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Concrete Technology — Complete Syllabus

BTEUP Diploma in Civil Engineering • 3rd Semester • Session 2026-27

Subject 3.8 (Theory) + 3.9 (Lab) • Total 200 Marks • 4 Credits

About this document: Concrete Technology appears twice in the 3rd semester — as a theory paper (3.8) and as a lab (3.9). Both are covered here, completely, in the official order.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
3.8	Concrete Technology	Theory	2 - 0	2	Theory 40	Theory 60 (3 hrs)	100
3.9	Concrete Technology Lab.	Practical	0 - 4	2	Practical 60	Practical 40 (3 hrs)	100
Concrete Technology Total				4	100	100	200

What This Subject Aims To Do

To know the properties of cement, aggregate and water used in concrete, understand the different characteristics of concrete, and learn about the role of admixtures in concrete — so that you can prepare concrete of the desired strength and specification and maintain its quality under different conditions.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Cement, Aggregates and Water	6	20%
2	Concrete	6	20%
3	Concrete Mix Design and Testing of Concrete	4	20%
4	Quality Control of Concrete	6	20%
5	Chemical Admixture, Special Concrete and Extreme Weather Concreting	6	20%

Unit 1 — Cement, Aggregates and Water (6 Periods, 20%)

Topics: Physical properties of OPC and PPC: fineness, standard consistency, setting time, soundness, compressive strength; different grades of OPC and relevant BIS codes; testing of cement: laboratory tests — fineness, standard consistency, setting time, soundness, compressive strength; storage of cement and effect of storage on properties of cement; BIS specifications and field applications of different types of cements: rapid hardening, low heat, Portland pozzolana, sulphate resisting, blast furnace slag, high alumina and white cement; aggregates: requirements of good aggregate, classification according to size and shape; fine aggregates: properties, size, specific gravity, bulk density, water absorption and bulking, fineness modulus and grading zone of sand, silt content and their specification as per IS 383; concept of crushed sand; coarse aggregates: properties, size, shape, surface texture, water absorption, soundness, specific gravity and bulk density, fineness modulus of coarse aggregate, grading of coarse aggregates, crushing value, impact value and abrasion value of coarse aggregates with specification; water: quality of water, impurities in mixing water and permissible limits for solids as per IS: 456-2000.

Unit 2 — Concrete (6 Periods, 20%)

Topics: Concrete: different grades of concrete, provisions of IS 456; Duff Abraham water cement (w/c) ratio law, significance of w/c ratio, selection of w/c ratio for different grades, maximum w/c ratio for different grades of concrete for different exposure conditions as per IS 456; properties of fresh concrete: workability — factors affecting workability of concrete; determination of workability of concrete by slump cone, compaction factor, Vee-Bee consistometer; value of workability requirement for different types of concrete works; segregation, bleeding and preventive measures; properties of hardened concrete: strength, durability, impermeability.

Unit 3 — Concrete Mix Design and Testing of Concrete (4 Periods, 20%)

Topics: Concrete mix design: objectives, methods of mix design, study of mix design as per IS 10262-2009 (only procedural steps); testing of concrete, determination of compressive strength of concrete cubes at different ages, interpretation and co-relation of test results; non-destructive testing of concrete: rebound hammer test, working principle of rebound hammer and factor affecting the rebound index, ultrasonic pulse velocity test as per IS 13311 (part 1 and 2), importance of NDT tests.

Unit 4 — Quality Control of Concrete (6 Periods, 20%)

Topics: Concreting operations: storage, batching, mixing, transportation, placing, compaction, curing and finishing of concrete; joints in concrete construction: types of joints, methods for joining old and new concrete, materials used for filling joints; defects in concrete: identification of defects and methods of removing defects.

Unit 5 — Chemical Admixture, Special Concrete and Extreme Weather Concreting (6 Periods, 20%)

Topics: Admixtures in concrete: purpose, properties and application for different types of admixture such as accelerating admixtures, retarding admixtures, water reducing admixtures, air entraining admixtures and super plasticizers; special concrete: properties, advantages and limitation of following types of special concrete — ready mix concrete, fibre reinforced concrete, high performance concrete, self-compacting concrete and light weight concrete; cold weather concreting: effect of cold weather on concrete, precautions to be taken while concreting in cold weather condition; hot weather concreting: effect of hot weather on concrete, precautions to be taken while concreting in hot weather condition; under water concrete.

Practical Work

- Determine fineness of cement by Blaine's air permeability apparatus or by sieving.
- Determine specific gravity, standard consistency, initial and final setting times of cement.
- Determine compressive strength of cement.
- Determine silt content in sand.
- Determine bulking of sand.
- Determine bulk density of fine and coarse aggregates.
- Determine water absorption of fine and coarse aggregates.
- Determine fineness modulus of fine aggregate by sieve analysis.
- Determine impact value of aggregate.

- Determine crushing value of aggregate.
- Determine abrasion value of aggregate.
- Determine elongation and flakiness index of coarse aggregates.
- Determine workability of concrete by slump cone test.
- Determine workability of concrete by compaction factor test.
- To prepare concrete mix of a particular grade and determine compressive strength of concrete for 7 and 28 days.
- Demonstration of NDT equipments.

Reference Books (as listed in the syllabus)

- Gambhir, M.L., Concrete Technology, Tata McGraw Hill Publishing Co. Ltd., Delhi.
- Shetty, M.S., Concrete Technology, S.Chand and Co. Pvt. Ltd., Ram Nagar, Delhi.
- D.V. Gupta, Vikram Singh, Concrete Technology, Asian Publishers, Muzaffarnagar, ISBN: 978-93-91541-22-4.
- Santhakumar, A. R., Concrete Technology, Oxford University Press, New Delhi.
- Neville, A. M. and Brooks, J.J., Concrete Technology, Pearson Education Pvt. Ltd.
- Neville, A. M., Concrete Technology, Pearson Education Pvt. Ltd., New Delhi.
- Sood, H., Kulkarni P. D., Mittal L. N., Laboratory Manual in Concrete Technology, CBS Publishers, New 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.