Step-1

Spherical coordinates P,ϕ,θ given

$x = P\sin\phi\cos\theta, y = P\sin\phi\sin\theta, z = P\cos\phi$

Now

$x = P\sin\phi\cos\theta$

$\Rightarrow \frac{\partial x}{\partial P} = \sin\phi\cos\theta$

$\frac{\partial x}{\partial \phi} = P\cos\phi\cos\theta$

$\frac{\partial x}{\partial \theta} = -P\sin\phi\sin\theta$

Step-2

$y = P\sin\phi\sin\theta$

$\Rightarrow \frac{\partial y}{\partial P} = \sin\phi\sin\theta$

$\frac{\partial y}{\partial \theta} = P\sin\phi\cos\theta$

$\frac{\partial y}{\partial \phi} = P\cos\phi\sin\theta$

Step-3

And

$Z = P\cos\phi$

$\Rightarrow \frac{\partial z}{\partial P} = \cos\phi$

$\frac{\partial z}{\partial \phi} = -P\sin\phi$

$\frac{\partial z}{\partial \theta} = 0$

Step-4

So, the Jacobian matrix of partial derivatives is

$$\det J = \begin{vmatrix} \frac{\partial x}{\partial P} & \frac{\partial x}{\partial \phi} & \frac{\partial x}{\partial \theta} \\ \frac{\partial y}{\partial P} & \frac{\partial y}{\partial \phi} & \frac{\partial y}{\partial \theta} \\ \frac{\partial Z}{\partial \phi} & \frac{\partial Z}{\partial \phi} & \frac{\partial Z}{\partial \theta} \end{vmatrix}$$

$$= \begin{vmatrix} \sin\phi\cos\theta & P\cos\phi\cos\theta & -P\sin\phi\sin\theta \\ \sin\phi\sin\theta & P\cos\phi\sin\phi & P\sin\phi\cos\theta \\ \cos\phi & -P\sin\phi & 0 \end{vmatrix}$$

Step-5

The columns are mutually orthogonal and length of columns are given by

$$\sqrt{\sin^2\phi\cos^2\theta + \sin^2\phi\sin^2\theta + \cos^2\theta} = 1$$

$$\sqrt{P\left(\cos^2\phi\cos^2\theta + \cos^2\phi\sin^2\theta + \sin^2\phi\right)} = P$$

$$\sqrt{P^2\sin^2\phi\sin^2\phi + P^2\sin^2\phi\cos^2\phi} = P\sin\phi$$

$$\therefore \det J = 1.P.P.\sin\phi$$

$$= P^2\sin\phi$$

And hence $\boxed{dV = P^2\sin\phi dP d\phi d\theta}$