

Leaf Spring

Laminated Spring, locomotive Spring

Truck Spring.

$$\text{Master leaf length} = 2L + \pi (d + t)^2$$

$$n = n_f + n_g$$

$$2L = 2L_1 - b$$

b - Central band width

$$L_1 = \left(\frac{2L}{n-1} \right) \times (1+b)$$

- (1) A truck Spring has 12 no of leaves. Two of which are full length leaves.

The Spring supports 1.05 m apart. Central band is 85 mm wide. Ratio of total depth to the width of the Spring is 3. The central load is given as 5.4 kN. The Permissible stress is 280 MPa. Det. (i) thick and width of the steel Spring leaves and (ii) deflection of the Spring. (iii) Length of each leaves.

Given:

$$Q P = 5.4 \text{ kN}$$

$$Q L_1 = 1050 \text{ mm}$$

$$\text{Central band (B)} = 85 \text{ mm}$$

$$\frac{\text{(depth)} \ n t}{\text{(width)} \ b} = 3 \quad , \quad \sigma_b = 280 \text{ MPa}$$

Soln:

$$Q L = Q L_1 - B$$

$$= 1050 - 85$$

$$= 965 \text{ mm}$$

$$L = 482.5 \text{ mm}$$

$$Q P = 5.4 \text{ kN}$$

$$P = 2.7 \text{ kN}$$

$$n_g = 10$$

$$n_f = 2$$

$$n = 12$$

$$P_{3G} \text{ DB} \cdot 7.104$$

$$\sigma_b = \frac{6 P L}{w n t^2} = \frac{6 P L}{\frac{n x n t}{3} x t^2}$$

$$\sigma_b = \frac{18 P L}{n^2 + 3}$$

$$Q80 \quad \frac{12 \times 2.7 \times 10^3 \times 482.5}{(12)t^3}$$

$$t^3 = 581.5 \Rightarrow t = 8.34 \text{ mm}$$

$$b = \frac{nt}{3}$$

$$b = 33.3 \text{ mm}$$

Deflection $(y) = \frac{12PL^3}{bt^3E(3n^2 + 2ng)}$

$$= \frac{12 \times 2.7 \times 10^3 \times (482.5)^3}{33.3 \times 581.5 \times 210 \times 10^9 (3 \times 2^2 + 2 \times 10^3)}$$

$$y = 34 \text{ mm}$$

$$Q_1 = \left(\frac{2L}{n-1} \right) \times 1 + b \text{ and}$$

$$= \frac{965}{11} + 85$$

$$= 172.72 \text{ mm}$$

$$Q_2 = \frac{965}{12-1} \times 2 + b \text{ and}$$

$$= 260.4 \text{ mm}$$

$$L_3 = \frac{965}{12-1} \times 3 + 85$$

$$= 348.18 \text{ mm.}$$

$$L_4 = 435.2 \text{ mm.}$$

$$L_5 = 523.6 \text{ mm}$$

$$L_6 = 611.32 \text{ mm.}$$

$$L_7 = 699.04 \text{ mm.}$$

$$L_8 = 786.76 \text{ mm}$$

$$L_9 = 874.28 \text{ mm}$$

$$L_{10} = 962.2 \text{ mm.}$$

$$L_{11} = 1049.92 \text{ mm.}$$

$$L_m = 2L_1 + 2\pi (d + t)$$

$$= 2 \times 525 + \pi (17 + 8.34)$$

$$= 1209.6 \text{ mm.}$$

