Ans-ans 2 :- ~~Torsion~~ Torsion Equation :—

- Torsion eqⁿ or torsion constant is defined as the geometrical property of a bar's cross-section that is involved in the axis of the bar that has a relationship b/w the angle of twist and applied torque where a SI unit is m^4.
- The torsion eqⁿ is given as follows :—

$$\frac{T}{J} = \frac{\tau}{\gamma} = \frac{G\theta}{L}$$

Derivation :—

following are the assumption made for the derivation of torsion eqⁿ :—

- The material is homogenous (elastic property throughout)
- The material should follow Hook's Law.
- The material should ~~follow~~ have shear stress proportional to shear strain.
- The cross section area should be plane.
- The circular section should be circular.
- Every diameter of the material should rotate

through the same angle.

- The stress of the material should not exceed the elastic limit.

* Consider a solid circular shaft with Radius 'R' that is subjected to a torque 'T' at one end and the other end under the same torque.

- Angle in radius = $\frac{\text{arc}}{\text{radius}}$

$$\text{Arc } AB = R\theta = L\gamma$$

$$\gamma = \frac{R\theta}{L}$$

Where,

A & B → two joined point on the Circular shaft.

γ → angle subtended by AB.

$G = \frac{\tau}{\gamma}$ (Modulus of rigidity)

- $\frac{G\theta}{L}$ J (substituting for the polar moment of Inertia)

$$\therefore \boxed{\frac{T}{J} = \frac{\tau}{\gamma} = \frac{G\theta}{L}}$$ Ans

Above are the steps of "Doppler Effect derivation"