

Q11

Ans: Equations for motion

$$F_T = f_{Tf} + F_{TR}$$

$$F_T - (R_a + R_r + R_g) = m \times a$$

$$F_T = m a + R_a + R_r + R_g$$

$m a \rightarrow$ Acceleration resistance

$R_a \rightarrow$ aerodynamic resistance

$R_r \rightarrow$ rolling resistance

$R_g \rightarrow$ gradient resistance

For maximum gradeability, $R_g = W$

$$\Rightarrow F_T = m a + R_a + R_r + W$$

Q2)

Ans: $m = 1765 \text{ kg}$, $l = 2.84 \text{ m}$, $a_1 = 1.22 \text{ m}$
 $a_2 = 1.62 \text{ m}$

load on the ^{rear} ~~front~~ axle = $mg \left(\frac{a_1}{l} \right)$

$$= 1765 \times 9.8 \times \frac{1.22}{2.84}$$

$$= \underline{\underline{7437.71 \text{ N}}}$$

load on the rear axle = $mg \frac{a_2}{l}$

$$= 1765 \times 9.8 \times \frac{1.62}{2.84}$$

$$= \underline{\underline{9859.29 \text{ N}}}$$

Different parts of tire.

3) The tread

Outer section of the tire that makes contact with the road surface. It provides traction to the wheel.

→ The sidewall - Section of the tire between the tread and the ~~broad~~ bead. It helps to support the weight of the vehicle and provides protection for the tire.

→ The shoulder - The shoulder is the thickest part of the tire and it helps to evenly distribute the weight of the vehicle.

→ The bead - The bead is the innermost part of the tire that helps to seal the tire to the rim. Made up of high strength steel wire reinforced with kevlar or nylon.

The inner liner : Layer of rubber that covers the carcass and helps to keep the air inside the tire. Main function is to prevent the air from escaping.

→ The steel belt - Reinforce the tread and sidewall - offers additional support and protection to the tire and helps to improve its handling characteristics.

Based on construction of the tyre, 2 types

→ Bias ply : In these tyres, ply cords are at an angle of 30° - 40° to the tire axis.

→ Radial ply : Ply cords run in the radial direction in these tyres.