CIV100 Truss Analysis Thursday, October 13, 2022 11:15 AM + Oct 14, 2022 + Oct 18, 2022 TRUSSES IN 2D b Pratt Warren truss cy TODO K- truss Fink truss TEIANGLE BASIC ELEMENT 3 bin Tointz 4 pen joints 4) unstable and 4 stable & rigid unit not rigid. Assumptions for truss analysis 1. All numbers are connected by PINNED Joints. 2. All loads on the truss are applied at the pin joints. A truss consists solely of "two force" nembers a) compression & -> --by tension Methods of Truss Analysis (ourrent design methods () 1. METHOD OF JUNES (this today) wardyse FBD of each joint in Hetres, PIN -> point/particle. solving for equilibrium with SFx = 0 SFj = 0 2. METHOD OF SECTIONS. METHOD OF JOINTS for Tros Analysis Available equations of equilibrium 4 joint (point) in 2D · '- 2 equations $\begin{cases} SF_{k} = 0 \\ 2SF_{k} = 0 \end{cases} \qquad \left(\vec{R} = 0 \right)$ EXAMPLE. 1. Solve for external reactions FBD of truss; $2M_A = (9)(6) - (6)(10) - (3)(10) = 0$ - : Gy = 10 KN 1 -: Ay = 10 KN T 2Fx = Ax = 0 2. Start analysis at a joint where there are & 2 unknowns (only 2 equations of equilibrium) RESULTS: i.e. cannot start at C -> 4 unknowns L) can only start at A or G AB 11.18 KN, compression AC 5.00 KN, tension Dimensions of A FBD & A BC 11.18 W, fension BD 10.0 kN, compression Ay = 10 KN OKN , N/A CE 10.0kN, tension $\Sigma F_y = 10 - F_{AB} \left(\frac{3}{3.35} \right) = 0$ * Member AB is DE OKN , N/A - FAB = 1 /. 18 KN In Compression! as FBD of AB is: DF 10.0 KN, compression $\Sigma F_{x} = -11.18 \left(\frac{1.5}{3.35}\right) + F_{Ac} = 0$ EF 11.18 kN, tension .. FAC = 5.00 KN 5.00 km, tension Member is in compression EG if it postes on the FBD FG 11.18 EN, compression 3. Continue by analyzing rext joint with < 2 unknowns. Repeat. FBD of B $2F_{4} = 11.18\left(\frac{3}{3.35}\right) - F_{60}\left(\frac{3}{5.35}\right) = 0$ FAB= 11.18 W FBD = (0.0 KN -> member in compession $2F_{3} = 11.18 \left(\frac{3}{3.35}\right) - F_{co}\left(\frac{3}{3.35}\right) - 10 = 0$ $F_{CD} = 0$ $SF_{X} = F_{CE} - 11.18 \left(\frac{1.5}{3.35} \right) - 5.0 = 0$. . FCE = 10.0 KN FBD of D FBO of E $ZF_{3} = F_{EF}(\frac{3}{3.35}) - 10.0 = 0$ · . FEF = 11.18 KN FCE = 10.0 kNFEG = 5.00 kNJoint F, EF and FG are symmetrical .. FAG = 11.18 KN, compression 4. Oreck calculations by atecking equilibrium at last joint (G). DEFORMATION OF THIS TRUSS → rollers will move right (, TRUSS (DEMO MODEL weight on left weight on 1914 (C) METHOD OF SECTIONS recall our example earlier 1. Normally, solve for reactions. But we have already found: $A_x = 0$, $A_y = 10^{KN}$ $G_y = 10^{KN}$ 2. Pass a section (arcut) through up to 3 members of interest purple dotted line

Q: Soive for highlighted members (AC, BC, BD)

3. FBD of left side of cut $(2D \rightarrow 50 \text{ 3 equations of equilibrium})$

 $\xi M_{c} = (3\chi_{B0}) - (3\chi_{10}) = 0$

 $SF_y = -F_{BC}(\frac{3}{3.35}) + 10 = 0$... $F_{BC} = 11.18KN$ (tension)

 $2F_{\chi} = 11.18 \left(\frac{1.5}{3.35}\right) = 10 + F_{AC} = 0$... FAC = 5.00 kN (tension)

unis in KN

·· FBD = 10.0 (compression)