction cosine of a line equally inclined to co-ordinate axes are $1,1,1$ So, $1^{2} + 1^{2} + 1^{2} = 1$ Or, $1^{2} = 1$ Or, $1^{2} = 1$ Or, $1^{2} = 1$ So, Direction cosines are $1 + \frac{1}{\sqrt{3}}, 1 + \frac{1}{\sqrt{3}}, 1 - \frac{1}{\sqrt{3}}, -\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}$ 13. The cartesian equation of motion of a rocket is $\frac{x^{2}}{5} = \frac{y^{2}}{y^{2} + 1} = \frac{6^{-2}}{-2}$ The standard form of line of equation is $(x - x_{1})/a = (y, y_{1})/b = (z-z_{1})/c$	3.						
<ul> <li>5. (1,0,1)</li> <li>6. These are parallel lines because their direction ratios are proportional.</li> <li>2</li> <li>7. Direction cosines of AB are:  \$\frac{1}{3}, \frac{2}{3}, \frac{2}{3}, \frac{7}{306}\$ \ \text{yi06}\$ \ \frac{7106}{7016}\$ \ \text{Direction cosines of BC are:  \$\frac{7}{337}, \frac{7}{3076}, \frac{7106}{7016}\$ \ \text{Direction cosines of CA are:  \$\frac{2}{357}, \frac{7}{327}, \frac{7}{327}\$ \end{array}\$</li> <li>8. Direction ratios of 1st line: 3, 3, 3 \text{Since direction ratios of both lines are same/ proportional, hence the lines are parallel.</li> <li>9. These are parallel lines because their direction ratios are proportional. So, angle between the given lines is 0°</li> <li>10. m = -11, using condition of perpendicularity i.e. sum of product of direction ratios of two perpendicular lines is zero.</li> <li>11. \$\frac{1}{2} + m^2 + n^2 = 1\$ \ (1/2)^2 + (1/\sqrt{2})^2 + n^2 = 1\$ \ (1/2)^2 + (1/\sqrt{2})^2 + n^2 = 1\$ \ n^2 = 1.3/4\$ \ n^2 = ½\$ \text{ n = ½}\$ \ \text{cos } \gamma = \frac{7}{1}\$ \ \text{ n} \  n</li></ul>		V 7 0 1					
<ul> <li>6. These are parallel lines because their direction ratios are proportional.</li> <li>7. Direction cosines of AB are:  <sup>1</sup>/<sub>3</sub> <sup>2</sup>/<sub>3</sub> <sup>2</sup>/<sub>3</sub> <sup>2</sup>/<sub>3</sub> <sup>2</sup>/<sub>3</sub> <sup>2</sup>/<sub>3</sub> <sup>2</sup>/<sub>3</sub> Direction cosines of BC are:  <sup>3</sup>/<sub>306</sub>, <sup>3</sup>/<sub>306</sub>, <sup>3</sup>/<sub>306</sub></li> <li>8. Direction ratios of 1st line: 3, 3, 3 Direction ratios of 2ml line: 3, 3, 3 Since direction ratios of both lines are same/ proportional, hence the lines are parallel.</li> <li>9. These are parallel lines because their direction ratios are proportional. So, angle between the given lines is 0°</li> <li>10. m = -11, using condition of perpendicularity i.e. sum of product of direction ratios of two perpendicular lines is zero.</li> <li>11.  <sup>1</sup>/<sub>2</sub> + m<sup>2</sup> + n<sup>2</sup> = 1 (1/2)<sup>2</sup> + (1/√2)<sup>2</sup> + n<sup>2</sup> = 1 x + 1/(2 + n<sup>2</sup> = 1 n<sup>2</sup> = 1 · 3/4 n<sup>2</sup> = x</li> <li>12. Let direction cosine of a line equally inclined to co-ordinate axes are   ,   2 so,   <sup>2</sup> +   <sup>2</sup> +   <sup>2</sup> = 1 Or,   <sup>2</sup> = 1/3 Or,   <sup>2</sup> = 1/3</li></ul>	4.	$k = \frac{-10}{7}$					
<ul> <li>7. Direction cosines of AB are: \$\frac{1}{3}, \frac{2}{3}, \frac{2}{3}, \frac{2}{3}, \frac{2}{3} \frac{2}{3}, \f</li></ul>							
<ul> <li>8. Direction ratios of 1<sup>st</sup> line: 3, 3, 3 Direction ratios of 2<sup>nd</sup> line: 3, 3, 3 Since direction ratios of both lines are same/proportional, hence the lines are parallel.</li> <li>9. These are parallel lines because their direction ratios are proportional. So, angle between the given lines is 0<sup>o</sup> 10. m = -11, using condition of perpendicularity i.e. sum of product of direction ratios of two perpendicular lines is zero.</li> <li>11.    <sup>2</sup> + m<sup>2</sup> + n<sup>2</sup> = 1</li></ul>	-	These are parallel lines because their direction ratios are proportional.					
