Section 5

Qn 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 requirment of energy is more than the supply

types of Flywheel

1. Disc type
2. Rim type.

Energy stored by flywheel

1. Let

N_1 = maximum speed during the cycle

N_2 = minimum speed during the cycle

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

$E = \frac{1}{2} I\omega^2 = \frac{1}{2} mk^2\omega^2$ $[I = mk^2]$

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3. The maximum fluctuation of energy in flywheel

ΔE = maximum kinetic energy − minimum K.E

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

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

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

$= mk^2 \omega^2 C_s$

$\left[C_s = \frac{\omega_1 - \omega_2}{\omega} \right.$

$\therefore \omega = \frac{2\pi N}{60}$

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

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

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