FED006U1M - **Engineering Mechanics**

Analysis of Structures

By

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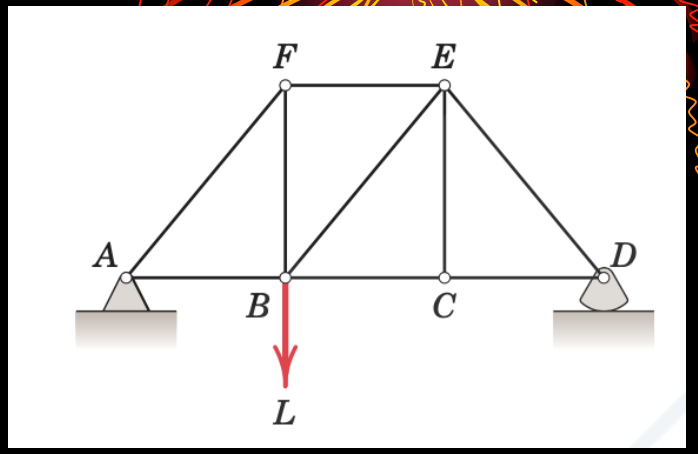
Overview

- ✓ Internal Statical Indeterminacy
- ✓ Plane Trusses or Pin Jointed Plane Frames.
- ✓ Method of Joints
- ✓ Discussion and Summary

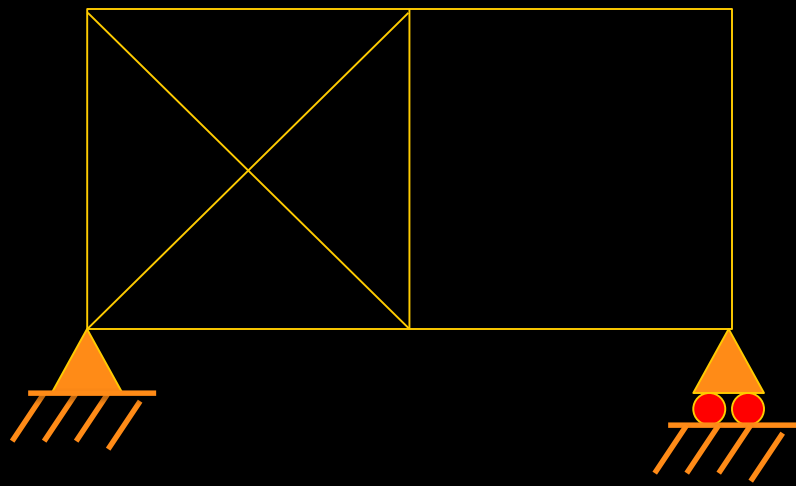
Internal Statical Indeterminacy



- If a truss has more number of members than necessary to prevent collapse when removed from the supports, then these extra members constitute internal redundancy
- For internally determinate truss

$$m = 2j - 3$$

- This condition is necessary but not sufficient



Internal Statical Indeterminacy

- **Internal plus external indeterminacy constitutes total Statical Indeterminacy**

