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Design of Reinforced Cement Concrete Structures — Complete Syllabus

BTEUP Diploma in Civil Engineering • 4th Semester • Session 2026-27

Subject 4.6 (Theory) • Total 100 Marks • 3 Credits • L 2 - T 1

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
4.6	Design of Reinforced Cement Concrete Structures	Theory	2 - 0	3	Theory 40	Theory 60 (3 hrs)	100
Design of RCC Structures Total				3	40	60	100

What This Subject Aims To Do

To learn the concept of limit state design for tension and compression members and steel beams, understand the design of RCC elements, and know the design of short and long RCC columns.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Introduction	8	20%
2	Concept of Limit State Method	8	20%

3	Design of Reinforced Concrete Beams by Limit State Method	9	20%
4	Design of One Way and Two Way Slab	9	20%
5	Design of Axially Loaded RCC Column and Pre-stressed Concrete	9	20%

Unit 1 — Introduction (8 Periods, 20%)

Topics: Concept of Reinforced Cement Concrete (RCC); reinforcement materials: suitability of steel as reinforcing material, properties of mild steel, HYSD steel and TMT bars; loading on structures as per IS: 875; introduction to following methods of RCC design: working stress method — definition and basic assumptions; limit state method — definition and basic assumptions; working stress method: shear and development length; problems of singly, doubly and T beam analysis by working stress method; shear as per IS: 456-2000 by working stress method — (i) shear strength of concrete without shear reinforcement, (ii) maximum shear stress, (iii) shear reinforcement, (iv) development length.

Unit 2 — Concept of Limit State Method (8 Periods, 20%)

Topics: Concept of limit state method: definitions and assumptions made in limit state of collapse (flexure); partial factor of safety for materials; partial factor of safety for loads; design loads; stress block, parameters.

Unit 3 — Design of Reinforced Concrete Beams by Limit State Method (9 Periods, 20%)

Topics: Singly reinforced beam: theory and design of singly reinforced beam by limit state method; doubly reinforced beams: theory and design of simply supported doubly reinforced rectangular beam by limit state method; behaviour of T beam, inverted T beam, isolated T beam and 'L' beams; simple problems related to moment capacity.

Unit 4 — Design of One Way and Two Way Slab (9 Periods, 20%)

Topics: One way slab: theory and design of simply supported one way slab including sketches showing reinforcement details (plan and section) by limit state method; two way slab: theory and design of two-way simply supported slab with corners free to lift, no provisions for torsional reinforcement by limit state method including sketches showing reinforcement details (plan and two sections).

Unit 5 — Design of Axially Loaded RCC Column and Pre-stressed Concrete (9 Periods, 20%)

Topics: Axially loaded column: definition and classification of columns; effective length of column; specifications for longitudinal and lateral reinforcement; design of axially loaded square, rectangular and circular short columns by limit state method including sketching of reinforcement (sectional elevation and plan). Pre-stressed concrete: concept of pre-stressed concrete; methods of pre-stressing: pre-tensioning and post-tensioning; advantages and disadvantages of pre-stressing; losses in pre-stress.

Reference Books (as listed in the syllabus)

- Shah, V. L., and Karve, S.R., Limit State Theory and Design of Reinforced Concrete Structures, Structures Publications, Pune, 2014.
- Sinha N.C., and Roy S.K., Fundamentals of Reinforced Concrete, S. Chand & Co., New Delhi.
- D.V. Gupta, Vikram Singh, Reinforced Concrete Technology, Asian Publishers, Muzaffarnagar, ISBN: 978-93-5502-123-6.
- Krishna Raju, and N. Pranesh, R.N., Reinforced Concrete Design Principles and Practice, New Age International, Mumbai.
- Pillai, S.U., and Menon, Devdas, Reinforced Concrete Design, McGraw Hill Publications, New Delhi.
- Varghese, P. C., Limit State Design of Reinforced Concrete, Prentice Hall India Learning Private Limited, Delhi.

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Source: BTEUP 2nd Year curriculum (folder2627), approved in C.D.C. meeting held on 16.07.2026. Topic lists follow the official syllabus; short explanations are the author's own plain-English summaries, not syllabus text.
Please confirm with your own polytechnic for any local changes.