Date
13/02/2026
MJC-PHYSICS, Sem-IV
Paper-05/Unit-01

Cylinderical co-ordinates.

Cylindrical coordinates →:

Cylindrical and spherical coordinates are two generalization of polar coordinates to three dimensions. When moving from polar coordinates in two dimensions we use the polar coordinates in the xy plane and add a z coordinate. For this reason, we use the notation (r, θ, z) to express cylindrical coordinates. The relationship between cartesian coordinates (x, y, z) and cylindrical coordinates (r, θ, z) is given by

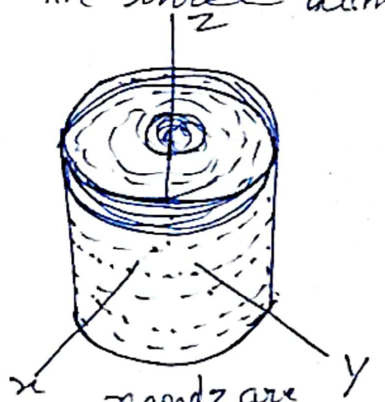
$$x = r\cos(\theta)$$

$$y = r\sin(\theta)$$

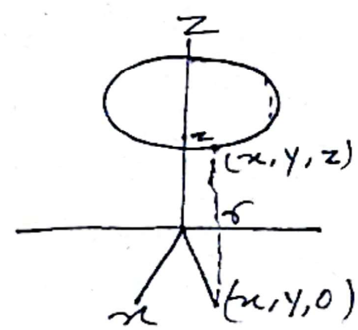
$$z = z$$

Where $r \geq 0$, $\theta \in [0, 2\pi]$ and z is simply the cartesian coordinate. Notice that x and y are difined as the usual polar coordinates in the x-y plane. That r is defined as the length of the ray from the origin to the point $(x, y, 0)$, when θ is the angle between the positive x-axis and this same ray

Consider the fig. r and z are Known. The cylinder corresponds to a given value for r. Here r is as the distance between a point in three dimensions and the z-axis.



r and z are Known
fig(a)



r, θ, and z are Known.
fig(b)

Every point on the cylinder shown is at the same distance from the z-axis. Giving a value for z results in a horizontal circle or cross section of the cylinder at the given height on the z-axis. Every point of three dimessional space other than the z-axis has unique cylindrical coordinates of course there are infinitely many cylindrical coordinates for the origin and for the z-axis Any θ will work is $r = 0$ and z is given.