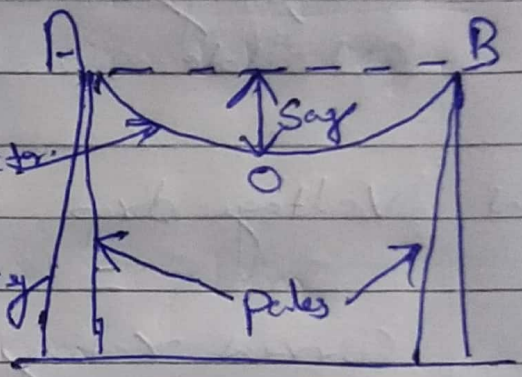
The difference in level between point of support & lowest point of Conductor is known as Sag



Sag is small as compared to span length.

The Conductor form a Catenary & is not fully stretched

$$\text{Sag } S = \frac{WL^2}{8T}$$

L = length of span in meter

W = weight per length of Conductor in kg

T = Tension in Conduct

& will be small & vice versa. therefore proper sag to be used to permit safe tention in overhead lines

(2) Height of Tower :-
If Sag is too small more tention on overhead lines and on line support poles If Sag is more or too large more Conductor material required, more weight on supports & for safety purpose high poles will be required

(3) Weight of Conductor. =
Heavier the Conductor greater will be the Sag & place where ice falls of Conductor will cause increase in Sag

(4) Length of Span.
Sag is directly proportional to the square of length of span.

(5) Working tensile strength.
Sag is inversely proportional to working tensile strength of Conductor. If other condition such as temp. length of span remain same. Working or safe tensile strength of Conductor is determined by multiplying ultimate stress and area of cross section & dividing by factor of Safety

(6) Temperature :- All metal body expand with rise in temp. therefore length of Conductor increase and the Sag also increases.

Sol $L = 250\ m$

$W = 612\ kg/1000\ m$

$W = \frac{612}{1000} = 0.612\ kg/m$ 3

Tension $T = 1430\ kg$ (1)

Sag $S = \frac{WL^2}{8T} = \frac{0.612 \times 250 \times 250}{8 \times 1430}$

Sag $= 3.43\ m$

$= \frac{3000}{2} = 1500\ kg$

$Sag\ S = \frac{WL^2}{8T} = \frac{0.612 \times 240 \times 240}{8 \times 1500}$

$Sag = 2.93\ m$

Conductor should be supported at height of = 10 + 2.93 = 12.93 meter.

A 220kv Transmission line has following data

Diameter of Conductor = 20 mm
weight of Conductor W = 680 kg/1 km

Breaking stress, $f_b = 5000\ kg/cm^2$
Factor of safety = 2.
Length of Span L = 3000 meter
and clearance required = 7m. calculate height at which conductor should be placed
Area of Crossection $\frac{\pi}{} \times \left(\frac{Diameter}{2}\right)^2$

$$a = \frac{\pi}{4} \times (2 \times 2) = 3.14\ cm^2$$

Ultimate strength = Breaking stress × Crossectional area
$= 5000 \times 3.14 = 15700\ kg$

factor of Safety = F = 2

Allowable safe strength = $\frac{15700}{2}$ $\left(\frac{Ultimate\ strength}{factor\ of\ safety}\right)$
$= 7850\ kg$

Weight of Conductor = $\frac{680}{1000} = 0.68\ kg/m$