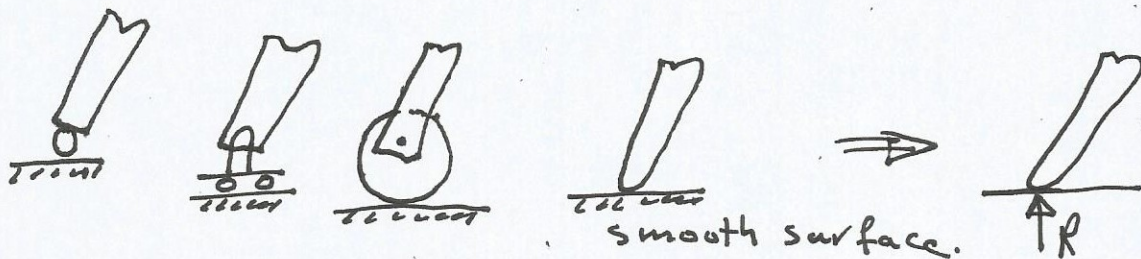


- Analysis of structures:-

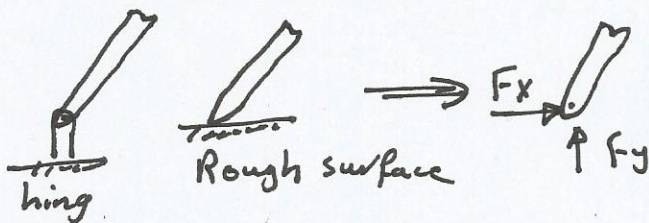
Structure:- A body consisting of many members or bars connected together in different ways according to the type of its material (steel, timber, reinforced concrete,).

