MOTHER TERESA
INSTITUTE OF SCIENCE AND TECHNOLOGY
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ACCREDITED BY NAAC
B - GRADE

DEPARTMENT OF CIVIL ENGINEERING

ACADEMIC YEAR: 2018-19

A SUMMARY REPORT

Course Name: Structural Analysis.
Name of the Resource Person: Mr. D.Hathiramu Head of Department, Civil engineering, KLR College Of Engineering, Palwancha, Bhadradri kothagudem district.
Gap Identified: Flexibility Method For Fixed Beams: Force Transformation Matrix; Element Flexibility Matrix; Solution Procedure
No. of Students attended: 50 members

Summary: On the day of the session (i.e 26-07-2018) Mr. D.Hathiramu, Head of Department, Civil engineering KLR College Of Engineering, Palwancha, Bhadradri Kothagudem district. delivered a lecture on the basics of Introduction to the course of Definition. Flexibility Method In 1864 James Clerk Maxwell published the first consistent treatment of the flexibility In 1864 James Clerk Maxwell published the first consistent treatment of the flexibility method for indeterminate structures. His method was based on considering deflections, but the presentation was rather brief and attraced little attention. Ten years later Otto Mohr independently extended Maxwell's theory to the present day treatment.

The flexibility method will sometimes be referred to in the literature as Maxwell-Mohr method. With the flexibility method equations of compatibility involving displacements at each of the redundant forces in the structure are introduced to provide the additional equations the redundant forces in the structure are introduced to provide the additional equations needed for solution. This method is somewhat useful in analyzing beams, framse and trusses that are statically indeterminate to the first or second degree. For structures with a high degree of static indeterminacy such as multi-story buildings and large complex trusses stiffness methods are more appropriate. Nevertheless flexibility methods provide an understanding of the behavior of statically indeterminate structures.
The fundamental concepts that underpin the flexibility method will be illustrated by the study of a two span beam. The procedure is as follows:

1. Pick a sufficient number of redundants corresponding to the degree of indeterminacy
2. Remove the redundants
3. Determine displacements at the redundants on released structure due to external or imposed actions
4. Determine displacements due to unit loads at the redundants on the released structure
5. Employ equation of compatibility, e.g., if a pin reaction is removed as a redundant the compatibility equation could be the summation of vertical displacements in released structure must add to zero.

There are several methods available to calculate deformations (displacements and rotations) in beams. They include:
• Formulating moment equations and then integrating to find rotations and displacements
• Moment area theorems for either rotations and/or displacements
• Virtual work methods Since structural analysis based on finite element methods is usually based on a potential energy method, we will tend to use virtual work methods to compute beam deflections. The theory that supports calculating deflections using virtual work will be reviewed and several examples are presented.

Conventional force method.

Structure as a whole or any substructure Must Satisfy
1. Equilibrium of forces.
2. Displacement compatibility.
3. Force-displacement relation.

Matrix Force Method –also called as Flexibility method. Member forces are treated as the basic unknowns. Similar to the classical force method, but based on matrix approach. Based on finite element concept Step-by-step building up of force-displacement relationship using basic elements composing the structure.

Flexibility matrix refers to the adaptability strategy, additionally called the technique for reliable deformations. It is the customary strategy for processing part forces and relocations in auxiliary systems. In this matrix, there are basic unknown member forces.

(i) Order of matrix is the number of coordinates chooses for the solution of the problem.
(ii) Elements of flexibility matrix are displacements.
(iii) Flexibility matrix will always be a square matrix.
(iv) Elements along the diagonal will always be non-zero and positive.

In the afternoon session solving the problems for Flexibility Method for Fixed Beams,Force Transformation Matrix, Element Flexibility Matrix.