ES 221: Mechanics of Solids

# ANALYSIS OF TRUSS SYSTEM


GROUP 5

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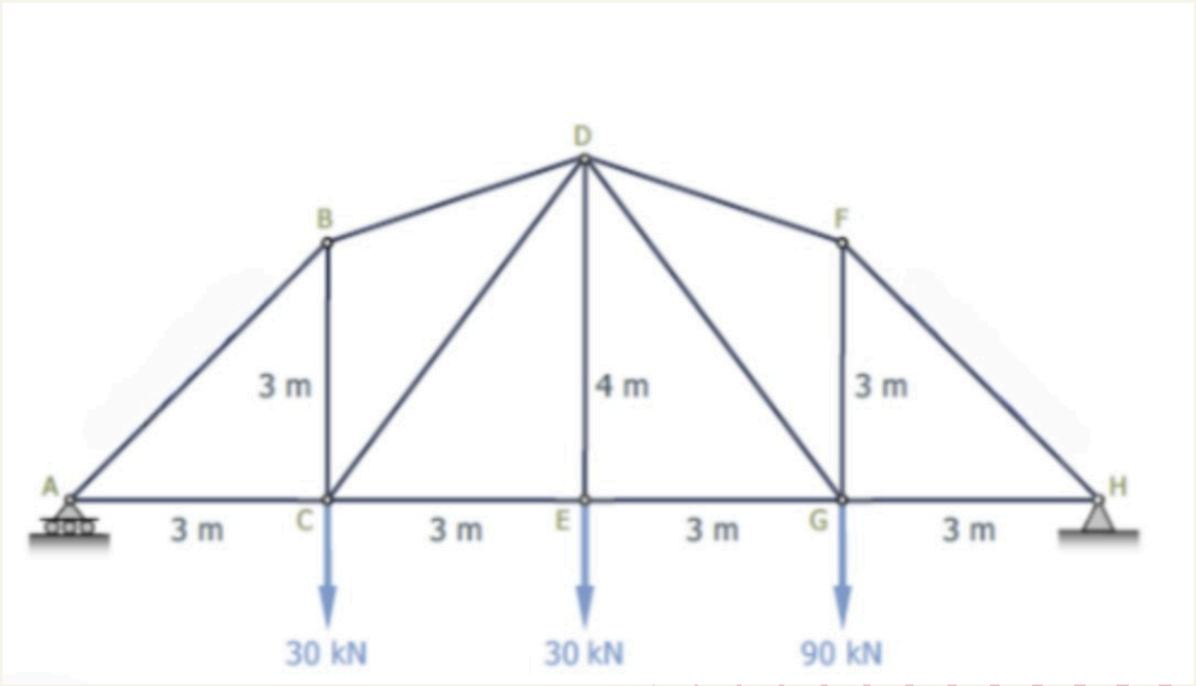
# PROBLEM STATEMENT

Trusses are essential structural systems commonly used to support loads in bridges, towers, and buildings. In such structures, members are subjected to axial forces—either tension or compression—depending on the loading conditions and support configuration. This problem involves analyzing a fixed truss to determine the internal force in each of its members and to classify the nature of these forces as either tensile or compressive.