<ul> <li>8. Direction ratios of 1<sup>st</sup> line: 3, 3, 3 Direction ratios of 2<sup>nd</sup> line: 3, 3, 3 Since direction ratios of both lines are same/proportional, hence the lines are parallel.</li> <li>9. These are parallel lines because their direction ratios are proportional. So, angle between the given lines is 0<sup>o</sup> 10. m = -11, using condition of perpendicularity i.e. sum of product of direction ratios of two perpendicular lines is zero.</li> <li>11.    <sup>2</sup> + m<sup>2</sup> + n<sup>2</sup> = 1</li></ul>	7.	Direction cosines of AB are: $\frac{1}{3}$ , $\frac{2}{3}$ , $\frac{2}{3}$					
<ul> <li>8. Direction ratios of 1<sup>st</sup> line: 3, 3, 3 Direction ratios of 2<sup>nd</sup> line: 3, 3, 3 Since direction ratios of both lines are same/proportional, hence the lines are parallel.</li> <li>9. These are parallel lines because their direction ratios are proportional. So, angle between the given lines is 0<sup>o</sup> 10. m = -11, using condition of perpendicularity i.e. sum of product of direction ratios of two perpendicular lines is zero.</li> <li>11.    <sup>2</sup> + m<sup>2</sup> + n<sup>2</sup> = 1</li></ul>		Direction cosines of BC are: $\frac{-3}{\sqrt{106}}$ , $\frac{-9}{\sqrt{106}}$ , $\frac{-4}{\sqrt{106}}$					
<ul> <li>8. Direction ratios of 1<sup>st</sup> line: 3, 3, 3 Direction ratios of 2<sup>nd</sup> line: 3, 3, 3 Since direction ratios of both lines are same/proportional, hence the lines are parallel.</li> <li>9. These are parallel lines because their direction ratios are proportional. So, angle between the given lines is 0<sup>o</sup> 10. m = -11, using condition of perpendicularity i.e. sum of product of direction ratios of two perpendicular lines is zero.</li> <li>11.    <sup>2</sup> + m<sup>2</sup> + n<sup>2</sup> = 1</li></ul>		Direction cosines of CA are: $\frac{2}{\sqrt{57}}, \frac{2}{\sqrt{57}}$					
Since direction ratios of both lines are same/ proportional, hence the lines are parallel.  9. These are parallel lines because their direction ratios are proportional. So, angle between the given lines is $0^{\circ}$ 10. $m = -11$ , using condition of perpendicularity i.e. sum of product of direction ratios of two perpendicular lines is zero.  11. $ ^2 + m^2 + n^2 = 1$ $(1/2)^2 + (1/\sqrt{2})^2 + (1/\sqrt$	8.	Direction ratios of 1 <sup>st</sup> line: 3, 3, 3	2				
9. These are parallel lines because their direction ratios are proportional. So, angle between the given lines is $0^{\circ}$ 10. $m=-11$ , using condition of perpendicularity i.e. sum of product of direction ratios of two perpendicular lines is zero.  11. $l^2+m^2+n^2=1$ $(1/2)^2+(1/\sqrt{2})^2+n^2=1$ $(1/2)^2+(1/2)^2+n^2=1$ $(1/2)$							
between the given lines is $0^\circ$ 10. $m = -11$ , using condition of perpendicularity i.e. sum of product of direction ratios of two perpendicular lines is zero.  11. $l^2 + m^2 + n^2 = 1$	Q		2				
10. $m = -11$ , using condition of perpendicularity i.e. sum of product of direction ratios of two perpendicular lines is zero.  11. $l^2 + m^2 + n^2 = 1$ ( $l/2l^2 + (1/\sqrt{2})^2 + n^2 = 1$ $\frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3}$ ( $l/2l^2 + (1/\sqrt{2})^2 + n^2 = 1$ $l/2l + \frac{1}{3} + \frac{1}{3}$	J.						
