

B. E. CIVIL ENGINEERING
Choice Based Credit System (CBCS) and Outcome Based Education (OBE)
SEMESTER - V

CONCRETE AND HIGHWAY MATERIALS LABORATORY

Course Code	18CVL58	CIE Marks	40
Teaching Hours/Week(L:T:P)	(0:2:2)	SEE Marks	60
Credits	02	Exam Hours	03

Course Learning Objectives: This course will enable students

1. To learn the procedure of testing concrete ingredients and properties of concrete as per standard code recommendations.
2. To learn the procedure of testing bituminous materials as per standard code recommendations.
3. To relate material characteristics to various application of construction.

Modules

Part A: Concrete Lab

1. Tests on Cement:

- a. Normal Consistency
- b. Setting time
- c. Compressive strength
- d. fineness by air permeability test
- e. specific gravity

2. Tests on Concrete:

- a. Design of concrete mix as per IS-10262
- b. Tests on fresh concrete:
 - i. slump,
 - ii. compaction factor and
 - iii. Vee Bee test
- c. Tests on hardened concrete:
 - i. compressive strength test,
 - ii. split tensile strength test,
 - iii. flexural strength test
- d. NDT tests by re bound hammer and pulse velocity test.

3. Tests on Self Compacting Concrete:

- a. Design of self compacting concrete, As per IS 10262:2019
- b. slump flow test,
- c. V-funnel test,
- d. J-Ring test,
- e. U Box test and
- f. L Box test

Part B: Highway materials Lab

1. Tests on Aggregates

- a. Aggregate Crushing value
- b. Los Angeles abrasion test
- c. Aggregate impact test
- d. Aggregate shape tests(combined index and angularity number)

2. Tests on Bituminous Materials

- a. Penetration test
- b. Ductility test
- c. Softening point test
- d. Specific gravity test
- e. Viscosity test by tarviscometer
- f. Bituminous Mix Design by Marshal Method (Demonstration only)

3. Tests on Soil

- a. Wet sieve analysis
- b. CBR test

Course Outcomes: During this course, students will develop expertise in

1. Able to interpret the experimental results of concrete and highway materials based on laboratory tests.
2. Determine the quality and suitability of cement.
3. Design appropriate concrete mix Using Professional codes.
4. Determine strength and quality of concrete.
5. Evaluate the strength of structural elements using NDT techniques.
6. Test the soil for its suitability as sub grade soil for pavements.

Question paper pattern:

- All are individual experiments
- Instructions as printed on the cover page of answer script for split up of marks to be strictly followed.
- All exercises are to be included for practical examination.

Reference Books:

1. M. L. Gambir, "Concrete Manual", Danpat Rai and sons, New Delhi
2. Shetty M.S, "Concrete Technology", S. Chand & Co. Ltd, New Delhi.
3. Mehta P.K, "Properties of Concrete", Tata McGraw Hill Publications, New Delhi.
4. Neville AM, "Properties of Concrete", ELBS Publications, London.
5. Relevant BIS codes.
6. S K Khanna, C E G Justo and A Veeraragavan, "Highway Materials Testing Laboratory Manual", Nem Chand Bros, Roorkee.
7. L R Kadiyali, "Highway Engineering", Khanna Publishers, New Delhi.


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