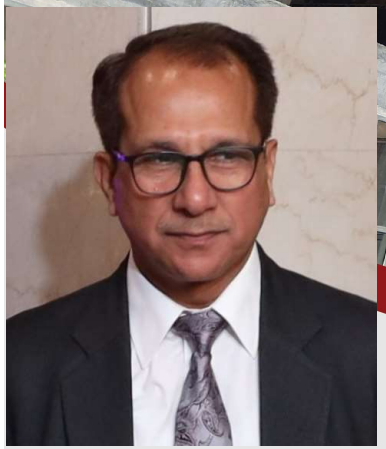
Analysis of Trusses



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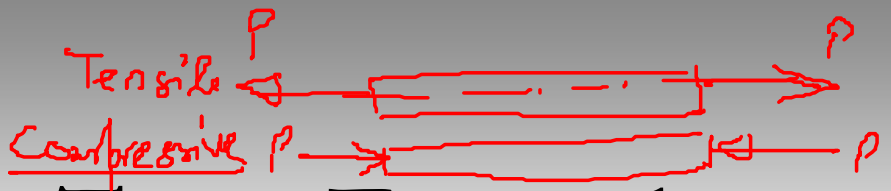
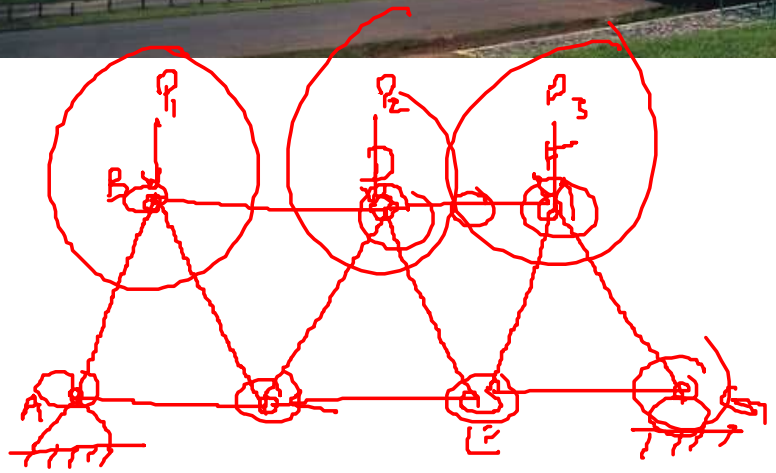
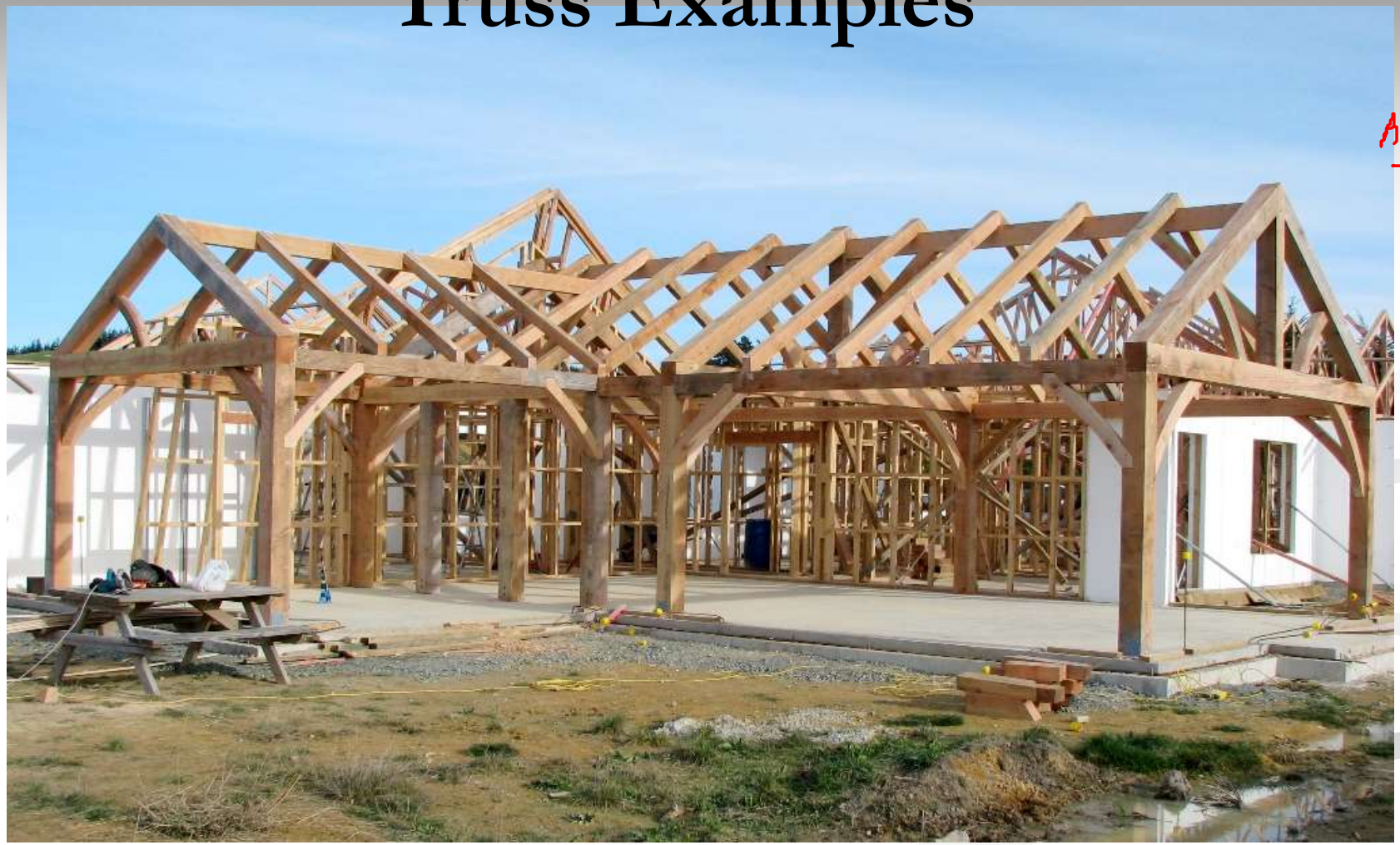


