



MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AN AUTONOMOUS INSTITUTION)

(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)

Accredited by NAAC with 'A' Grade & Recognized Under Section 2(f) & 12(B) of the UGC act, 1956

COURSECONTENT

ADVANCED STEEL AND CONCRETE COMPOSITE STRUCTURES								
I Semester: SE								
Course Code	Category	Hours/ Week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
2512042	PE-I	3	0	0	3	40	60	100
		Contact Classes:45		Tutorial Classes:Nil		Practical Classes:Nil		TotalClasses:48
Prerequisites: Nil								

Course Overview:

Advanced Steel and Concrete Composite Structures focus on the behavior, design, and analysis of systems that combine steel and concrete to achieve superior strength, stiffness, and durability. The course covers composite beams, columns, slabs, and connections, along with design principles based on modern codes and standards. It also introduces topics such as shear connectors, load transfer mechanisms, construction techniques, and performance under various loading conditions. Emphasis is given to practical applications, efficiency in material usage, and the advantages of composite construction in modern infrastructure.

Course Objectives:

1. To understand limit states and shear connectors in composite beams.
2. To design composite beams under propped and un-propped conditions including partial shear connection.
3. To analyze and design composite slabs and floor systems with profiled sheeting.
4. To design different types of composite columns under various loading conditions.
5. To understand temperature, shrinkage, creep, vibration, and cyclic behavior in composite structures.

Course Outcomes:After completion of the course, students should be able to

1. Examine the limit states of composite sections, shear connectors, degree of shear connection, and behavior of composite beams without profile sheets.
2. Determine the response of composite beams under propped and un-propped conditions, including deflection and partial shear connection.
3. Investigate the performance of composite slabs and composite floor systems with profiled sheeting arranged parallel or perpendicular to span.
4. Assess the structural behavior of composite columns subjected to axial, uni-axial, and bi-axial loading conditions.
5. Test composite sections for the influence of temperature, shrinkage, creep, vibration,



cyclic behavior, and case studies.

SYLLABUS:

UNIT-I:

Introduction – limit states of composite sections - shear connectors – types of shear connectors – degree of shear connection – partial and complete shear connections – strength of shear connectors – Analysis and design of composite beams without profile sheet.

UNIT-II:

Design of composite beam – propped condition – un-propped condition – deflection of composite beams – beam with profile sheeted deck slab – design of partial shear connection.

UNIT-III:

Introduction – Composite slabs – profiled sheeting – sheeting parallel to span – sheeting perpendicular to span – analysis and design of composite floor system.

UNIT-IV:

Types of Composite columns – design of encased columns – design of in-filled columns – axial, uni-axial and bi-axially loaded columns.

UNIT-V:

Temperature – shrinkage and creep – vibration of composite beams – Cyclic behavior of composite section – case studies.

REFERENCES:

1. Johnson R. P., “Composite Structures of Steel and Concrete” Volume-I, Black Well Scientific Publication, U.K., 1994.
2. Teaching Resources for “Structural Steel Design”. Vol. 2 of 3, Institute of Steel Development and Growth (INSDAG), 2000.
3. Narayanan R., “Composite Steel Structures – Advances, Design and Construction, Elsevier, Applied Science, U. K., 1987.
4. Owens, G. W & Knowels, P., Steel Designers Manual,” Steel Concrete Institute (U. K), Oxford Blackwell Scientific Publication, Fifth Edition, 1992.
5. Oehlers D. J. and Bradford M. A., Composite Steel and Concrete Structural Members, Fundamental Behaviour, Pergamon Press, Oxford, 1995.

ELECTRONICRESOURCES:

1. <https://nptel.ac.in/courses/105105162>



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MATERIALSONLINE:

1. Course template
2. Tutorial question bank
3. Definitions and terminology
4. Assignments
5. Model question paper-I
6. Model question paper-II
7. Lecture notes
8. E-Learning Readiness Videos(ELRV)