B.Sc. DEGREE EXAMINATION, APRIL 2018.

II YEAR III SEMESTER

Core Major - Paper VI - THREE DIMENSIONAL GEOMETRY

Time : 3 Hours Max. Marks : 75

SECTION A – (10 × 2 = 20 marks)

Answer any *TEN* questions

1. Find the distance between the parallel planes $2x-2y-z+3=0$ and $4x-4y+2z+5=0$.
2. Find the equation of the straight line joining the points $\left(2,5,8\right)$ and $\left(-1,6,3\right)$.
3. Find the equation of the sphere which has its centre at the point $\left(6,-1,2\right)$ and touches the plane $2x-y+2z-2=0$.
4. Find the equation of the sphere which touches the coordinate plane and whose centre lies in the first octant.
5. Write the general equation to a cone which touches the co-ordinate planes.
6. Find the equation of the cone whose vertex is at the origin and the guiding curve is $\frac{x^{2}}{4}+\frac{y^{2}}{9}+z^{2}=1, x+y+z=1$.
7. A right circular cone has three mutually perpendicular generators. Prove that the semi vertical angle of the cone is $tan^{-1}\sqrt{2}$.
8. Find the equation of the right circular cone with its vertex at the origin, axis along the z-axis and semi vertical angle is $α$.
9. Define a cylinder.
10. Write the general equation of a right circular cylinder whose axis is the straight line $\frac{x-α}{l}=\frac{y-β}{m}=\frac{z-γ}{n}$ and whose radius is $a$.
11. Prove that the planes $x+2y+2z=0, 2x+y-2z=0$ are at right angles.
12. Find the centre and radius of the sphere $16x^{2}+16y^{2}+16z^{2}-16x-8y-16z-55=0$.

SECTION B – (5 × 5 = 25 marks)

Answer any *FIVE* questions

1. Find the equation of the plane passing through the points $(9,3,6)$ and $\left(2,2,1\right)$ and perpendicular to the plane $2x+6y+6z-9=0$.
2. Find the equation of the sphere having the circle $x^{2}+y^{2}+z^{2}=5, x-2y+2z=5$ for a great circle. Find its centre and radius.

[P.T.O.]

1. Prove that the equation $2x^{2}+2y^{2}+7z^{2}-10yz-10zx+2x+2y+26z-17=0$ represents a cone.
2. Aright circular cone has its vertex at $\left(2,-3,5\right)$. Its axis passes through $A\left(3,-2,6\right)$ and its semi vertical angle is $30^{o}$. Find its equation.
3. Obtain the equation of the right circular cylinder with axis $\frac{x-α}{l}=\frac{y-β}{m}=\frac{z-γ}{n}$ and radius of the guiding circle $λ$.
4. Find the image of the point $P\left(2,3,5\right)$ in the plane $2x+y-z+2=0$.
5. Find the equation of the right circular cylinder whose axis is $x=2y=-z$ and radius 4.

SECTION C – (3 × 10 = 30 marks)

Answer any *THREE* questions

1. Find the shortest distance between the lines $\frac{x-8}{3}=\frac{y+9}{-16}=\frac{z-10}{7}$ and $\frac{x-15}{3}=\frac{y-29}{8}=\frac{z-15}{-5}$. Find also the equation on the line of the shortest distance.
2. Find the condition that the line $\frac{x-a}{l}=\frac{y-b}{m}=\frac{z-c}{n}$ where $l^{2}+m^{2}+n^{2}=1$ should touch the sphere $x^{2}+y^{2}+z^{2}+2ux+2vy+2wz+d=0$.
3. Find the condition for the equation $F\left(x,y,z\right)=ax^{2}+by^{2}+cz^{2}+2fyz+2gzx+2hxy+2ux+2vy+2wz+d=0$ to represent a cone.
4. Find the semi vertical angle and the equation of the right circular cone having its vertex at origin and passes through the circle $y^{2}+z^{2}=b^{2}, x=a$.
5. Find the equation of the right circular cylinder described on the circle through the points $\left(α,0,0\right),\left(0,α,0\right),\left(0,0,α\right)$ as a guiding line.