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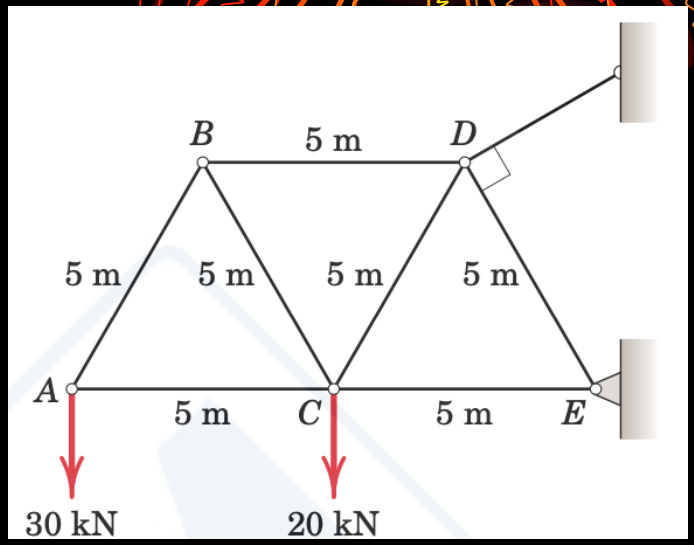
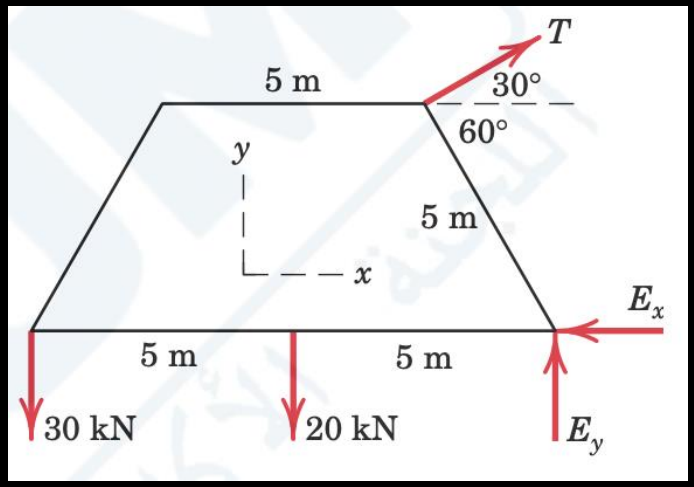
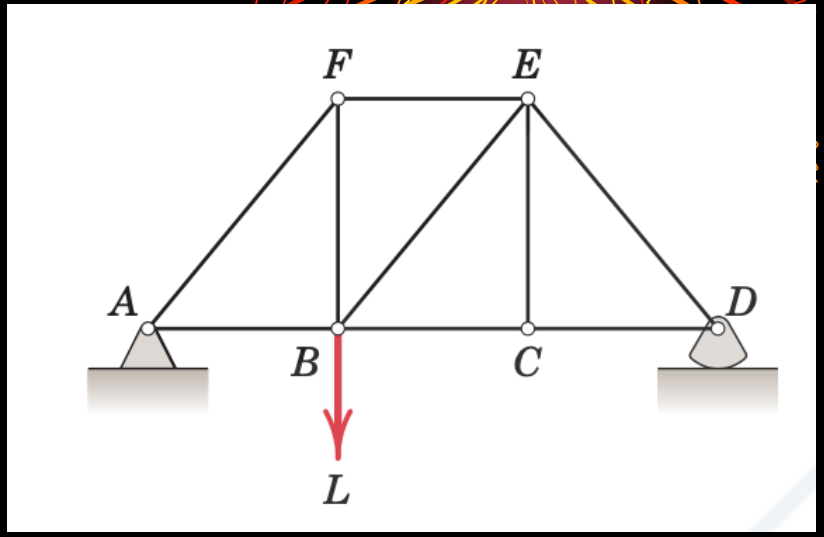
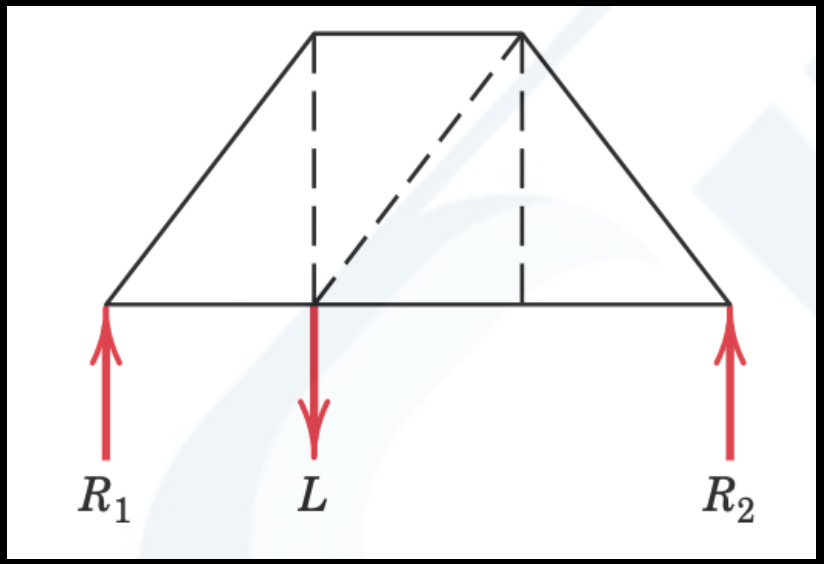




