The ophere (1911 and)

- 1. General equation of a sophere. $n^2 + y^2 + 2^2 + 2vx + 2vy + 2w2 + d = 0 \text{ whose centre is at } (-v, -v, -w) \text{ and tradius is } \sqrt{v^2 + v^2 + w^2} d$
- 2. Equation of the sophere through the origin, $n^2+y^2+2^2+2\nu x+2\nu y+2\omega =0$ whose centre is at (-v,-v,-w) and radius $\sqrt{v^2+v^2+\omega^2}$
- 3. Equation of a sphere whose centre is at (a,b,c) and radius πis , $(x-a)^2 + (y-b)^2 + (z-c)^2 = \pi^2$
- 4. Equation of a sphere whose centre is at (0,0,0). i.e, origin and madius π is $x^2+y^2+z^2=\pi^2$
- 5. The equation of a sophere through the two end points of a diameter is, $(x-x_1)(x-x_2) + (y-y_1)(y-y_2) + (z-z_1)(z-z_2) = 0$
- 6. The equation of a tangent plane to a sopherice $x^2+y^2+2^2+2vx+2vy+2wz+d=0$ at the point (x_1,y_1,z_1) is, $x_1+yy_1+zz_1+v(x+x_1)+v(y+y_1)+d=0$ $+w(z+z_1)+d=0$

7. The equation of a circle $x^{2}+y^{2}+2^{2}+2vx+2vy+2vy+2v2v2+d=0=0x+by+02+d$ on, $x^{2}+y^{2}+2^{2}+2vx+2vy+2w2+d=0$ and by+02+d=0

8. The equation of the sphere through the above einele, n2+y2+22+2vx+2vy+2w2+klan+by+e2+d)=0

9. Gentre GA encle star Gried Encle)

Centre of the great cincle = centre of the ophere Radius of the great cincle = Radius of the ophere

so the inapper of the appeare is the partient when

distance them the enign to the plane.

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VIH

went putting the values of n in eq. a was get

 $(k-2)^{2} + (k-1)^{2} + (2+3)^{2} = (\frac{1}{\sqrt{10}})^{2}$

101 - 6+ 60 f-+ 1+10-10+1+10 xx

+ 19 (x + 21-12-) - 56x - 281 + 51/3 + 18 = 5

Find the equation of the sphere with centre (12,15-3) that is tangent to the plane + n-3y+22-4=0

Solution: Given the plane,

n-3y+22-4=0

Given the centre of the required sphere

Let the madius be n has the equation of sophene $(n-2)^2 + (14-1)^2 + (12+3)^2 = n^2 - 0$

Again, the spherie () is the transport of the plane x-3y+ 22-4=0

so, the radius of the spherie is the perspendicular distance from the origin to the plane.

-mat is $\Pi = \left| \frac{1.2 + 3.1 + 2(-3) - 4}{\sqrt{12 + 3^2 + 2^2}} \right|$ $= \frac{11}{\sqrt{14}}$

Now, putting the values of 11 in eq. 10 me get

 $(x-2)^{2} + (y-1)^{2} + (2+3)^{2} = (\frac{11}{\sqrt{14}})^{2}$ $\Rightarrow x^{2} + 4x + 4 + y^{2} + 2y + 1 + 2x^{2} + 62 + 9 = \frac{121}{14}$ $\Rightarrow 14(x^{2} + y^{2} + 2x^{2}) - 56x - 28y + 842 + 75 = 0$

(Am)

Find the equation of the sopheric for which the cincle $x^2+y^2+z^2+7y-2z+2=0$, 2x+3y+4z=8 is a great cincle.

60 lution: Given that, $x^2+y^2+2^2+7y-22+2=0$ 2x+3y+42=8

The equation of the sopherce through the circle is (1) is, $x^2+y^2+z^2+.07y=2z+2+k(2x+3y+42-8)=0-2$ $\Rightarrow x^2+y^2+z^2+2kx+(3k+7)y+(4k-2)z+2-8k=0$ Here the centre is at $(-k,-\frac{3k+7}{5},1-2k)$

Since the given eincle is a great circle, no the centre, $(-k, \frac{-3k+7}{2}, +2k)$ must liep on the plane

2×+34+42-8=0

i.e,
$$2(-k) + 3 = \frac{-(3k+7)}{2} + 4(1-2k) - 8 = 0$$

$$\Rightarrow -4k - 3(3k+7) + 8(1-2k) - 16 = 0$$

$$\Rightarrow -4k - 9k - 21 + 8 - 16k - 16 = 0$$

$$\Rightarrow -29k - 29 = 0$$

: K = -1

Putting the Value of k in eq. @ we have, $n^2+y^2+2^2+7y-27+2-1(2x+3y+42-8)=0$ $\Rightarrow x^2+y^2+2^2-2x+4y-62+10=0$ which is the mequined sphere.

3) Find the equation of the sphere with center 12, -3, 2) and tangent to the plane 6x-3y+22-8=0

Solution: Given the contre of the nequired spherie is

Let the madius be in has the equation of the

Spherie High of the bear with the $(x-2)^2 + (1+3)^2 + (2-2)^2 = \pi^2 - 0$

Again, the sphere 10 is the tangent of the plane 6x-3y+22-8=0 6x-3y+22-8 = 0

50 the readius of the ophene is penpendicular distance

from the origin to the plane.

That is
$$\pi = \left[\frac{6 \cdot 2 - 3(-3) + 2 \cdot 2 - 8}{\sqrt{6^2 + (-3)^2 + (2)^2}}\right]$$

Now, putting the value of It in leg D

(x-2)2+ (y+3)2+(2-2)2- (17)2

 $\Rightarrow x^2 - 4x + 4 + 4^2 + 6y + 9 + 2^2 - 42 + 4 = \frac{289}{49}$

> 49 (x2 4x+4+ y2+6y+9+2=42+4) - 289 = 0

> 49 (x²+y²+2²) - 196x + 196 + 294y + 941 - 1947 + 196-2892

=> 49 (n2+y2+22) - 196x +294y-1942 +544=0.

9 Find the equation of the ophere with its centre at 1-4, 2, 3) and tangent to the plane 2x-y-22+7 Solution: Given the centre of the opherie is (-4,2,3) Let the madius be in how the equation of the opherie, taty)2 + (y-2)2+ (2-3)2= 112 TO 1
Again, - The opheric D is the targent of the plane, 27-y-22+7=0
50, the nadius of the opheric is pempendicular distance from othe anign stouther plane out to agit up a That is, $\Pi = \frac{2(-4)8 - 1(0) - 2(3) + 7}{\sqrt{2^2 + (-1)^2 + (-2)^2}}$ 0 ×8-5+ (3 ×19)9 + (x3 +1) 1 + 1/4 + 1/4 + 2+ -1/4 1 /5 (=3-31 = NOT - NOT) 21 SIND BUT - 81111 Now, putting the value of 1877 in eq 1 $(n+9)^2 + (y-2)^2 + (z-3)^2 = 3^2$ > x3+8x+16+42=4y+4+ 22-62+9-9=0 > x2+2+2++2++8x-(4) -6€ +20=0= (Ams) STY- PSTRE ロッショノーがラナナイリアとうとこと