

1151CE107 (VTUR15)	STRUCTURAL ANALYSIS-I	L	T	P	C
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Course Category: Programme Core

A. Preamble

This course covers analysis of statically determinate and introduces the analysis of statically indeterminate structures. It further develops skills in determining reactions and loads on structures and familiarizes the students with the basic concepts of truss analysis

B. Prerequisites:

- Strength of Materials
- Mechanics of Solids

C. Links to other Courses:

- Structural Analysis - II

D. Course Educational Objectives:

Students undergoing this course are expected to:

- Analyze and design structural members subjected to tension, compression, deflection and rotation using the fundamental concepts of stress and strain
- Identifying determinate, indeterminate, stable and unstable structures.
- Learn to derive shear and moment expressions from loading functions.
- Develop a basic understanding of influence lines.

E. Course Outcomes

Upon the successful completion of the course, learners will be able to

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's taxonomy)
C01	Explain the principle of virtual work and compute the deflection of pin jointed & rigid jointed frames	K2
C02	Sketch the influence line for shear force, bending moment and member forces in statically determinate structure.	K3
C03	Analyze the different types of Arches	K4
C04	Analyze the continuous beam and frame structure by slope deflection method	K4
C05	Analyze the continuous beam and frame structure by moment distribution method	K4

F. Correlation of COs with POs

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M		M	M						H	
CO2	H	M		M	M						H	
CO3	H	M		M	M						H	
CO4	H	M		M	M						H	
CO5	H	M		M	M						H	

G. Course Content :**UNIT I DEFLECTION OF DETERMINATE STRUCTURES 6+6**

Principles of virtual work for deflections – Deflections of pin-jointed plane frames and rigid plane frames – Williot diagram - Mohr's correction

UNIT II MOVING LOADS AND INFLUENCE LINES (DETERMINATE & INDETERMINATE STRUCTURES) 6+6

Influence lines for reactions in statically determinate structures – influence lines for member forces in pin-jointed frames – Influence lines for shear force and bending moment in beam sections – Calculation of critical stress resultants due to concentrated and distributed moving loads. Muller Breslau's principle – Influence lines for continuous beams and single storey rigid frames – Indirect model analysis for influence lines of indeterminate structures – Beggs deformer

UNIT III ARCHES 6+6

Arches as structural forms – Examples of arch structures – Types of arches – Analysis of three hinged, two hinged and fixed arches, parabolic and circular arches – Settlement and temperature effects.

UNIT IV SLOPE DEFLECTION METHOD 6+6

Continuous beams and rigid frames (with and without sway) – Symmetrical and unsymmetrical – Simplification for hinged end – Support displacements.

UNIT V MOMENT DISTRIBUTION METHOD 6+6

Stiffness and carry over factors - Distribution and carryover of moments – Analysis of continuous beams – Plane rigid frames with and without sway - Naylor's simplification.

TOTAL: 30 + 30 = 60 Periods

H. Learning Resources:

a) TEXT BOOKS

1. Vaidyanadhan R and Perumal P., Comprehensive Structural Analysis –Vol.1 & Vol.2, Laxmi Publications, New Delhi, third Edition,2007.
2. Bhavikatti S.S ., Structural Analysis - Volume I and II, Vikas Publishing House, New Delhi, Second Edition, 2005.

b) REFERENCES

1. Timoshenko and Young D.H, Theory of Structures, 2ndedition, McGraw-Hill, 1965
2. Devdas Menon- Structural Analysis, Alpha Science International, Limited, 2008
3. Wang C.K. Analysis of Indeterminate Structures, Tata McGraw-Hill, 1986
4. Negi L.S., & Jangid R.S., Structural Analysis, Tata McGraw-Hill Publications, New Delhi, Sixth Edition, 2003
5. Reddy C.S, Basic Structural Analysis, Tata McGraw-Hill, 1994

c) ONLINE RESOURCES

1. <http://nptel.ac.in/downloads/105101085/>
2. <http://nptel.ac.in/courses/105105166/>
3. <http://nptel.ac.in/courses/105106050/>

