

for member ABC:-

$$\uparrow \sum M_A = 0$$

$$R_B \times 1 - T \cdot \sin 60 \times 2.5 = 0$$

$$T = \frac{577.351}{2.162} = 266.675 \text{ N}$$

$$\rightarrow \sum F_x = 0$$

$$A_x + 577.351 - 266.675 \times \sin 60 = 0$$

$$\therefore A_x = -346.425 \text{ N} = 346.425 \text{ N} \leftarrow$$

$$\uparrow \sum F_y = 0 \Rightarrow A_y - 266.675 \times \cos 60 = 0 \Rightarrow A_y = 133.338 \text{ N} \uparrow$$

Ex. No. 2:- Determine the load (P) required to hold bar AB in a horizontal position on the smooth inclined surfaces?

Sol:-

$$\rightarrow \sum F_x = 0$$

$$R_A \cdot \sin 60 - R_B \sin 45 = 0$$

$$0.866 R_A - 0.707 R_B = 0 \quad \text{--- (1)}$$

$$\uparrow \sum F_y = 0 \Rightarrow R_A \cdot \cos 60 + R_B \cdot \cos 45 - P - 400 = 0 \Rightarrow 0.5 R_A + 0.707 R_B - P = 400 \quad \text{--- (2)}$$

$$\uparrow \sum M_A = 0$$

$$P \times 4 + 400 \times 18 - R_B \cdot \cos 45 \times 20 = 0$$

$$4P - 14.142 R_B = -7200 \quad \text{--- (3)}$$

Solve eq. (1), (2) & (3)

$$R_A = 472 \text{ N}, R_B = 578 \text{ N}, P = 245 \text{ N}$$

Another solution:-

$$\tan 45 = \frac{y}{x} \Rightarrow 1 = \frac{y}{x} \Rightarrow y = x$$

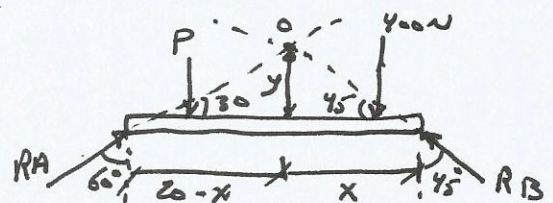
$$\tan 30 = \frac{y}{20-x} \Rightarrow 0.577 = \frac{y}{20-x}$$

$$0.577(20-x) = x \Rightarrow x = 7.318 \text{ m}$$

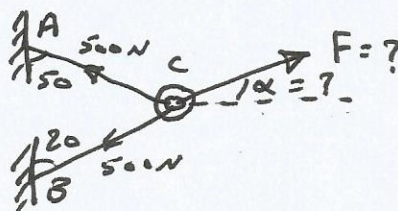
$$\uparrow \sum M_O = 0$$

$$400 \times (7.318 - 2) - P(16 - 7.318) = 0$$

$$2127.2 = 8.682 P \Rightarrow P = 245 \text{ N}$$



H.w. No. 13:- Two cables are tied together at C, as shown in figure. Find the maximum force (F) for which the tension in cables A and BD does not exceed 500N. In what direction must this maximum force act?

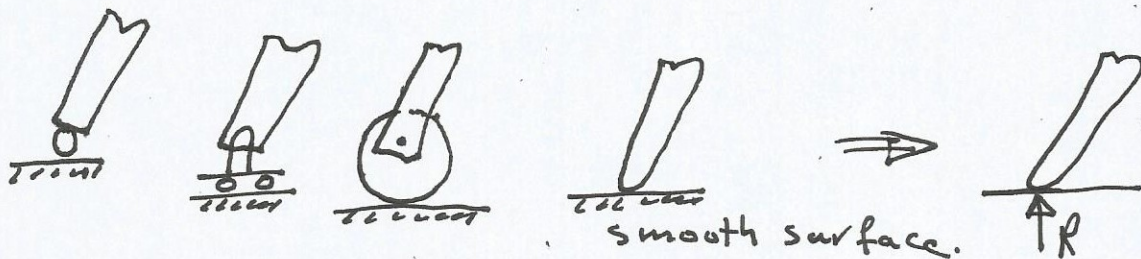


- Analysis of structures:-

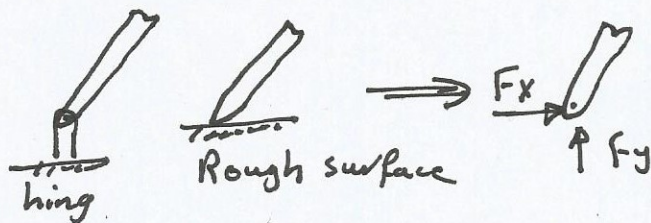
Structure:- A body consisting of many members or bars connected together in different ways according to the type of its material (steel, timber, reinforced concrete,).

- Types of supports:-

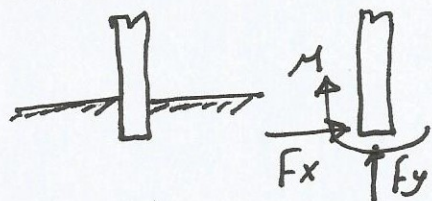
① Rollers, balls:-



② Smooth pin or hinge:-



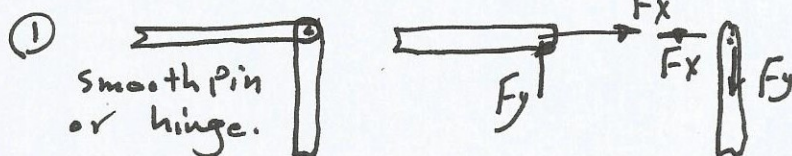
③ Fixed support:-



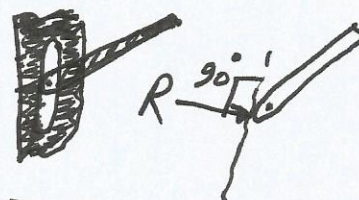
④ Spring:-



- Types of connections:-



② Pin in smooth slot



③ Rigid joint:-

