CHAPTER-11

THREE DIMENSIONAL GEOMETRY

ONE MARK QUESTIONS:

- 1. If a line makes the angles 90° , 60° and 30° with the positive directions of x ,z and z-axes respectively, find its direction cosines. (U)
- 2. If a line makes angles 90° , 135° and 45° 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 $\vec{r} \cdot (\vec{t} + 2\vec{j} 5\vec{k}) 9 = 0$. (U)
- 24. Find the cartesian equation of the plane $\vec{r} \cdot (2\vec{i} + 3\vec{j} 4\vec{k}) = 1$. (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 $\vec{r} = 3\vec{\iota} + 2\vec{j} 4\vec{k} + \lambda(\vec{\iota} + 2\vec{j} + 2\vec{k})$ and

$$\vec{r} = 5\vec{\iota} - 2\vec{j} + \mu(3\vec{\iota} + 2\vec{j} + 6\vec{k})$$
 (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 $2\vec{i} 3\vec{j} + 4\vec{k}$. (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 $\vec{r} \cdot (6\vec{\iota} 3\vec{j} + 2\vec{k}) = 4$. (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 I_1 and I_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 I_1 and I_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)
- 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 $\vec{r}.(6\vec{i}-3\vec{j}-2\vec{k})+1=0$ 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)
- 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 $\vec{r} = \vec{a1} + \lambda(\vec{b})$ and $\vec{r} = \vec{a2} + \mu(\vec{b})$. (U)
- 6. Derive the equation of the plane in normal form (both in vector and cartesian form). (U)

- 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)