Analysis of Plane Truss

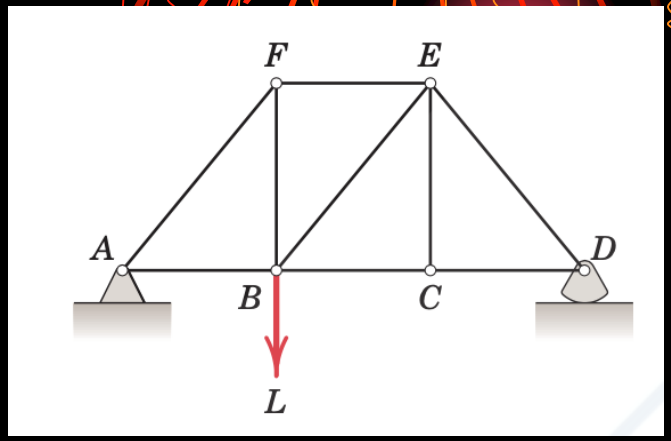
- ✓ All the joints in the truss are idealized as pin joints.
- ✓ Forces are applied at joints only.
- ✓ All the members carry only axial forces

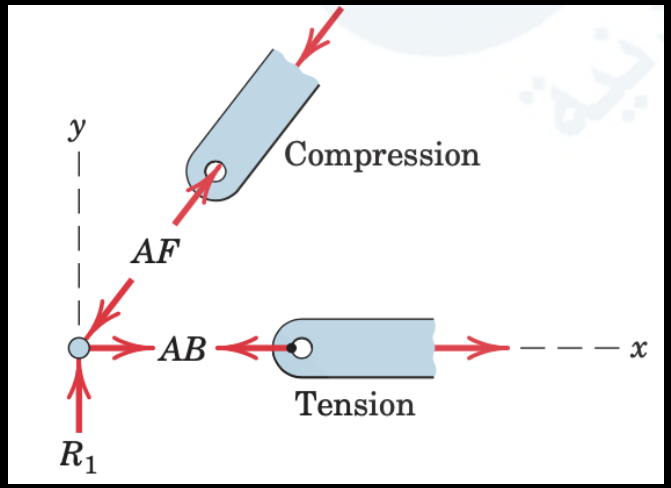




Method of Joints

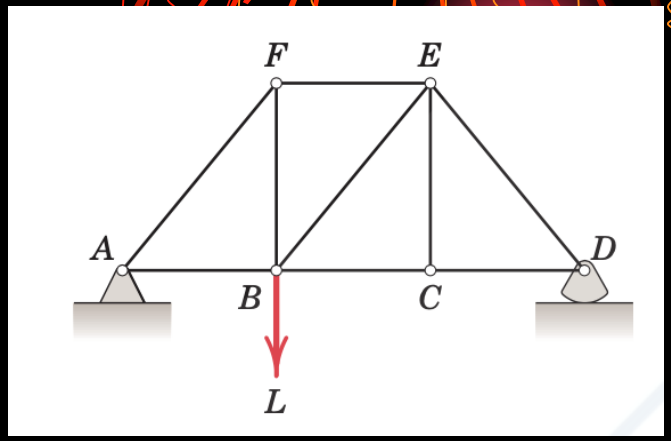
- ✓ Used for finding the forces in the members of a truss or pin jointed plane frames.
- ✓ Equations of Equilibrium are applied at each joint
- ✓ Forces are Concurrent at each joint
- ✓ So only TWO independent equations of equilibrium are involved