Truss Examples



Truss Examples



Truss Examples

Truss Examples

TRUSS

A truss is a structure composed of slender members joined together at their end points. The members commonly used in construction consist of wooden struts or metal bars. In particular, planar trusses lie in a single plane and are often used to support roofs and bridges.

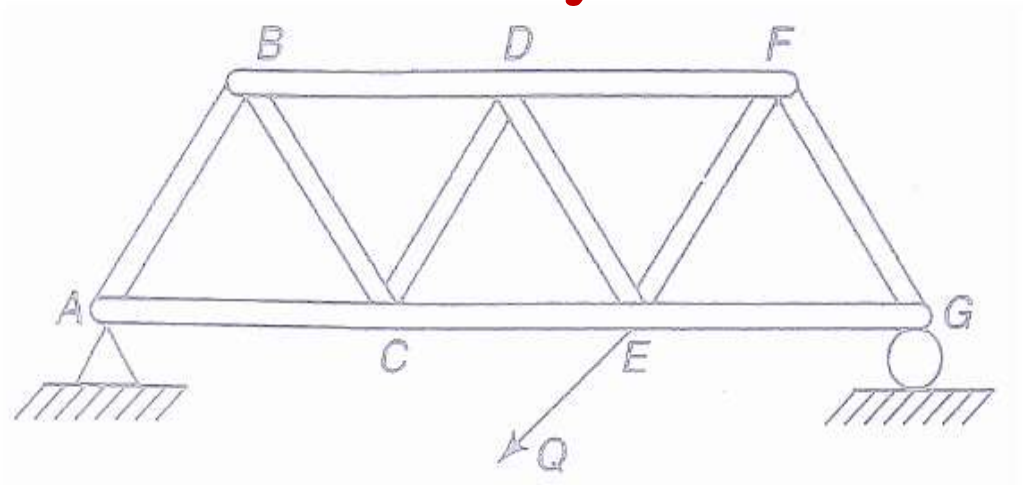
ANALYSIS OF TRUSS

- To study how to determine the magnitude and nature of forces in the members of a truss using different methods.
- To analyze the forces acting on the members of frames and machines composed of pin-connected members.

