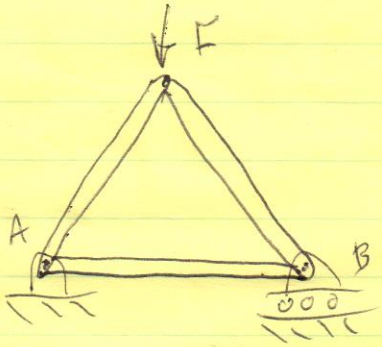
LECTURE 10 CHAPTER 6: ANALYSIS OF STRUCTURES

TRUSSES ARE USED IN BRIDGES AND BUILDINGS. THE INDIVIDUAL MEMBERS ARE PINNED AT THE ENDS. = P. ~~277~~ 286

THE SIMPLEST TRUSS IS A TRIANGLE:



WE WILL LEARN TWO WAYS TO ANALYZE TRUSSES:

- METHOD OF JOINTS
- METHOD OF SECTIONS.

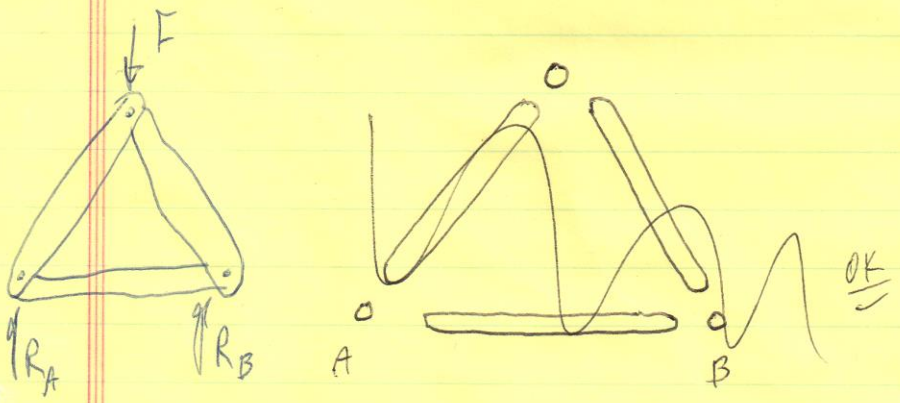
OUR IMMEDIATE OBJECTIVE IS TO FIND WHETHER MEMBERS ARE IN TENSION OR COMPRESSION, AND THE MAGNITUDE OF THE FORCE IN EACH MEMBER. (INTERNAL FORCE VS. EXTERNAL FORCE)

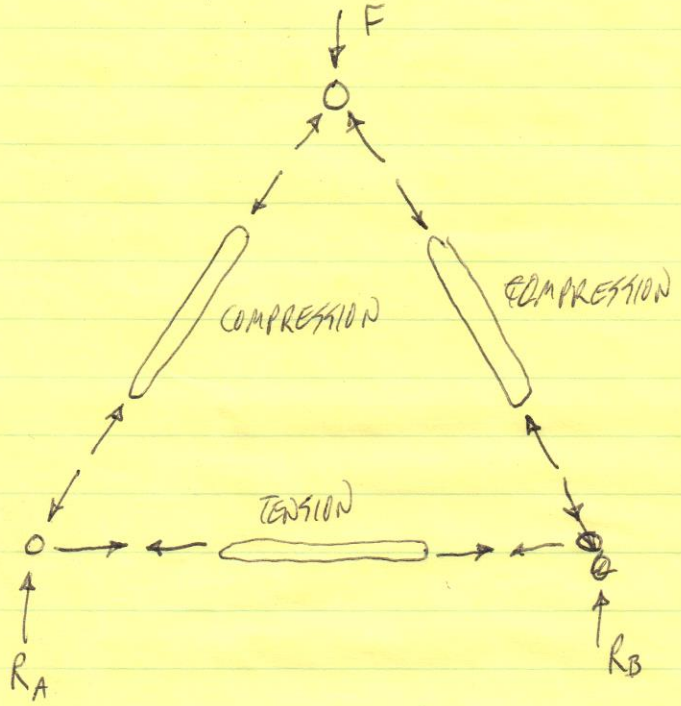
KNOWING THE CROSS-SECTION OF A MEMBER, and THE YIELD STRENGTH OF THE MATERIAL, WE CAN DETERMINE IF A PARTICULAR MEMBER WILL FAIL UNDER THE LOADING CONDITIONS.

BUCKLING

METHOD OF JOINTS

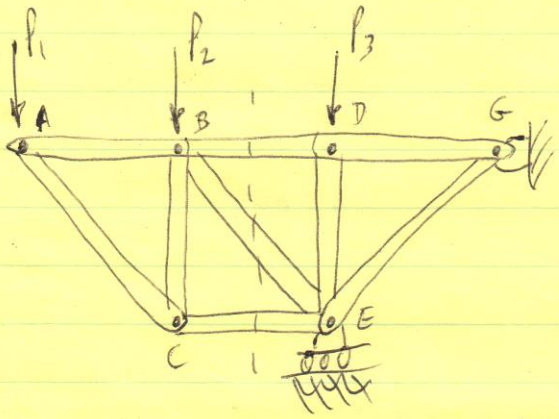
DISASSEMBLE THE TRUSS, DRAW FREE-BODY DIAGRAMS OF THE PINS AND MEMBERS, WRITE $\Sigma F_x = 0$, $\Sigma F_y = 0$ FOR EACH PIN AND MEMBER.