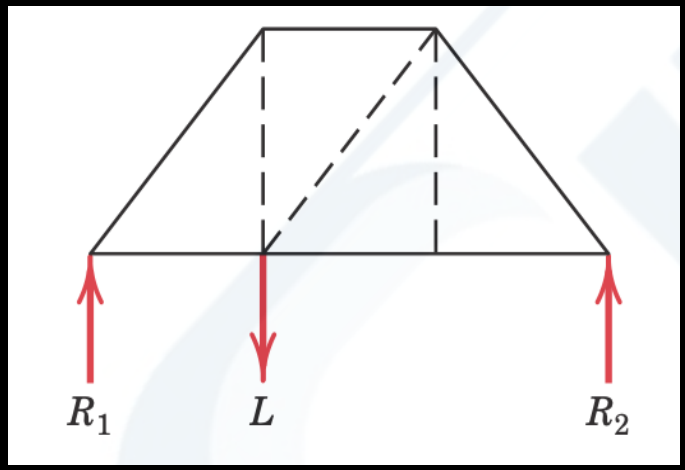




Method of Joints

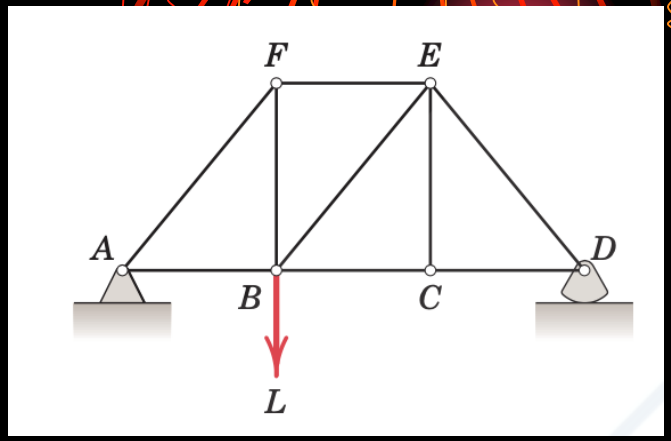
- ✓ Analysis of forces is carried out at each joint.
- ✓ Normally Free-Body diagram of the whole body is drawn first.
- ✓ Reactions at the supports are calculated.

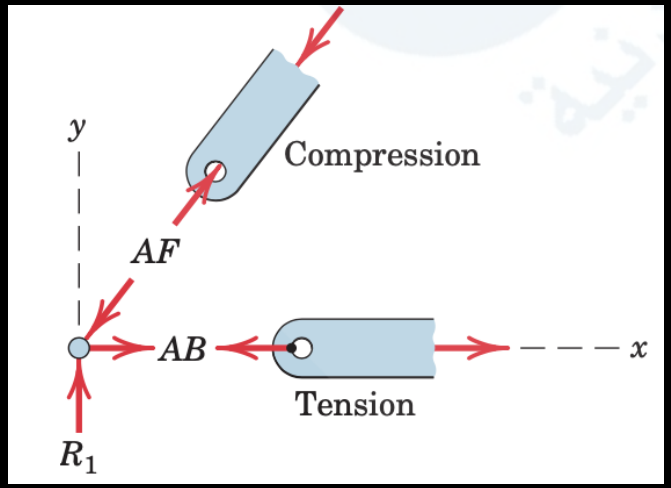




Method of Joints

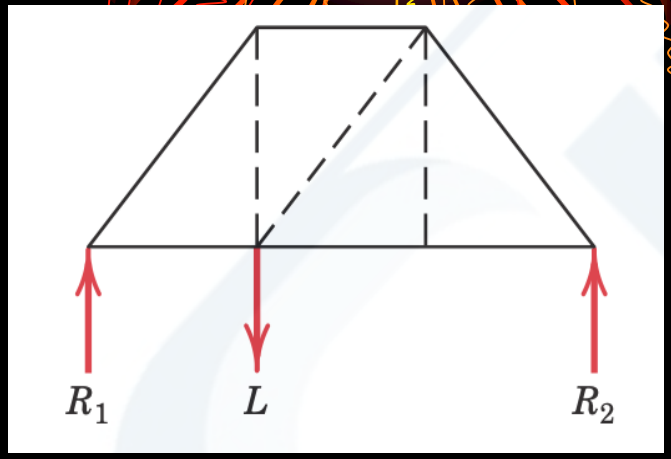
- ✓ **Free-Body diagram of each joint is drawn.**
- ✓ **Forces exerted by the members on the joint are evaluated.**
- ✓ **Analysis of each joint is carried out one by one ensuring that at least one known force is present and not more than two unknown forces are there.**

