LECTURE NOTE ON
CVE 305 (STRUCTURAL ANALYSIS I)
Course Unit 3

Course Lecturer: Engr. Akinyele J.O

Duration for lecture: 2 hours per week (15 weeks)

Duration for Practical : 3 hours per week

COURSE OBJECTIVES

- Students should be able to differentiate between determinate and indeterminate structures.
- Develop the method of solving determinate structures like beams, arches, frames and trusses.
- Ability to solve indeterminate structures using virtual work and energy methods.

Types of indeterminacy (Week 1)

- External indeterminacy: If the total number of reactions in a structure exceed the number of the equation of equilibrium applicable to the structure.
- Internal indeterminacy: This can be define by the following equations: M=2j-r,(determinate and stable), If M>2j-r,(Indeterminate and stable), If M<2j-r, (Unstable)
- External and Internal Redundancy: This can be determined by this equation : D=m+r-2j (for pin and roller supports), and D=3n+r-3j (for rigidly joined frames).
- M=members, j=joints, r=reaction at supports.

Methods of Analysis for Frames and Trusses (5 weeks)

- Virtual work method (Week 2)
- Method of tension coefficients (Week 3)
- Method of sections (Week 4)
- Method of joint resolution of forces (Week 5)
- Energy method (Week 6)

Determination of bending moments and shear forces in beams (6 weeks)

- Moment distribution method (Week 7)
- Conjugate beam method (Week 8)
- Slope deflection method (Week 9)
- Influence lines (Week 11)
- The use of Macaulay brackets (Week 12)
- Three moments equation (Week 13)

Analysis of Arches (Week 14)

- Three pinned arches
- Two pinned arches
- Symmetrical arches
- Unsymmetrical arches

References

- Analysis of indeterminate structures by Alan Williams (McMillan books)
- Structural theory and analysis by J.D. Todd (McMillan books)
- Principles of structural mechanics by A.O. Adekola (Lagos University press).
- Theory of Structures by R.S. Khurmi (S. Chand & Co.)
- Structural analysis using virtual work by F. Thompson and G.G. Haywood (Chapman & Hall).

Assessments

- Week 10 class quiz
- Week 15 Revision
- Assignments =10%
- Practical = 15%
- Quiz = 5%
- Examination =70%
- Total =100%