DPP – 1

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1. (a) $W = FS\cos\theta$

$= 5 \times 10 \times \cos 37$

$= 50 \times \frac{4}{5} = 40\ J$

(b) $W = FS\cos 143$

$= -40\ J$

2. (a) $F = T$ When particle move from A to B displacement of point of action $= \frac{\pi R}{2}$

$\rightarrow W = FS\cos\theta$

$= F \cdot \frac{\pi R}{2}$

$= \frac{\pi RF}{2}$

(b) When particle move from A to B displacement of point of action

$= R\sqrt{2}$

$W = F \cdot R\sqrt{2}$

3. $\vec{F} = (2\hat{i} + 3\hat{j} + 4\hat{k})N.$

$\vec{S} = (\hat{i} + 2\hat{j} + 3\hat{k})m.$

$W = \vec{F} \cdot \vec{s}$

$= 2 + 6 + 12$

$W = 20\ J$

4. $F = 2x$

$W = \int \cdot dx$

$= \int_2^5 2xdx = \left[\frac{2x^2}{2}\right]_2^5$

$W = (25 - 4) = 21\ J$

5. $\vec{F} = (3\hat{i} + 2\hat{j})N$

$y = x + 2$

$x = 0\ y = 2$

$x = 5\ y = 7$

$\vec{s} = \hat{i} + 5\hat{j}$

$w = \vec{F} \cdot \vec{s} = 15 + 20 = 25$ Joule

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6. $\vec{F} = x\hat{i} + y\hat{j}$

$y = x + 2$

$dy = dx$

$W = \int_0^2 F_x dx + \int_2^4 F_y dy$

$= \left[\frac{x^2}{2}\right]_0^2 + \left[\frac{y^2}{2}\right]_2^4$

$= 2 + [8 - 2] = 8J$

7. z-component of the force and the x-Component of displace mont are not used in work done so.

Total work done given as

$d\omega = Fydy = 3xydy$

$d\omega = 6x^2 dx$

$\omega = \int d\omega = \int_0^2 6x^4 dx$

$= \frac{6}{5}[x^5]_0^2 = \frac{192}{5}.$

8. $x = 0\ v = 4\ m/s$

$x = 2\ v = 16\ m/s$

$\omega_{net} = \frac{1}{2}m[v^2 - u^2]$

$= \frac{1}{2} \times 0.5[(16)^2 - (4)^2]$

$= 60\ J$

9. $W_1 = 0$

$W_2 = F(x_2 - x_1)$

$W_3 = F(x_2 - x_1) + \frac{1}{2}F \times (x - x_2)$

$W_3 = W_2 + \frac{1}{2}F(x - x_2)$

$W_4 = -\frac{1}{2}F(x_2 - x_1) + \frac{1}{2}F(x_3 - x_2)$

$W_3 > W_2 > W_1 > W_4$

10. $W = \int_{\vec{r_1}}^{\vec{r_2}} \vec{F} \cdot \vec{r}$

$W = \int_1^0 -xdx + \int_0^1 ydx =$

$W = \frac{1}{2} + \frac{1}{2} = 1J$