CHAPTER-11

THREE DIMENSIONAL GEOMETRY

ONE MARK QUESTIONS:

1. If a line makes the angles 90^0 ,60^0 and 30^0 with the positive directions of x ,z and z-axes respectively, find its direction cosines. (U)
2. If a line makes angles 90^0,135^0 and 45^0 with the positive direction of x, y and z-axes respectively ,find its direction cosines. (U)
3. If a line has direction ratios 2,-1,-2 , determine its direction cosines. (U)
4. If a line has direction ratios -18,12,-4 then what are its direction ratios. (U)
5. Find the direction cosines of the line passing through two points (-2,4,-5) and (1,2,3). (U)
6. Find the direction ratios of the line $\frac{x-1}{2}$ = 3y = $\frac{2z+3}{4}$. (U)
7. The cartesian equation of a line is $\frac{x-5}{3}=\frac{y+4}{7}=\frac{z-6}{2}$. Write its Vector form. (U)
8. Find direction cosines of x-axis. (K)
9. Find direction cosines of y-axis. (K)
10. Find direction cosines of z-axis. (K)
11. Find the direction cosines of the line which makes equal angles with coordinate axis. (U)
12. Find the direction cosines of the line passing through two points (-2,4,-5) and (1,2,3). (U)
13. Find the distance of the plane 2x-3y+4z=5 from the origin. (U)
14. Find the distance of the plane z=2 from the origin. (U)
15. Find the direction cosines of the normal to the plane x + y + z =1.(U)
16. Find the direction cosines of the normal to the plane 5y+8 = 0.(U)
17. Find the cartesian equation of the plane $\vec{r}$.(i+j+k)=2. (U)
18. Find intercept cut off the plane 2x+y-z=5. (U)
19. Find the equation of the plane with intercept 4 on z -axiz and parallel to XOY plane. (U)
20. Find equation of the plane cuts coordinate axis at (a,0,0) ,(0,b,0),(0,0,c). (U)

21. Find the vector equation of the plane passing through the point (1,0,-2) and normal to the plane $\vec{i}+\vec{j}-\vec{k}$. (U)

22. Find cartesian equation of the plane passing through the point (1,4,6) and normal to the vector $\vec{i}-2\vec{j}+\vec{k}$. (U)

23. Find vector equation of the plane passing through the point(1,2,3) and perpendicular to the vector $\vec{r}.(\vec{i}+2\vec{j}-5\vec{k})-9=0$. (U)

24. Find the cartesian equation of the plane $\vec{r}.(2\vec{i}+3\vec{j}-4\vec{k})=1$. (U)

25. Show that the planes 2x+y+3z-2=0 and x-2y+5=0 are perpendicular. (U)

26. Show that the planes 2x-y+3z-1=0 and 2x-y+3z+3=0 are parallel. (U)

27. Find the equation of the line in vector form which passes through (1,2,3) and parallel to the vector $3\vec{i}+2\vec{j}-2\vec{k}$. (U)

28. Define skew lines. (K)

29. Find the distance between the 2 planes 2x+3y+4z=4 and 4x+6y+8z=12. (U)

TWO MARKS QUESTIONS:

1. Find the equation of the line which passes through the point (1,2,3) and parallel to the vector $3\vec{i}+2\vec{j}-2\vec{k}$,both are in vector and cartesian form. (U)

2. Find the vector equation of the line passing through the points (3,-2,-5) and (3,-2,6). (U)

3. Find the vector equation of the line passing through the points (-1,0,2) and (3,4,6). (U)

4. Find the angle between the lines $\vec{r}=3\vec{i}+2\vec{j}-4\vec{k}+\lambda(\vec{i}+2\vec{j}+2\vec{k}.)$ and $\vec{r}=5\vec{i}-2\vec{j}+\mu(3\vec{i}+2\vec{j}+6\vec{k})$ (U)

5. Find the angle between the lines $\frac{x+3}{3}=\frac{y-1}{5}=\frac{z+3}{4}$ and $\frac{x+1}{1}=\frac{y-4}{1}=\frac{z-5}{2}$. (U)

6. Show that the line passes through the points (4,7,8) , (2,3,4) is parallel to the line passing through the points (-1,2,1) and (1,2,5). (U)

7. Find the vector equation of the plane which is at a distance 7 units from the origin and which is normal to the vector $3\vec{i}+5\vec{j}-6\vec{k}$. (U)

8. Find the vector equation of the plane which is at a distance of $\frac{6}{\sqrt{29}}$ units from the origin and its normal vector from the origin is $2\vec{\imath} - 3\vec{\jmath} + 4\vec{k}$. (U)

9. Find the equation of the plane passing through the line of intersection of the planes 3x-y+2z-4=0 and x+y-z-2 =0 and the point (2,2,1). (U)

10. Show that the points (2,3,4) ,(-1,-2,1) and (5,8,7) are collinear. (U)

11. Show that the line through the points (1,-1,2) ,(3,4,-2) is perpendicular to the line through the points (0,3,2) and (3,5,6). (U)

