## Section - 5

Q-1 **Flywheel :-** It is used in machines to serve as a reservoir, which stores energy during the period when the supply of energy is more than the requirement and releases it during the period when the requirement of energy is more than the supply.

There are two types.

1. Disc type (2) Rim type.

**Expression**

Let $N_1$ = maximum Speed

$N_2$ = minimum speed during the

$N$ = mean speed of flywheel = $\frac{N_1 + N_2}{2}$

$C_s$ = Co-efficient of fluctuation of Speed = $\frac{N_1 - N_2}{N}$

2. The mean kinetic energy of the flywheel

$$E = \frac{1}{2} I\omega^2 = \frac{1}{2} mk^2\omega^2 \quad (\because I = mk^2)$$

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3.2 The maximum fluctuation of energy in a flywheel

$\Delta E$ = maximum KE − minimum KE

$= \frac{1}{2} I\omega_1^2 - \frac{1}{2} I\omega_2^2$

$= \frac{1}{2} I(\omega_1^2 - \omega_2^2)$

$= \frac{1}{2} mk^2(\omega_1+\omega_2)(\omega_1-\omega_2)$

$= mk^2\left(\frac{\omega_1+\omega_2}{2}\right)\left(\frac{\omega_1-\omega_2}{\omega}\right)\omega$

$= mk^2\omega^2 C_s \quad \left(\because C_s = \frac{\omega_1-\omega_2}{\omega}\right)$

$= mk^2\left(\frac{2\pi N}{60}\right)^2 C_s \quad \left(\because \omega = \frac{2\pi N}{60}\right)$

$$\boxed{\Delta E = \frac{\pi^2}{900} mk^2 N^2 C_s}$$