

(Maths-3)

Assignment-3

Que.1 Show that $n+3=0$; if \vec{r}^n is solenoidal.

Que.2 Find the divergence and curl of the vector function

$$F(x,y,z) = e^{xyz} (xy^2 \hat{i} + yz^2 \hat{j} + zx^2 \hat{k})$$

at the point (1,2,3).

Que.3 Find the directional derivative of

$$f(x,y,z) = x^2yz + 4xz^2$$

at the point (1,-2,1) in the direction of the vector $2\hat{i} - \hat{j} - 2\hat{k}$.

Que.4 Find value of 'a' such that vector field

$$\vec{F} = 2xyz^3 \hat{i} + ax^2y^3 \hat{j} + 3x^2yz^2 \hat{k} \text{ is irrotational}$$

Hence find scalar function ϕ such that

$$\vec{F} = \nabla \phi.$$

Que.5 What is the directional derivative of $\phi = xy^2 + yz^3$ at the point (2,-1,1) in the direction of the normal to the surface $x \log z - y^2 = -4$ at (-1,2,1) ?