11. $ l^2 + m^2 + n^2 = 1$ $(1/2)^2 + (1/\sqrt{2})^2 + n^2 = 1$ $1/4 + 1/2 + n^2 = 1$ $1/2 = 1 - 3/4$ $1/2 = 1/4$ $1/$	10.	m = -11, using condition of perpendicularity i.e. sum of product of direction ratios of	2				
	11.		2				
		$(1/2)^2 + (1/\sqrt{2})^2 + n^2 = 1$					
$n^2 = \frac{1}{4}$ $n = \frac{1}{2}$ $\cos \gamma = \frac{1}{2} = \cos 60^0$ $12.  \text{Let direction cosine of a line equally inclined to co-ordinate axes are I,I,I}$ $50,  ^2 +  ^2 +  ^2 = 1$ $0r, 3 ^2 = 1$ $0r,  ^2 = \frac{1}{3}$ $0r,   = \pm \frac{1}{3}$ $50, \text{ Direction cosines are } + \frac{1}{\sqrt{3}}, + \frac{1}{\sqrt{3}} \text{ or } -\frac{1}{\sqrt{3}}, -\frac{1}{\sqrt{3}}, -\frac{1}{\sqrt{3}}$ $13.  \text{The cartesian equation of motion of a rocket is}$ $\frac{x-2}{5} = \frac{y+4}{7} = \frac{6-z}{2}$ $0r, \frac{x-2}{5} = \frac{y+4}{7} = \frac{z-6}{-2}$ The standard form of line of equation is $(x-x_1)/a = (y-y_1)/b = (z-z_1)/c$							
12. Let direction cosine of a line equally inclined to co-ordinate axes are I,I,I $So,  ^2 +  ^2 +  ^2 = 1$ $Or, 3  ^2 = 1$ $Or,  ^2 = \frac{1}{3}$ So, Direction cosines are $+\frac{1}{\sqrt{3}}$ , $+\frac{1}{\sqrt{3}}$ or $-\frac{1}{\sqrt{3}}$ , $-\frac{1}{\sqrt{3}}$ , $-\frac{1}{\sqrt{3}}$ 13. The cartesian equation of motion of a rocket is $\frac{x-2}{5} = \frac{y+4}{7} = \frac{6-z}{2}$ $Or, \frac{x-2}{5} = \frac{y+4}{7} = \frac{z-6}{-2}$ The standard form of line of equation is $(x-x_1)/a = (y-y_1)/b = (z-z_1)/c$		·					
$cos \ \gamma = \frac{1}{2} = cos \ 60^{\circ}$ $\gamma = 60^{\circ}$ 12. Let direction cosine of a line equally inclined to co-ordinate axes are I,I,I $so, \ l^{2} + l^{2} + l^{2} = 1$ $Or, \ 3 \ l^{2} = 1$ $Or, \ l^{2} = \frac{1}{3}$ $So, \ Direction cosines are + \frac{1}{\sqrt{3}}, + \frac{1}{\sqrt{3}}, -\frac{1}{\sqrt{3}}, -\frac{1}{\sqrt{3}}, -\frac{1}{\sqrt{3}}$ 13. The cartesian equation of motion of a rocket is $\frac{x-2}{5} = \frac{y+4}{7} = \frac{6-z}{2}$ $Or, \frac{x-2}{5} = \frac{y+4}{7} = \frac{z-6}{-2}$ The standard form of line of equation is $(x-x_{1})/a = (y-y_{1})/b = (z-z_{1})/c$		$n^2 = \frac{1}{4}$					
$cos \ \gamma = \frac{1}{2} = cos \ 60^{\circ}$ $\gamma = 60^{\circ}$ 12. Let direction cosine of a line equally inclined to co-ordinate axes are I,I,I $so, \ l^{2} + l^{2} + l^{2} = 1$ $Or, \ 3 \ l^{2} = 1$ $Or, \ l^{2} = \frac{1}{3}$ $So, \ Direction cosines are + \frac{1}{\sqrt{3}}, + \frac{1}{\sqrt{3}}, -\frac{1}{\sqrt{3}}, -\frac{1}{\sqrt{3}}, -\frac{1}{\sqrt{3}}$ 13. The cartesian equation of motion of a rocket is $\frac{x-2}{5} = \frac{y+4}{7} = \frac{6-z}{2}$ $Or, \frac{x-2}{5} = \frac{y+4}{7} = \frac{z-6}{-2}$ The standard form of line of equation is $(x-x_{1})/a = (y-y_{1})/b = (z-z_{1})/c$							