Methods of Analysis of a Truss

- METHOD OF JOINTS
- METHOD OF SECTION
- GRAPHICAL METHOD

Assumptions in the Analysis of a Truss

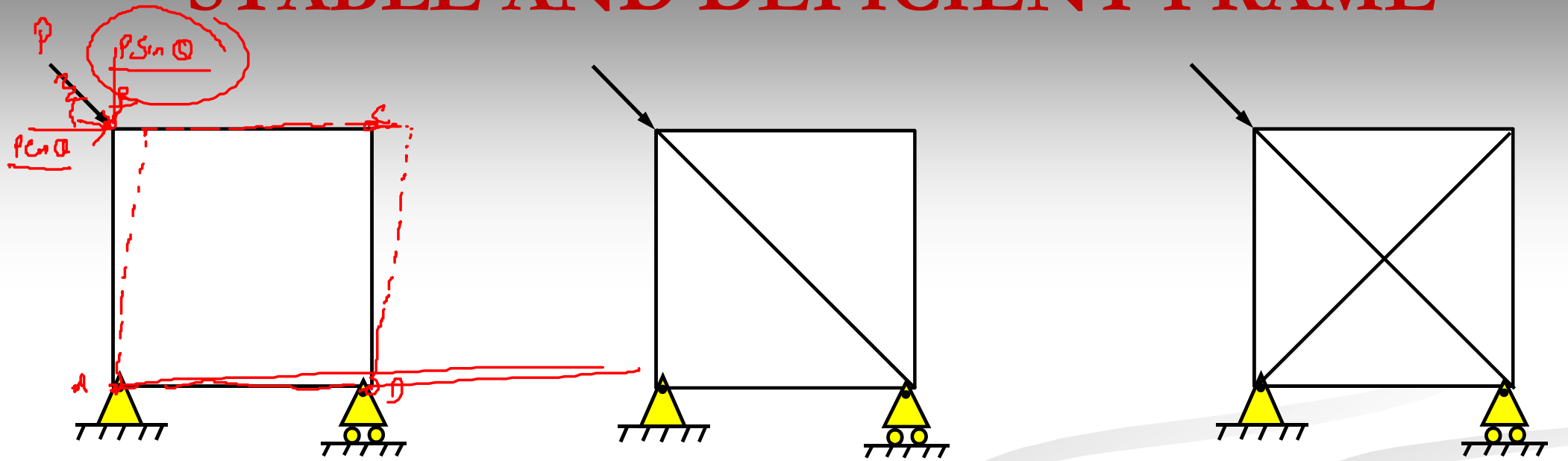


Truss: A plane truss is defined as a system of bars, all lying in one plane and joined together at their ends by pin joints.

Assumptions:

1. The bars are connected at their ends by frictionless hinges.
2. All the bars are lying in one plane.
3. The forces acting on the bars are applied at the hinges only.
4. The forces must act on the same plane of the bars.

