Problems and Questions

Q.1: A particle moving in the xy- plane undergoes a displacement $d\vec{r} = 2\hat{\imath} + 3\hat{\jmath}\,m$, as a constant force $\vec{F} = 5\hat{\imath} + 2\hat{\jmath}\,N$, acts on the particle

1. Calculate the magnitude of the displacement and that of the force.

2. Calculate the work done by the force $\vec{F}$.

3. Find the angle between $\vec{F}$ and $d\vec{r}$.

Q.2: A particle of mass m initially at rest, is acted on by the force

$F = F_0\left[T^2 - \frac{(2t - T)^2}{T^2}\right]$ during the interval $0 \le t \le T$, prove that the velocity

of particle at the end of the interval is $\frac{2F_0T}{3m}$

Q.3: A 6Kg block initially is pulled to the right a long a horizontal, frictionless surface by a constant horizontal force of 12N. Find the speed of the block after it has moved 3m.

Q.4: A block of mass 1.6Kg is attached to horizontal spring that has a force of

$1 \times 10^3 \left(\frac{N}{m}\right)$. The spring compressed 2cm and then released from rest

a. Calculate the speed of the block as it passes through the equilibrium position $x = 0$, if the surface is frictionless

b. Calculate the speed of the block as it passes through the equilibrium position if a constant frictional force of 4N retards its motion from the moment it is release.