5. A body constrained to move along the z-axis of a coordinate system is subject to a constant force F given by $F = -\hat{i} + 2\hat{j} + 3\hat{k}N$ Where $\hat{i}, \hat{j}, \hat{k}$ are unit vectors along the x-, y- and z- axis of the system respectively. What is the work done by this force in moving the body a distance of 4 m along the z-axis?

Sol. Force exerted on the body, $F = -i + 2\hat{j} + 3\hat{k}N$

Displacement, $s = 4\hat{k}\text{m}$

Work done, W = Fs

$= (-\hat{i} + 2\hat{j} + 3\hat{k}) \cdot (4\hat{k})$

$= 0 + 0 - 3 \times 4$

= 12 J

Hence, 12 J of work is done by the force on the body.