Q4. If $\emptyset(x, y, z) = 3(x^2y - y^2x)$, Calculate gradient.

Given:- $\emptyset(x, y, z) = 3(x^2y - y^2x)$

Formula:-

Solution:-

$$\text{Grad } \emptyset = \nabla\emptyset = \left(\hat{\imath}\frac{\partial}{\partial x} + \hat{\jmath}\frac{\partial}{\partial y} + \hat{k}\frac{\partial}{\partial z}\right)\{3(x^2y - y^2x)\}$$

$$= \hat{\imath}(6xy - 3y^2) + \hat{\jmath}(3x^2 - 2yx) + \hat{k}(0)$$

$$\text{Therefore, } \nabla\emptyset = \hat{\imath}(6xy - 3y^2) + \hat{\jmath}(3x^2 - 2yx)$$

Ans:- The gradient is , $\boldsymbol{\nabla\emptyset = \hat{\imath}(6xy - 3y^2) + \hat{\jmath}(3x^2 - 2yx)}$.