12. Let direction cosine of a line equally inclined to co-ordinate axes are I,I,I So, $ ^2 +  ^2 +  ^2 = 1$ Or, $ ^2 = 1/3$ Or, $ ^2 = 1/3$ Or, $ ^2 = \frac{1}{3}$ So, Direction cosines are $+\frac{1}{\sqrt{3}}$ , $+\frac{1}{\sqrt{3}}$ or $-\frac{1}{\sqrt{3}}$ , $-\frac{1}{\sqrt{3}}$ , $-\frac{1}{\sqrt{3}}$ 13. The cartesian equation of motion of a rocket is $\frac{x-2}{5} = \frac{y+4}{7} = \frac{6-z}{2}$ Or, $\frac{x-2}{5} = \frac{y+4}{7} = \frac{z-6}{-2}$ The standard form of line of equation is $(x-x_1)/a = (y-y_1)/b = (z-z_1)/c$							
12. Let direction cosine of a line equally inclined to co-ordinate axes are I,I,I So, $ ^2 +  ^2 +  ^2 = 1$ Or, $3  ^2 = 1$ Or, $ ^2 = 1/3$ Or, $ ^2 = 1/3$ So, Direction cosines are $+\frac{1}{\sqrt{3}}$ , $+\frac{1}{\sqrt{3}}$ or $-\frac{1}{\sqrt{3}}$ , $-\frac{1}{\sqrt{3}}$ , $-\frac{1}{\sqrt{3}}$ 3. The cartesian equation of motion of a rocket is $\frac{x-2}{5} = \frac{y+4}{7} = \frac{6-z}{2}$ Or, $\frac{x-2}{5} = \frac{y+4}{7} = \frac{z-6}{-2}$ The standard form of line of equation is $(x-x_1)/a = (y-y_1)/b = (z-z_1)/c$		•					
So, $ ^2 +  ^2 +  ^2 = 1$ Or, $3  ^2 = 1$ Or, $ ^2 = 1/3$ Or, $ ^2 = \pm \frac{1}{3}$ So, Direction cosines are $\pm \frac{1}{\sqrt{3}}$ , $\pm \frac{1}{\sqrt{3}}$ , $\pm \frac{1}{\sqrt{3}}$ , or $\pm \frac{1}{\sqrt{3}}$ , $\pm \frac{1}{\sqrt{3}$		7 - 66					
So, $ ^2 +  ^2 +  ^2 = 1$ Or, $3  ^2 = 1$ Or, $ ^2 = 1/3$ Or, $ ^2 = \pm \frac{1}{3}$ So, Direction cosines are $\pm \frac{1}{\sqrt{3}}$ , $\pm \frac{1}{\sqrt{3}}$ , $\pm \frac{1}{\sqrt{3}}$ , or $\pm \frac{1}{\sqrt{3}}$ , $\pm \frac{1}{\sqrt{3}$							
So, $ ^2 +  ^2 +  ^2 = 1$ Or, $3  ^2 = 1$ Or, $ ^2 = 1/3$ Or, $ ^2 = \pm \frac{1}{3}$ So, Direction cosines are $\pm \frac{1}{\sqrt{3}}$ , $\pm \frac{1}{\sqrt{3}}$ , $\pm \frac{1}{\sqrt{3}}$ , or $\pm \frac{1}{\sqrt{3}}$ , $\pm \frac{1}{\sqrt{3}$	12.	Let direction cosine of a line equally inclined to co-ordinate axes are I,I,I	2				
Or, $l^2 = 1/3$ Or, $l = \pm \frac{1}{3}$ So, Direction cosines are $+\frac{1}{\sqrt{3}}$ , $+\frac{1}{\sqrt{3}}$ or $-\frac{1}{\sqrt{3}}$ , $-\frac{1}{\sqrt{3}}$ , $-\frac{1}{\sqrt{3}}$ 13. The cartesian equation of motion of a rocket is $\frac{x-2}{5} = \frac{y+4}{7} = \frac{6-z}{2}$ Or, $\frac{x-2}{5} = \frac{y+4}{7} = \frac{z-6}{-2}$ The standard form of line of equation is $(x-x_1)/a = (y-y_1)/b = (z-z_1)/c$							
