

PADMASHREE KRUTARTHA ACHARYA INSTITUTE OF  
ENGINEERING & TECHNOLOGY, BARGARH



LESSON PLAN  
Session-2024-2025

Semester: 4th Discipline: Civil Engg.

Subject: Structural Design-I

Name of the Teaching Faculty: Bikramachitya Bagh

Subject: Structural Design-INo. of Days/per week class allotted : 5Semester From Date : 04/02/2025 To Date: 17/05/2025 No. of Weeks : 15

Week	Class Day	Theory / Practical Topics
1	1st	Working stress Method objective of design and detailing. state the difference methods of design of concrete structures
	2nd	Introduction to reinforced concrete, R.C. section their behaviour, grades of concrete and steel, Permissible stresses assumption in W.S.M.
	3rd	Flexural design and analysis of singly reinforced section from first principles
	4th	concept of under reinforced, over reinforced sections and balance section
	5th	Advantages and disadvantages of WSM, reason for its obsolescence
2	1st	philosophy of limited state method definition, advantages of LSM over WSM, IS code suggestions regarding design philosophy
	2nd	Types of limit states, partial safety factors, both material strength characteristics strength, characteristic load, design loads. loading on structure as per IS. 875
	3rd	study of I.S. specification regarding spacing of reinforcement in slab, cover to reinforcement in slab, beam, column & footing minimum reinforcement in slab, beam & column, lapping, anchorage effective span for beam & slab
	4th	analysis and design of singly and double reinforced section (LSM) limit state of collapse (flexure), Assumptions
	5th	stress-strain relationship for concrete and steel, neutral axis
3	1st	stress block diagram and strain diagram for singly reinforced sections
	2nd	concept of under reinforced, over-reinforced

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Week	Class Day	Theory /Practical Topics
	3 <sup>rd</sup>	limiting section, neutral axis coefficient
	4 <sup>th</sup>	limiting value of moment of resistance and limiting percentage of steel required for limiting singly R.C section
	5 <sup>th</sup>	Analysis and design, determination of design constants
4	1 <sup>st</sup>	determination of design constant
	2 <sup>nd</sup>	moment of resistance
	3 <sup>rd</sup>	area of steel for rectangular sections
	4 <sup>th</sup>	area of steel for rectangular sections
	5 <sup>th</sup>	Monthly class test
5	1 <sup>st</sup>	Necessity of doubly reinforced section
	2 <sup>nd</sup>	design of doubly reinforced rectangular section
	3 <sup>rd</sup>	design of doubly reinforced rectangular section
	4 <sup>th</sup>	Shear, Bond & Development Length (L <sub>sd</sub> ) Nominal, shear strength in RC section, design shear strength of concrete, maximum shear stress of shear reinforcement, maximum shear reinforcement, factors of shear reinforcement

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Week	Class Day	Theory /Practical Topics
	5th	Bond and types of bond, bond stresses, checks for bond stress development length in tension and compression, anchorage value for hooks 90° and 45° bend standard lapping of bars
6	1st	check for development length, Numerical problems on deciding whether shear reinforcement is required or not, check for adequacy of the section in shear
	2nd	Design of shear reinforcement, Minimum shear reinforcement in beams
	3rd	Analysis and Design of T-beam (LSM) General features
	4th	advantages of T-beam
	5th	effective width of flange as per IS:456-2000 code provision
7	1st	analysis of singly reinforced T-beam
	2nd	analysis of singly reinforced T-beam
	3rd	stress & strain diagram
	4th	depth of neutral axis
	5th	depth of neutral axis
8	1st	Moment of resistance of T-beam sections with neutral axis lying within the flange

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Week	Class Day	Theory /Practical Topics
	2 <sup>nd</sup>	Moment of resistance of T-beam section with neutral axis lying within the flange
	3 <sup>rd</sup>	Simple numeric problem on deciding effective flange width
	4 <sup>th</sup>	Simple numeric problem on deciding effective flange width
	5 <sup>th</sup>	Problems only on bending moment of resistance of T-beam section when N.A. lies within flange
9	1 <sup>st</sup>	Problems only on bending moment of resistance of T-beam section when N.A. lies upto the bottom of flange slab
	2 <sup>nd</sup>	Problems only on bending moment of resistance of T-beam section N.A. lies upto the bottom of flange
	3 <sup>rd</sup>	Analysis and Design of slab and staircase (LSM) Design of simply supported one-way slabs for flexure check for deflection control and shear
	4 <sup>th</sup>	Design of simply supported one-way slabs for flexure check for deflection control and shear
	5 <sup>th</sup>	Design of simply supported one-way slabs for flexure check for deflection control and shear
10	1 <sup>st</sup>	Design of one-way cantilever slab
	2 <sup>nd</sup>	Design of one-way cantilever slab
	3 <sup>rd</sup>	Design of one-way cantilever chhajja for flexure check for deflection control and check for development length and shear

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Week	Class Day	Theory / Practical Topics
	4th	Design of two-way simply supported slabs for flexure with corner free to lift
	5th	Design of two-way simply supported slabs for flexure with corner free to lift
11	1st	Design of two-way simply supported slabs for flexure with corner free to lift
	2nd	Design of dog-legged staircase
	3rd	Design of dog-legged staircase
	4th	Detailing of reinforcement in stairs spanning longitudinally
	5th	Detailing of reinforcement in stairs spanning longitudinally
12	1st	Detailing of reinforcement in stairs spanning longitudinally
	2nd	Design of Axially loaded column and footing (LSM) Assumption in limit state of collapse - compression
	3rd	Assumption in limit state of collapse - compression
	4th	Definition and classification of columns
	5th	Monthly class test

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Week	Class Day	Theory /Practical Topics
13	1st	effective length of column, specification for minimum reinforcement
	2nd	cover, maximum reinforcement
	3rd	number of bars in rectangular, square and circular sections
	4th	diameter and spacing of lateral ties
	5th	diameter and spacing of lateral ties
14	1st	Analysis and design of axially loaded short square column
	2nd	Analysis and design of axially loaded short square column
	3rd	Analysis and design of axially loaded rectangular column
	4th	Analysis and design of axially loaded rectangular column
	5th	Analysis and design of axially loaded circular column
15	1st	Analysis and design of axially loaded short circular column
	2nd	Types of footing

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Week	Class Day	Theory / Practical Topics
	3 <sup>rd</sup>	Design of isolated square column footing of uniform thickness for flexure and shear
	4 <sup>th</sup>	design of isolated square column footing of uniform thickness for flexure and shear
	5 <sup>th</sup>	design of isolated square column footing of uniform thickness for flexure and shear

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