Q- A piston in a gasoline engine is in simple harmonic motion. Taking the extremes of its position, relative to its center point as plus or minus 5.00cm, find the maximum velocity and acceleration of the piston, when the engine is running at the rate of 3600 rev/min.

The amplitude of oscillation is A = 5.00 cm = $5.00*10^{-2}$ m

The angular frequency is given by

$$\omega = n\frac{rev}{\min} = 2\pi n\frac{radiuns}{\min} = 2\pi * 3600\frac{radiuns}{\min} = \frac{2\pi * 3600}{60}\frac{radiuns}{\sec} = 377\,\text{rad/s}$$

Hence the maximum velocity of the object making SHM will be

$v_{max} = A*\omega = 5.00*10^{-2}*377 = 18.85$ m/s

and the magnitude of maximum acceleration is given by

$a_{max} = A*\omega^2 = 5.00*10^{-2}*377^2 = 7106.45$ m/s^2 = 7.1 km/s^2