STABLE AND DEFICIENT FRAME



Unstable frame

Deficient frame

Stable frame

Perfect frame

Redundant frame

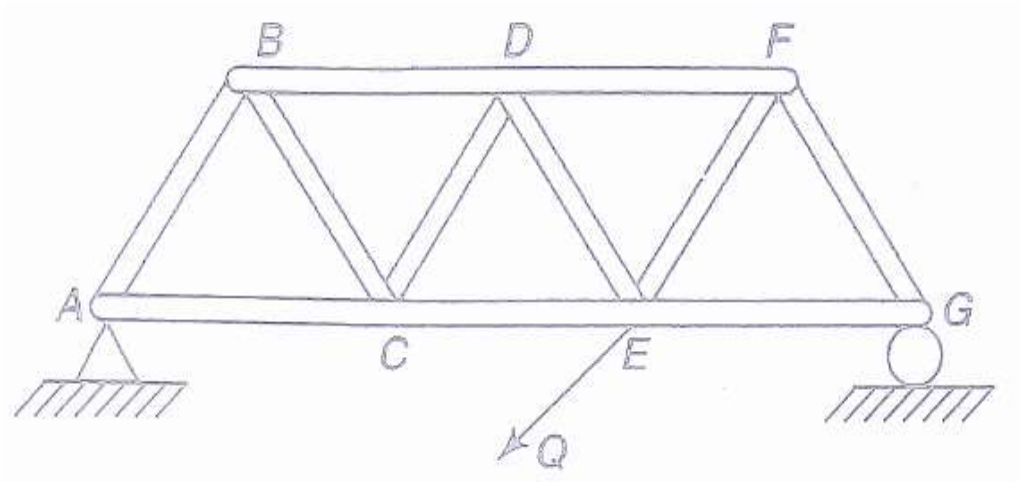
STABLE AND DEFICIENT FRAME

n – number of members in the truss
j – number of joints " " "

$If \quad n < 2j - 3 \rightarrow \quad$ ***Deficient frame***

$If \quad n = 2j - 3 \rightarrow \quad$ ***Perfect frame*** (***Statically determinate***)

$If \quad n > 2j - 3 \rightarrow \quad$ ***Redundant frame*** (***Statically indeterminate***)

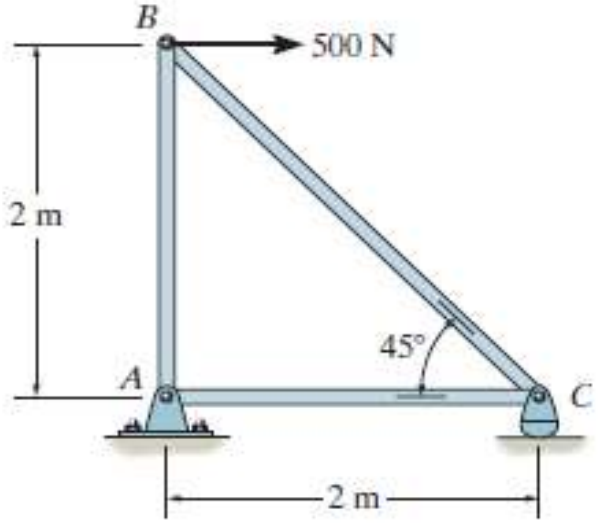


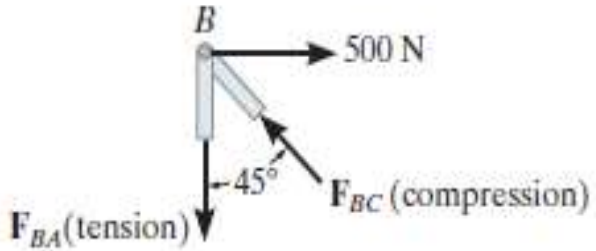
$$n = 11 \; and \; j = 7, \qquad \rightarrow 2 \times 7 - 3 = 11,$$

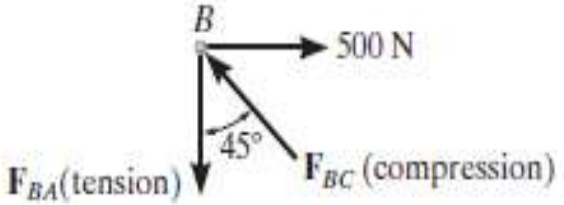
$$Perfect \; frame$$

METHOD OF JOINTS

This method is based on the fact that if the entire truss is in equilibrium, then each of its joints is also in equilibrium.







FBD of joint B