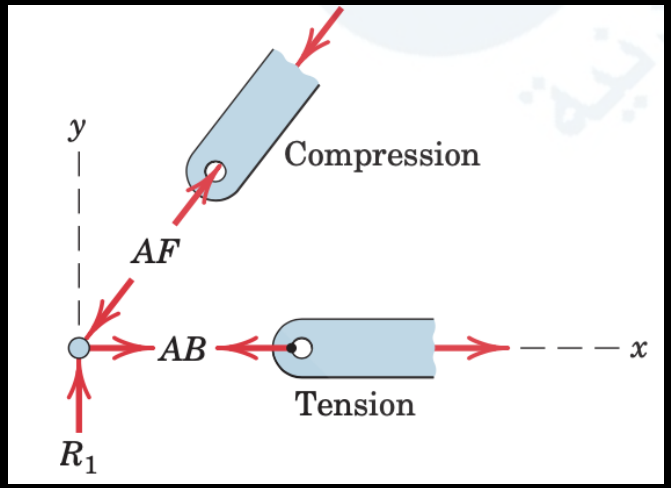




Method of Joints

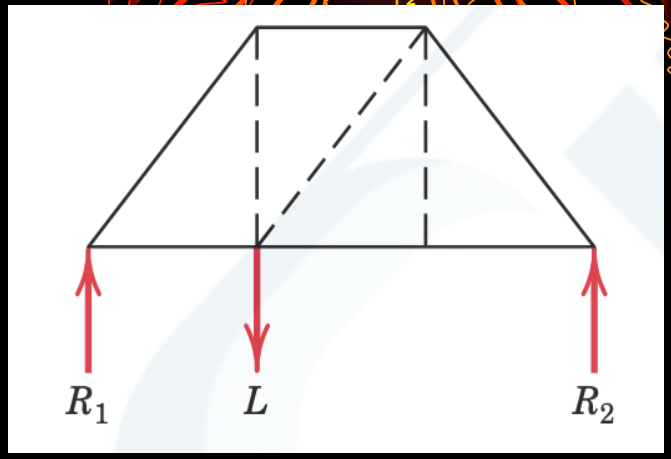
- ✓ **Two Equations of equilibrium are applied at each joint.**
- ✓ **Unknown forces are calculated**