12. Find the distance of the point (3,-2,1) from the plane 2x-y+2z-3=0. (U)

13. Find the distance of the point (2,5,-7) from the plane $\vec{r}.\left(6\vec{\imath} - 3\vec{\jmath} + 2\vec{k}\right) = 4$. (U)

14. Find the angle betweens the planes 3x-6y+2z=7 and 2x+2y-2z=5. (U)

15. Find the vector equation of the line passing through the points (-1,0,2) and (3,4,6). (U)

16. Find the vector and cartesian equation of the plane passing through the point (1,0,-2) and normal to the plane is i+j-k. (U)

THREE MARKS QUESTIONS:

1. Find the shortest between the lines l_1 and l_2 whose vector equations are $\vec{r} = i + j + \lambda(2i - j + k)$and $\vec{r} = 2i + j - k + \mu(3i - 5j + 2k)$. (U)

2. Find distance between the lines l_1 and l_2 given by $\vec{r} = i + 2j - 4k + \lambda(2i + 3j + 6k)$and $\vec{r} = 3i + 3j - 5k + \mu(2i + 3j + 6k)$ (U)

3. Find shortest distance between the lines $\frac{x+1}{7} = \frac{y+1}{-6} = \frac{z+1}{1}$and $\frac{x-3}{1} = \frac{y-5}{-2} = \frac{z-7}{1}$. (U)

4. Find the value of p,so that the lines $\frac{1-x}{3} = \frac{7y-14}{2p} = \frac{z-3}{2}$and $\frac{7-7x}{3p} = \frac{y-5}{1} = \frac{6-z}{5}$ are at right angles. (U)

5. Find the vector and cartesian equation of the line passing through the point (3,-2,-5) and (3,-2,6). (U)

6. Find the vector equation of the plane passing through the three points (1,-1,-1) ,(6,4,-5) and (-2,2,-1) . (U)

7. Find the equation of the line which passes through the point (1,2,3) and is parallel to the vector 3i+2j-2k both in vector and cartesian form. (U)

8. Find the direction cosines of unit vector perpendicular to the plane $\vec{r}.\left(6\vec{\imath}-3\vec{\jmath}-2\vec{k}\right)+1=0$passing through origin. (U)

9. Find vector equation of the plane passing through the intersections of the planes

3x-y+2z-4=0 and x+y+z+2=0 and the point (2,2,1). (U)

10. Find vector equation of the plane passing through the intersections of the planes

x+y+z=1 and 2x+3y+4z=5 which is perpendicular to the plane x-y+z=0 . (U)

11. Find distance between the point P(6,5,9) and the plane determined by the points A(3,-1,2) ,

B(5,2,4) and C(-1,-1,6). (U)

12. Show that the lines $\frac{x+3}{-3}=\frac{y-1}{1}=\frac{z-5}{5}$and $\frac{x+1}{-1}=\frac{y-2}{2}=\frac{z-5}{5}$are co-planar. (U)

13. Find the coordinates of foot of perpendicular drawn from the origin to the plane

2x-3y+4z-6=0. (U)

14. Find the angle between the planes 2x+y-2z=5 and 3x-6y-2z=7 using vector method. (U)

15. Find the angle between the planes 3x-6y+2z=7 and 2x+2y-2z=5 using cartesian form. (U)

16. Find the coordinates of the point where the line through the points A(3,4,1) and B(5,1,6)

crosses x-y plane. (U)

17. Find equation of the plane passing through the point (-1,3,2) and perpendicular to each of the planes x+2y+3z=5 and 3x+3y+z=0 . (U)

FIVE MARKS QUESTIONS:

1. Derive the equation of the line in space passing through the point and parallel to the vector both in the vector form and cartesian form. (U)

2. Derive the equation of the line in space passing through two given points both in vector and cartesian form. (U)

3. Derive the angle between two lines in vector and cartesian form. (U)

4. Derive the shortest distance between skew lines both in vector and cartesian form. (A)

5. Derive the distance between the parallel lines $\vec{r}=\overrightarrow{a1}+\lambda\left(\vec{b}\right)$and $\vec{r}=\overrightarrow{a2}+\mu\left(\vec{b}\right)$. (U)

6. Derive the equation of the plane in normal form (both in vector and cartesian form). (U)

7. Derive the equation of the plane perpendicular to the given vector and passing through a given point both in cartesian and vector form. (U)

8. Derive equation of a plane passing through three non-collinear with position vectors $\vec{a}, \vec{b}, \vec{c}$(both in vector and cartesian form). (U)

9. Derive equation of the plane passing through the intersection of two given planes both in vector and cartesian form.(U)

10. Derive the condition for the co-planarity of two lines in space both in vector and cartesian form. (U)

11. Derive the formula to find distance of a point from a plane both in vector and cartesian form. (U)