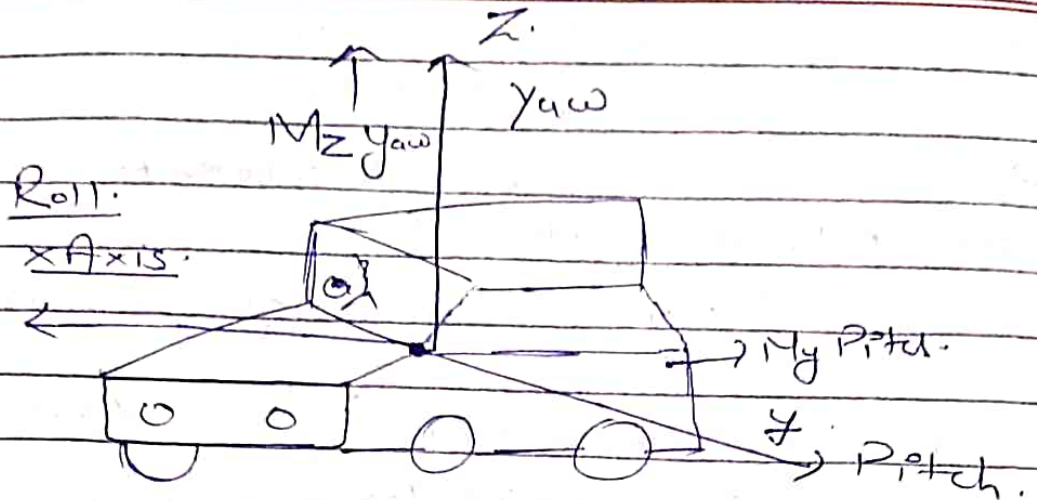


Answer 1. :-



(A) Power Train Calculation.

Acceleration $\rightarrow F_x$

(B) Steering Calculation.

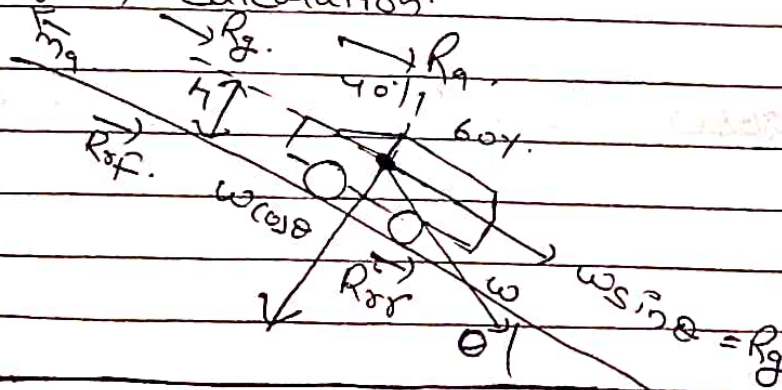
Direction change & Stability.
 $\rightarrow F_y \text{ \& } M_z$

(C) Suspension Calculation.

Vehicle Stability & Comfort $\rightarrow$
 F_z, F_y, M_x, M_y

$\rightarrow$ Coincident with C.G under Static Condition.

$\Rightarrow$ Power Train Calculation.



① Aerodynamic Resistance.

② $R_a = \frac{1}{2} \times \rho \times C_d \times A \times V^2$
 $h = \text{height of CG}$

③ Gradient Resistance / Gradient Resistance (R_g).
 $R_g = W \sin \theta$

$\theta = 0$

$R_g = 0$

If $\theta = 90^\circ$

$R_g = \text{Max}$

$\theta = \text{gradient Angle or Inclination angle}$

④ Rolling Resistance (R_R)

At the contact patch.

$R_R = R_{RF} + R_{RX}$

$= f_{40\%} + f_{60\%}$

$0.4 R_{RF} + 0.6 R_X$

4. Traction Force (F_T)

$F_T = F_{TF} + F_{TR}$

$= 40\% + 60\%$

$0.4 F_y + 0.6 F_{TF}$

For front wheel drive.

$F_T = F_{TF}$

Rear wheel drive, $F_R = F_{TR}$

$F_T - (R_a + R_R + R_g) = m a$

$F_T = \underbrace{m a}_{\text{Acceleration}} + \underbrace{R_a + R_R + R_g}_{\text{Resisting Force}}$

Resisting Force

For Max Gradability
When $\theta = 90^\circ$

$$R_g = W \sin \theta \quad \theta = 90^\circ$$

$$R_g = W \quad \text{--- (1)}$$

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

For Max. gradability



Ans 3. Tyre $\rightarrow$ Tyre is a container which is filled with compressed air.

The main function of tyre is transporting the load, provide traction & travelled over surface.

$\rightarrow$ Parts.

(A) Tread $\rightarrow$ Tread is that part of tyre which comes in contact with road & provide traction to axles through wheel & travelled over

(B) Shoulder Area: The area in b/w tread & sidewall is Shoulder Area.

(C) Sidewall $\rightarrow$ Sidewall Area is from in b/w Rim line & Shoulder Area.

The main function of Sidewall Area is to provide cushioning & act to the ~~car~~ Absorbs Shocks & sometime act as Suspension Also.

(C) Bead : Bead in tyre is used to hold the tyre on the Rim properly & prevent leakage of air.
 Bead also provide flexibility so that tyre functions works efficiently.

(D) Innerliner : Innerliner is made of soft rubber compound like ~~butyl~~ butyl rubber & prevents leakage of air from tyre.

→ Types on the basis of construction.

Radial Tyre

(1) The casing composed of one body ply and several ~~ply~~ steel plies on tread ~~area~~ ~~running~~ from bead to bead at an angle 90° to rolling direction.

2. Sidewall is Flexible

(3) Less heat generate result in rolling & higher mileage

(4) Low fuel consumption & increase vehicle mileage.

Bias Tyre

The casing composed of several body plies running from bead to bead at an angle 0 to 45° to rolling direction.

Sidewall is stiff due many no. of body plies.

High heat generate due to scissoring effect. Less mileage of tyre.

High fuel consumption to improper footpeing.