Or, $I = \pm \frac{1}{3}$ So, Direction cosines are $+\frac{1}{\sqrt{3}}$ , $+\frac{1}{\sqrt{3}}$ or $-\frac{1}{\sqrt{3}}$ , $-\frac{1}{\sqrt{3}}$ , $-\frac{1}{\sqrt{3}}$ 13. The cartesian equation of motion of a rocket is $\frac{x-2}{5} = \frac{y+4}{7} = \frac{6-z}{2}$ Or, $\frac{x-2}{5} = \frac{y+4}{7} = \frac{z-6}{-2}$ The standard form of line of equation is $(x-x_1)/a = (y-y_1)/b = (z-z_1)/c$							
So, Direction cosines are $+\frac{1}{\sqrt{3}}$ , $+\frac{1}{\sqrt{3}}$ or $-\frac{1}{\sqrt{3}}$ , $-\frac{1}{\sqrt{3}}$ , $-\frac{1}{\sqrt{3}}$ 13. The cartesian equation of motion of a rocket is $\frac{x-2}{5} = \frac{y+4}{7} = \frac{6-z}{2}$ Or, $\frac{x-2}{5} = \frac{y+4}{7} = \frac{z-6}{-2}$ The standard form of line of equation is $(x-x_1)/a = (y-y_1)/b = (z-z_1)/c$							
13. The cartesian equation of motion of a rocket is $\frac{x-2}{5} = \frac{y+4}{7} = \frac{6-z}{2}$ Or, $\frac{x-2}{5} = \frac{y+4}{7} = \frac{z-6}{-2}$ The standard form of line of equation is $(x-x_1)/a = (y-y_1)/b = (z-z_1)/c$		J					
13. The cartesian equation of motion of a rocket is $\frac{x-2}{5} = \frac{y+4}{7} = \frac{6-z}{2}$ Or, $\frac{x-2}{5} = \frac{y+4}{7} = \frac{z-6}{-2}$ The standard form of line of equation is $(x-x_1)/a = (y-y_1)/b = (z-z_1)/c$		So, Direction cosines are $+\frac{1}{\sqrt{2}}$ , $+\frac{1}{\sqrt{2}}$ , $+\frac{1}{\sqrt{2}}$ or $-\frac{1}{\sqrt{2}}$ , $-\frac{1}{\sqrt{2}}$ , $-\frac{1}{\sqrt{2}}$					
$\frac{x-2}{5} = \frac{y+4}{7} = \frac{6-z}{2}$ Or, $\frac{x-2}{5} = \frac{y+4}{7} = \frac{z-6}{-2}$ The standard form of line of equation is $(x-x_1)/a = (y-y_1)/b = (z-z_1)/c$	13.		2				
Or, $\frac{x-2}{5} = \frac{y+4}{7} = \frac{z-6}{-2}$ The standard form of line of equation is $(x-x_1)/a = (y-y_1)/b = (z-z_1)/c$							
The standard form of line of equation is $(x - x_1)/a = (y-y_1)/b = (z-z_1)/c$							
$(x - x_1)/a = (y-y_1)/b = (z-z_1)/c$		3 / - 2					
		·					
So, vector equation of motion of rocket							
$\vec{r} = 2\hat{\imath} - 4\hat{\jmath} + 6\hat{k} + \lambda (5\hat{\imath} + 7\hat{\jmath} - 2\hat{k})$							

14.	Let line passing through two points P (-2,-3,4) and Q( 2,-1,3)	2
	$PQ = \sqrt{16 + 4 + 1} = \sqrt{21}$	
	So, Direction cosines of the line joining two points are $\frac{2+2}{\sqrt{21}}$ , $\frac{-1+3}{\sqrt{21}}$ , $\frac{3-4}{\sqrt{21}}$	
	$= \frac{4}{\sqrt{21}}, \frac{2}{\sqrt{21}}, \frac{-1}{\sqrt{21}}$	
15.	$\sqrt{21}' \sqrt{21}' \sqrt{21}$ Let P divides QR in the ratio $\lambda$ :1	2
13.	Co-ordinates of P are $(\frac{5\lambda+2}{\lambda+1}, \frac{\lambda+2}{\lambda+1}, \frac{-2\lambda+1}{\lambda+1})$	
