Answer on Question #41144 – Physics – Mechanics | Kinematics | Dynamics

A QUARTER HORSEPOWER MOTOR RUNS AT A SPEED OF 600 RPM. ASSUMING 40 % EFFICIENCY THE WORK DONE BY THE MOTOR IN ONE ROTATION WILL BE ?

Solution:

The rating of horsepower of a motor is its OUTPUT power. The INPUT power of a motor is delivered electrically and WATTs is a usual unit for that. UR questions gives an efficiency - normally, one would assume that this 40% is the MOTOR's Efficiency.

600 RPM means $60\ \text{RPS}$ or $\frac{1}{60}\frac{\text{sec}}{\text{rev}}$

$$\text{OUTPUT of motor} = 0.25\ \text{HP} = 0.25 \cdot (746\ \text{watts}) = 186.5\ \text{watts}$$

Then:

$$\text{OUTPUT of motor into work} = 186.5\ \text{watts} \cdot 0.4 = 74.6\ \text{watts}$$

Work done in $\frac{1}{60\text{s}}$:

$$\frac{\text{OUTPUT of motor into work}}{60\text{s}} = \frac{74.6\ \text{watts}}{60\text{s}} = 1.24\ \text{J}$$

Answer: work done by the motor in one rotation will be 1.24 J.

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