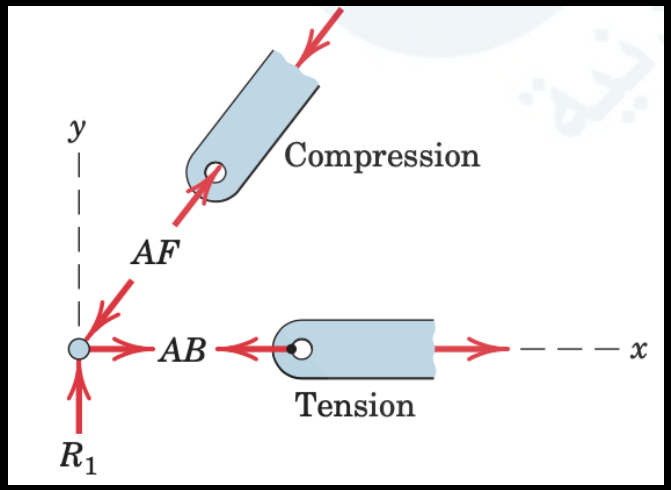




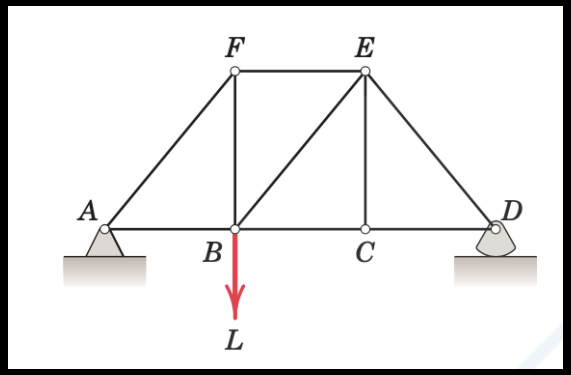
Method of Joints

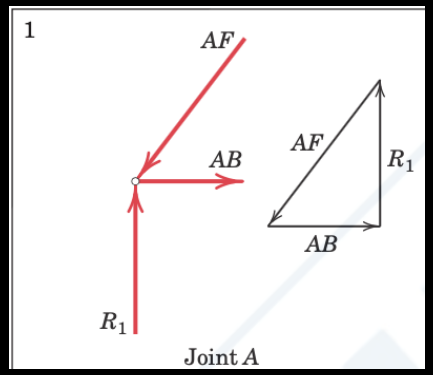
- ✓ **Free-Body diagram of the members at the joints is also drawn.**
- ✓ **Forces transferred to the next joint and steps are repeated**

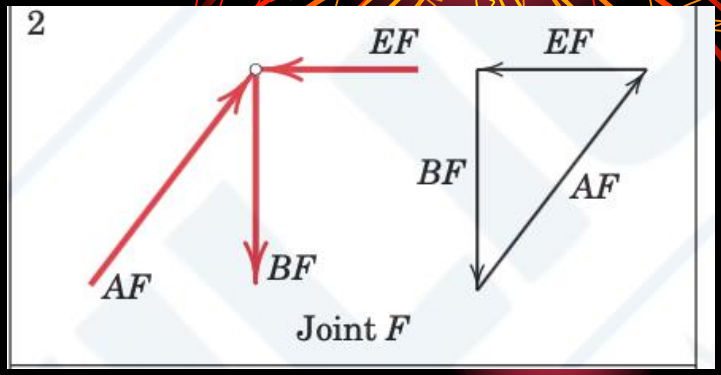




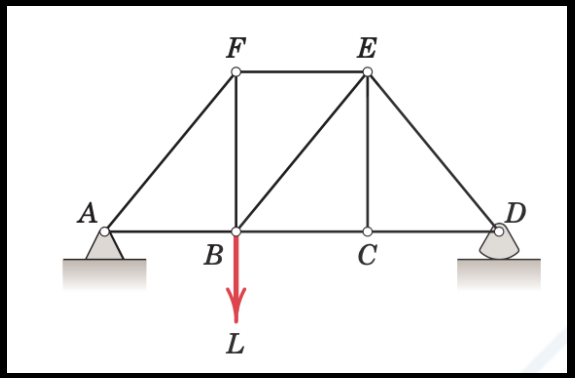
Method of Joints

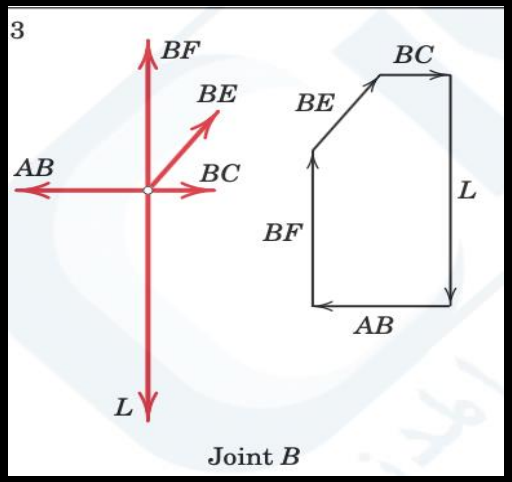


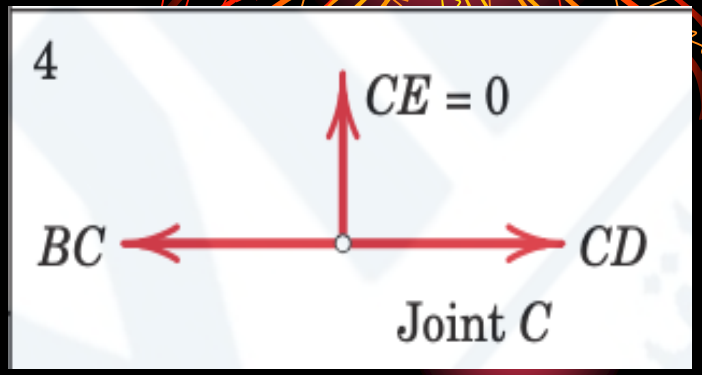




Method of Joints







Discussions & Summary