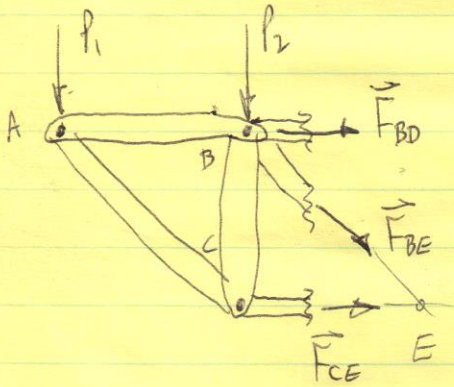


METHOD OF SECTIONS

METHOD OF JOINTS IS USED WHEN ALL FORCES IN MEMBERS IS NEEDED; M.O.S. IS USED WHEN A SELECT FEW ARE NEEDED.



TO FIND F_{BD}, PASS A SECTION THROUGH NO MORE THAN THREE MEMBERS. LOOK AT THE LEFT-HAND SIDE:

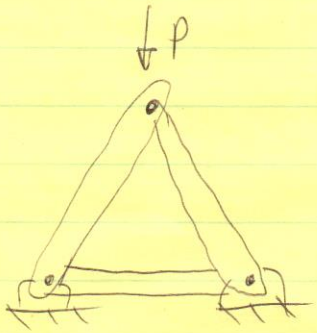


ASSUME DIRECTION OF UNKNOWN FORCES (TENSION IN THIS CASE).

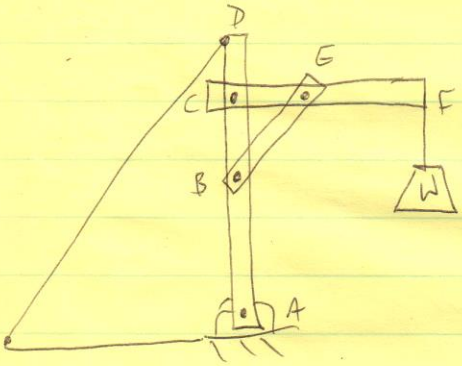
WE CAN $\Sigma F_x = 0$, $\Sigma F_y = 0$, $\Sigma M = 0$. IF WE'RE SMART, WE CAN ~~ALSO~~ $\Sigma M_E = 0$ TO ELIMINATE $\vec{F}_{BE}$ AND $\vec{F}_{CE}$; ~~AND~~ THIS GIVES $\vec{F}_{BD}$ DIRECTLY.

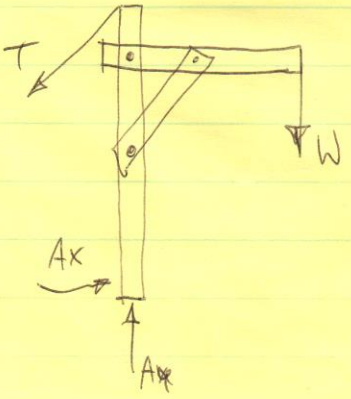
LECTURE 11

WE FOUND THAT TRUSSES WERE COMPOSED OF TWO-FORCE MEMBERS.



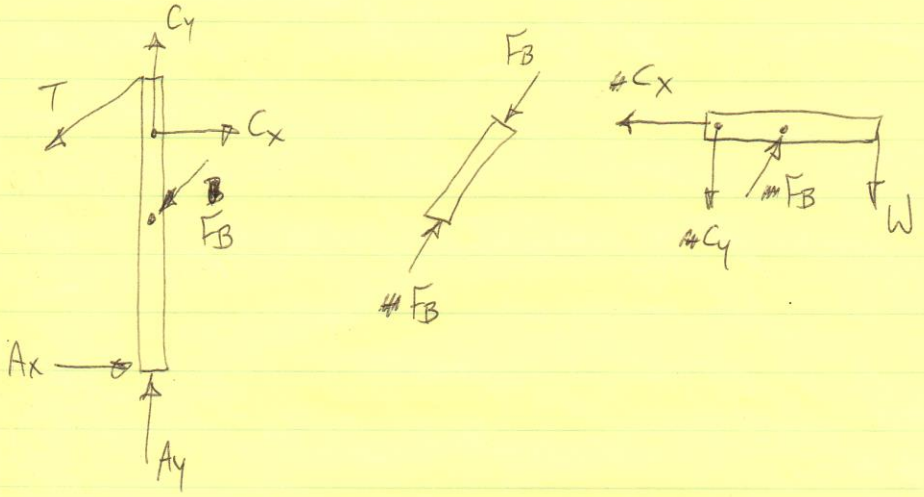
A FRAME IS A STRUCTURE WHOSE MEMBERS MAY BE MULTI-FORCE MEMBERS.





FBD OF ENTIRE FRAME: SOLVE FOR REACTIONS

FBD OF EACH MEMBER: BE IS A 2-FORCE MEMBER



NOW WE CAN $\Sigma \vec{F}=0$ AND $\Sigma \vec{M}=0$ ON THE MULTIFORCE MEMBERS TO SOLVE THE PROBLEM.

MACHINES TRANSMIT AND MODIFY FORCES.

MACHINES ARE ANALYZED BY DISASSEMBLING INTO COMPONENTS.