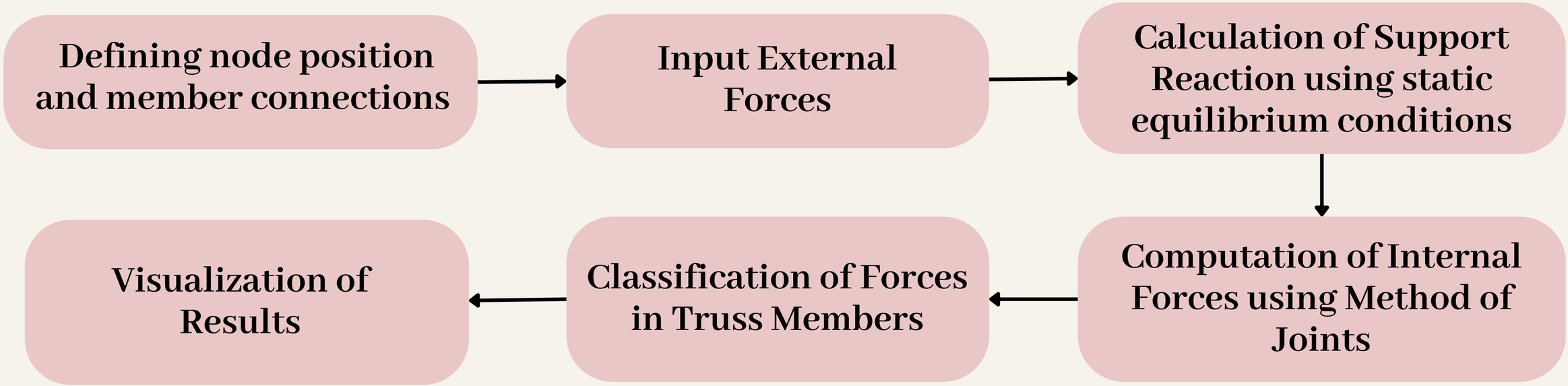


# METHODOLOGY



- Tool used: Wolfram Mathematica
- Methods used : 1) Static Equilibrium Equation  2) Method of Joints

## STEPS INVOLVED



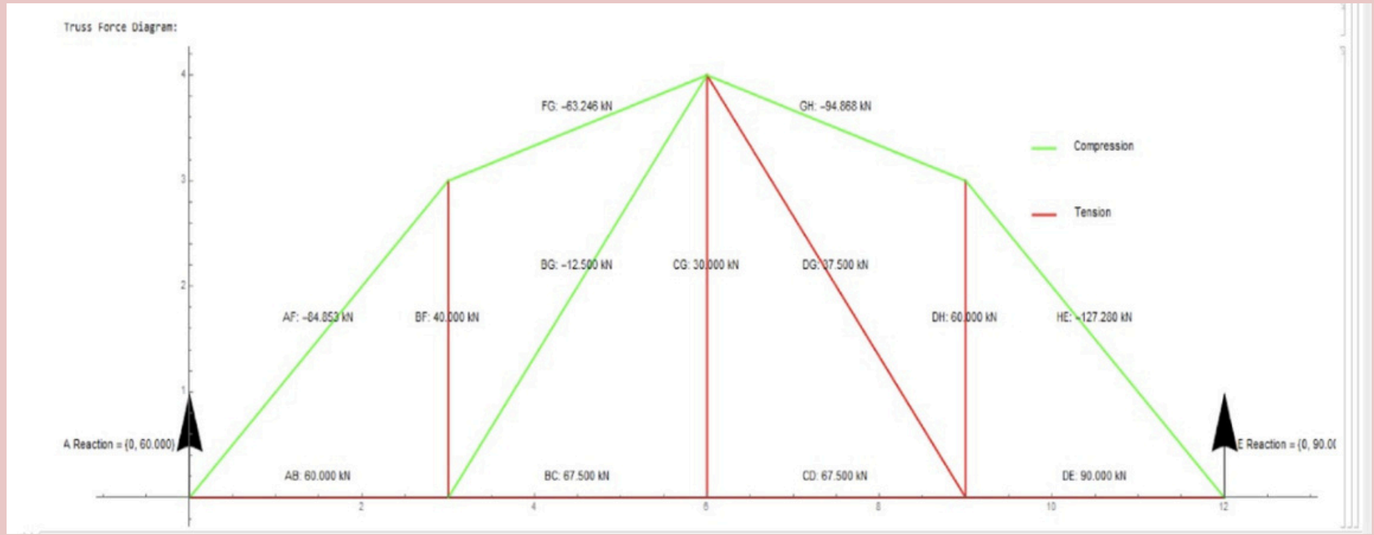
# RESULTS



## Computed values and Nature of the Force in Truss Members

| Member | Nature of Force | Force (kN) |
|---|---|---|
| $F_{AB}$ | Tensile | 60.000 |
| $F_{BC}$ | Tensile | 67.500 |
| $F_{CD}$ | Tensile | 67.500 |
| $F_{DE}$ | Tensile | 90.000 |
| $F_{AF}$ | Compressive | 84.853 |
| $F_{BF}$ | Tensile | 40.000 |
| $F_{FG}$ | Compressive | 63.246 |
| $F_{CG}$ | Tensile | 30.000 |
| $F_{GH}$ | Compressive | 94.868 |
| $F_{DH}$ | Tensile | 60.000 |
| $F_{HE}$ | Compressive | 127.280 |
| $F_{BG}$ | Compressive | 12.500 |
| $F_{DG}$ | Tensile | 37.500 |

## Visualization of Truss Force Diagram



# CONCLUSION

1. Successfully analyzed a fixed truss using static equilibrium and the Method of Joints.
2. Developed a Mathematic tool to compute and visualize internal forces.
3. Results aligned with theory and provided clear structural insights,