- Types of supports:-

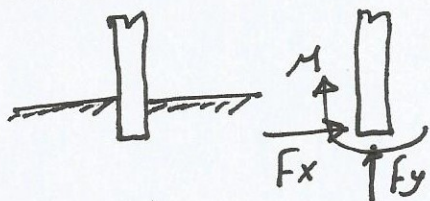
① Rollers, balls:-



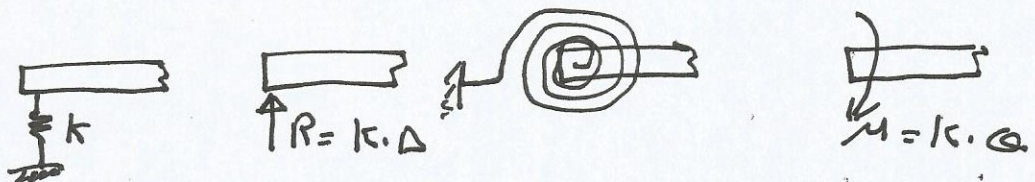
② Smooth pin or hinge:-



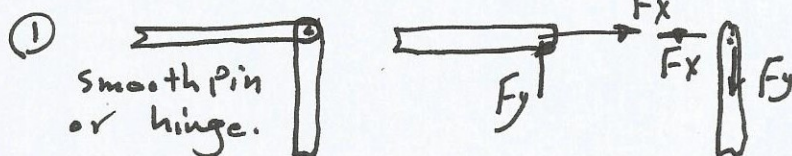
③ Fixed support:-



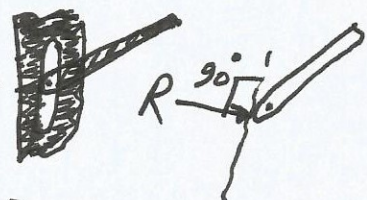
④ Spring:-



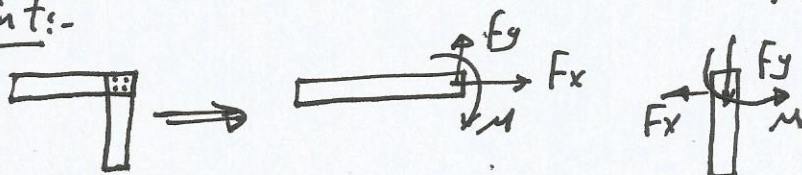
- Types of connections:-



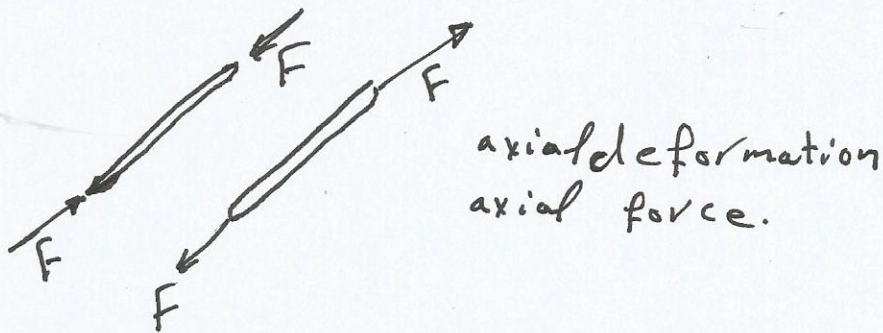
② Pin in smooth slot



③ Rigid joint:-

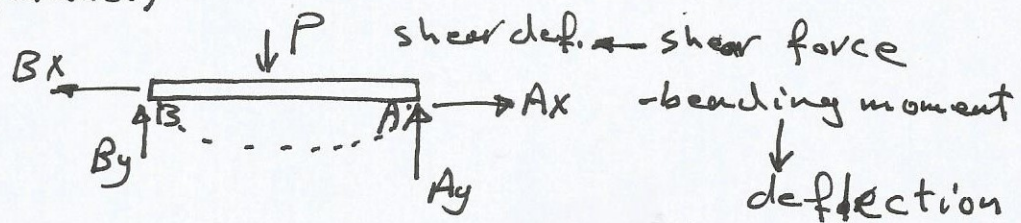


— Two-force member!- is one subjected to only two forces applied at two points which are equal in magnitude opposite and have the same line of action. (trusses).



— Three-force member!- is one subjected to three or more forces (all of them are not parallel).

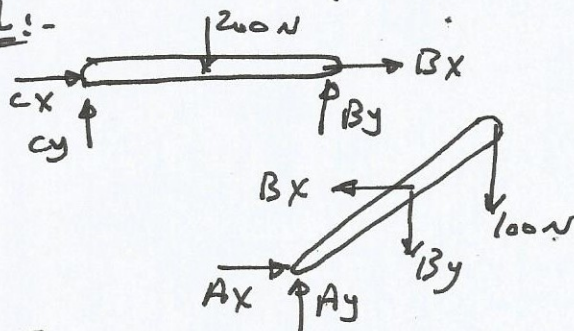
axial force
↓
axial deformation



I- Frames!- A structure that some or all its members are three-force member (i.e. some of its members subjected to bending action).

Ex. No. 1!- The structure shown in figure is hinged at A, B and C. Find the horizontal and vertical components of the hinge force at A, B and C?

Sol!-



Frame BC as F.B.D.

$$\uparrow \sum M_C = 0 \Rightarrow 200 \times 5 - B_y \times 10 = 0 \Rightarrow B_y = 100 \text{ N}$$

$$\uparrow \sum F_y = 0 \Rightarrow C_y + 100 - 200 = 0 \Rightarrow C_y = 100 \text{ N} \uparrow$$

Frame AB as F.B.D.

$$\uparrow \sum M_A = 0 \Rightarrow 100 \times 8 + 100 \times 6 - B_x \times 8 = 0 \Rightarrow B_x = 175 \text{ N} \leftarrow$$

$$\rightarrow \sum F_x = 0 \Rightarrow A_x - 175 = 0 \Rightarrow A_x = 175 \text{ N} \rightarrow$$

$$\uparrow \sum F_y = 0 \Rightarrow A_y - 100 - 100 = 0 \Rightarrow A_y = 200 \text{ N} \uparrow$$

Frame BC as F.B.D.

$$\rightarrow \sum F_x = 0 \Rightarrow C_x + 175 = 0 \Rightarrow C_x = -175 \text{ N} \rightarrow$$

$$\therefore C_x = 175 \text{ N} \leftarrow$$

