GOVERNMENT POLYTECHNIC, BOLANGIR
DEPARTMENT OF CIVIL ENGINEERING

Discipline: CIVIL ENGG.	**Semester: 5TH**	**Name of the Teaching Faculty: - Sri Ankit Bhinde [LECT. Stage-I, Civil Engg.]**
Subject: DESIGN OF RCC STRUCTURE	**No. of days/week class allotted: 03**	**Total contact Hours-45Hrs** **Total Marks-100** **Assessment: Internal Assessment -30, End term-70**
COURSE OUTCOMES	**CO1: Determine the development length in tension and compression members.** **CO2: Apply the codal provisions of IS 456:2000 in the design of RCC members.** **CO3: Design singly and doubly reinforced RCC beams.** **CO4: Design RCC beams for shear and development length.** **CO5: Design short and long RCC columns.**	

Lesson Plan Outcome Mapping

Class Day	Main Topic	Sub-Topics	Teaching Aids / Activities	Learning Outcome
1	Introduction to RCC Design	Design philosophies, Working Stress Method, Ultimate Load Method, Limit State Method	PPT, charts	CO2
2	Limit State Method	Assumptions, safety factors, limit states	PPT, numerical examples	CO2
3	Materials in RCC	Grades of concrete and steel, stress-strain curves	Charts, specimens	CO2
4	Codal Provisions	IS 456 provisions for beams	IS Code book activity	CO2
5	Singly Reinforced Beam	Assumptions and stress block parameters	PPT, diagrams	CO3
6	Neutral Axis	Limiting depth of neutral axis	Numerical examples	CO3
7	Moment of Resistance	Calculation of limiting moment	Board work	CO3

Class Day	Main Topic	Sub-Topics	Teaching Aids / Activities	Learning Outcome
8	Design of Singly Reinforced Beam	Step-by-step design procedure	Numerical examples	CO3
9	Numerical on SR Beam	Practice problems	Tutorial sheet	CO3
10	Doubly Reinforced Beam	Need and applications	Site examples	CO3
11	Design of Doubly Reinforced Beam	Design procedure	Numerical examples	CO3
12	Numerical on DR Beam	Practice problems	Tutorial session	CO3
13	Revision of Beam Design	Design exercises	Problem-solving activity	CO3
14	Introduction to Shear	Shear force, shear cracks	Failure photographs	CO4
15	Nominal Shear Stress	Calculation of τv	Numerical examples	CO4
16	Design Shear Strength	Shear strength of concrete	IS code tables	CO4
17	Shear Reinforcement	Types and forms of stirrups	Reinforcement samples	CO4
18	Design of Vertical Stirrups	Design calculations	Numerical examples	CO4
19	Bent-up Bars and Stirrups	Forms of shear reinforcement	Reinforcement details	CO4
20	Minimum Shear Reinforcement	Codal provisions	IS 456 activity	CO4
21	Numerical on Shear Design	Practice problems	Tutorial sheet	CO4

Class Day	Main Topic	Sub-Topics	Teaching Aids / Activities	Learning Outcome
22	Bond and Bond Stress	Types of bond, bond stress	Charts and diagrams	CO1
23	Development Length	Concept and significance	PPT and examples	CO1
24	Development Length in Tension	Determination and checks	Numerical examples	CO1
25	Development Length in Compression	Determination and checks	Numerical examples	CO1
26	Anchorage Value	Hooks, bends, anchorage	Reinforcement samples	CO1
27	Lapping of Bars	Codal provisions	Detailing drawings	CO1
28	Numerical on Development Length	Design exercises	Tutorial problems	CO1
29	Codal Provisions Review	Shear, bond and development length provisions	IS 456 activity	CO2
30	Serviceability Limit State	Deflection and cracking concepts	PPT, case studies	CO2
31	Introduction to Columns	Definition and classification	Column models	CO5
32	Effective Length of Columns	End conditions and slenderness ratio	Charts and examples	CO5
33	Codal Provisions for Columns	Cover, minimum steel, maximum steel, ties	IS Code book	CO5
34	Axially Loaded Short Column	Design procedure	Numerical examples	CO5
35	Design of Square Column	Step-by-step design	Board work	CO5

Class Day	Main Topic	Sub-Topics	Teaching Aids / Activities	Learning Outcome
36	Numerical on Square Column	Practice problems	Tutorial session	CO5
37	Design of Rectangular Column	Design procedure	Numerical examples	CO5
38	Numerical on Rectangular Column	Practice problems	Tutorial sheet	CO5
39	Design of Circular Column	Design procedure	Numerical examples	CO5
40	Numerical on Circular Column	Practice problems	Tutorial sheet	CO5
41	Long Columns	Introduction and behavior	PPT, diagrams	CO5
42	Short vs Long Columns	Comparison and design considerations	Charts, examples	CO5
43	Column Design Practice	Mixed numerical problems	Assignment	CO5
44	Comprehensive Numerical Session	Beam, shear, development length and column design	Problem-solving activity	CO1–CO5
45	Course Revision and Test	Complete syllabus revision	Quiz/Test	CO1–CO5

LEARNING RESOURCES:

1. R.C.C. Designs, B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *R.C.C. Designs*, Laxmi Publications.
2. Limit State Design of Reinforced Concrete, P.C. Varghese, *Limit State Design of Reinforced Concrete*, PHI Learning.
3. Reinforced Concrete Design, S. Unnikrishna Pillai and Devdas Menon, *Reinforced Concrete Design*, Tata McGraw-Hill.
4. Design of Reinforced Concrete Structures, N. Subramanian, Oxford University Press.

5. IS 456:2000, Bureau of Indian Standards, *Plain and Reinforced Concrete – Code of Practice*.

6. SP 16, Bureau of Indian Standards, *Design Aids for Reinforced Concrete to IS 456:2000*.

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