ADVANCED STRUCTURAL ANALYSIS
(Professional Elective-I)

Course Code: 20CE1151

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Pre-requisites: Strength of Materials, Structural analysis

Course Outcomes:
At the end of the course, the student will be able to:
CO1: Analyse portal frames with inclined legs and gable frames using slope deflection Method (L4)
CO2: Analyse two and three-hinged arches using ILD concept (L4)
CO3: Analyse frames and trusses using flexibility method (L4)
CO4: Analyse frames and trusses by stiffness method (L4)
CO5: Analyse cables structures (L4)

UNIT-I **(10 Lectures)**

SLOPE DEFLECTION METHOD:

Analysis of single bay portal frames with inclined legs, gable frames.

Learning outcomes:
At the end of the unit, the student will be able to
1. analyse portal frames with inclined legs (L4)
2. analyse portal frames with gable frames (L4)
3. summarize the concept of inclined legs and gable frames (L2)

UNIT-II **(10 Lectures)**

INFLUENCE LINES:

Analysis of indeterminate beams, three hinged arches, two hinged arches using Influence Line Diagram (ILD).

Learning outcomes:
At the end of the unit, the student will be able to
1. analyse the indeterminate beams using ILDs (L4)
2. analyse the three hinged arches using ILDs (L4)
3. analyse the two hinged arches using ILDs (L4)

UNIT-III **(10 Lectures)**

FLEXIBILITY METHOD:

Introduction to flexibility method and application to frames and trusses including support settlements. (Maximum static indeterminacy of 3)

Learning outcomes:
At the end of the unit, the student will be able to
1. analyse the frames using flexibility method (L4)
2. analyse the trusses using flexibility method (L4)
3. analyse the frames and trusses with settlements using flexibility method (L4)

UNIT-IV **(10 Lectures)**

STIFFNESS METHOD:

Introduction to stiffness method and application to frames and trusses including support settlements. (Maximum kinematic indeterminacy of 3)

Learning outcomes:

At the end of the unit, the student will be able to

1. analyse the frames using stiffness method (L4)
2. analyse the trusses using stiffness method (L4)
3. analyse the frames and trusses with settlements using stiffness method (L4)

UNIT-V **(10 Lectures)**

CABLES STRUCTURES:

Introduction, Equation of the cable, General Cable theorem, horizontal reaction for uniformly loaded cable, Tension in the cable supported at same and different levels, lengths of the cable when supported at the same and different levels.

Learning outcomes:

At the end of the unit, the student will be able to

1. explain the behavior of suspension cables (L2)
2. determine the tension in the cable supported at same and different levels (L3)
3. determine the lengths of suspension cable when supported at the same and different levels(L3)

Text Books:

1. G.S. Pandit and S.P.Gupta, "Matrix Methods of Structural Analysis", 2nd Edition, Tata McGraw Hill, 2000.
2. V.N. Vazirani and M.M. Ratwani, "Analysis of structures", Vol. I & II, 4th Edition, Khanna Publications, 2009.
3. Devdas Menon, "Advanced Structural Analysis", Narosa publishing house Pvt Ltd, 2012

References:

1. Prakash Rao D.S., "Structural Analysis", 3rd Edition, Sagar books, 2008.
2. Bhavi Katti S.S, "Structural Analysis", Vol. I & II, 4th Edition, Vikas Publications, 2010.