	70.2 70.2	
	x – co-ordinate of P = 3	
	So, $\frac{5\lambda+2}{\lambda+1}=3$	
	Or, $5\lambda + 2 = 3\lambda + 3$	
	Or, $\lambda = \frac{1}{2}$	
	So, y – co-ordinate of P = $\frac{\frac{1}{2}+2}{\frac{1}{2}+1}$ = 5/3	
	$\frac{1}{2}$ +1	
16.	r 1/1 7 1 8	1
10.	Equations of lines can be written in standard form as : $\frac{x-5}{2} = \frac{y+\frac{5}{2}}{2} = \frac{z+\frac{8}{3}}{\frac{5}{3}}$ and	
	Ω	
	$\frac{x-3}{-1} = \frac{y-2}{2} = \frac{z-\frac{5}{5}}{\frac{-6}{5}}$	
	So that Direction ratios of the lines are : $\left(2, 2, \frac{5}{3}\right) & \left(-1, 2, \frac{-6}{5}\right)$ and $2 \times (-1) +$	1
		1
	$2 \times 2 + \frac{5}{3} \times \left(\frac{-6}{5}\right) = 0.$	
17.	Here, $a \times (b-c) + b \times (c-a) + c \times (a-b)$	1
	= ab - ac + bc - ba + ca - cb = 0 So that lines are perpendicular.	1
18.	Direction – cosines of $x$ – axis are given by $(1,0,0)$	1
_0.	So that the equation of line passing through the point P $(1, 2, 3)$ and parallel to $x - $	
	axis is given by $\frac{x-1}{1} = \frac{y-2}{0} = \frac{z-3}{0}$ .	1
19.	The direction ratios of the line passing through points P $(3, 4, -1)$ and Q $(-2, 0, 4)$	1
	are:	
	(5,4,-5).	1
	So that its equation can be given as $\frac{x+2}{5} = \frac{y}{4} = \frac{z-4}{-5}$ .	
20.	Direction ratios of the line joining the points A $(1, -2, 3)$ , B $(2, -1, 1)$ is given by	
	(2-1,-1+2,1-3)=(1,1,-2)	
	Direction ratios of the line joining the points $C(0, -2, 2)$ , $D(0, 3, 4)$ is given by	1
	(0,3+2,4-2) = (0,5,2). Therefore, angle between the lines is given by	1
	$\cos \theta = \frac{1 \times 0 + 1 \times 5 - 2 \times 2}{\sqrt{1 + 1 + 4} \times \sqrt{0 + 25 + 4}} = \frac{1}{\sqrt{174}}.$	
		1
21.	$\vec{b} = \vec{a} + \lambda \vec{b} \Rightarrow \vec{r} = (5i^{} - 4j^{} + 6k^{} + \lambda(3i^{} + 7j^{} - 2k)$	2
22.	$\gamma = 60^{\circ} \text{ or } 120^{\circ}$	2
23.	$\vec{b} = \vec{a} + \lambda \vec{b} \Rightarrow \vec{r} = (5i^{\circ} - 4j^{\circ} + 6k^{\circ} + \lambda(3i^{\circ} + 7j^{\circ} - 2k))$ $\gamma = 60^{\circ} \text{ or } 120^{\circ}$ $\text{Dc's are: } \frac{3}{\sqrt{77}}, \frac{-2}{\sqrt{77}}, \frac{8}{\sqrt{77}}$ $\text{Dc's are: } \pm \frac{1}{\sqrt{3}} \pm \frac{1}{\sqrt{3}} \pm \frac{1}{\sqrt{3}}$	2
2.4	$ \begin{array}{c c} \hline  & \overline{77}, \sqrt{77}, \sqrt{77} \\ \hline  & 1 & 1 & 1 \end{array} $	
24.	Dc's are: $\pm \frac{1}{\sqrt{3}} \pm \frac{1}{\sqrt{3}} \pm \frac{1}{\sqrt{3}}$	2
25.	$\vec{r} = (i^{\wedge} + 0j^{\wedge} + 0k^{\wedge}) + \lambda(6i^{\wedge} + 3j^{\wedge} + 2k^{\wedge})$	2