

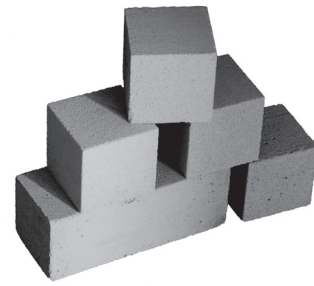
19CE204**BUILDING MATERIAL AND
CONCRETE TECHNOLOGY**

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P	WA/RA	SSH/HS	CS	SA	S	BS
45	-	30	20	48	6	12	3	5



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COURSE DESCRIPTION AND OBJECTIVES:

This course provides an understanding of various engineering properties of building materials like stones, bricks, lime, timber, steel and paints. The objective of this course is to provide basic knowledge about properties and testing of various building materials used in civil constructions

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Explain concepts of building materials and concrete technology	1
2	Describe the properties of cement and aggregates	1
3	Explain properties of concrete in fresh and hardened states	1
4:	Explain the characteristics of durability, elasticity, creep and shrinkage of concrete	1
5:	Compute mix design according to IS 10262 for various concrete proportions	1

SKILLS:

- ✓ *Identify different composition of building materials*
- ✓ *Make concrete mix proportions for different grades*
- ✓ *Test concrete cube to calculate characteristic compressive strength.*
- ✓ *Test fresh concrete to understand creep and shrinkage.*
- ✓ *Analyse engineering properties of special concretes such as green concrete, light*

UNIT – I**L-9****BUILDING MATERIALS:**

STONES: Qualities of a good building stones, Common building stones of India, Technical terms and Classification of stone masonry.

BRICKS: General, Composition of good brick earth, Harmful ingredients in brick earth, Manufacturing of bricks by clamp burning and kiln (Hoffman's kiln only) burning, Qualities of good bricks, Tests for bricks, Classification of bricks, Size and weight of bricks, Technical terms in brick bonding, Types of bonds in brickwork and their suitability.

LIME: General, Definitions, Sources of lime, Constituents of limestones, Classification of limes, Properties of fat lime and hydraulic lime, Manufacture of lime.

TIMBER: Definition, Structure of a tree, Qualities of good timber, Decay of timber, seasoning of timber, Preservation of timber, Advantages of timber construction.

UNIT – II**L-9****CEMENT AND AGGREGATES:**

CEMENTS: Portland cement, Chemical composition, Hydration, Setting of cement, Structure of hydrated cement, Tests on physical properties, Different grades of cement.

AGGREGATES: Classification, Source, Size and shape, Texture and influence of texture on strength, Specific gravity of aggregates, Moisture in aggregates, Bulking of fine aggregate, and Methods used for determination of moisture content of aggregates, Grading of aggregates, Sieve analysis, Standard grading curve, Grading limits of fine aggregates as per BIS.

UNIT – III**L-9**

FRESH CONCRETE AND ADMIXTURES: Workability, Factors affecting workability, Measurement of workability by different tests, Setting times of concrete, Effect of time and temperature on workability, Segregation and bleeding, Mixing and vibration of concrete, Methods of curing, Quality of mixing water.

ADMIXTURES: General, Plasticizers and super plasticizer, Dosage, Mixing procedure, Equipment, Effect of super plasticizers on the properties of hardened concrete, Retarders, accelerators, Air entraining admixtures, Factors affecting amount of air-entrainment, Effect of air-entrainment on the properties of concrete, Fly ash, Effect of fly ash on fresh and hardened concrete, High volume fly ash concrete, Silica fume, Available forms, Effect of silica fume on compressive strength of concrete, Construction chemicals for curing, Construction chemicals for water proofing.

HARDENED CONCRETE: General, Water-cement ratio, Gel/space ratio, Gain of strength with age, Maturity concept of concrete, Effect of maximum size of aggregate on strength.

TESTING OF HARDENED CONCRETE: Compression tests, Factors affecting strength, Flexure test, Splitting tests, Non-destructive testing methods, Codal provisions for NDT.

UNIT – IV**L-9**

ELASTICITY, CREEP & SHRINKAGE: Modulus of elasticity, Dynamic modulus of elasticity, Poisson's ratio, Creep of concrete, Factors influencing creep, Relation between creep and time, Nature of creep, Effects of creep, Shrinkage, Types of shrinkage.

DURABILITY OF CONCRETE: Factors contributing to cracks in concrete, Sulphate attack and Methods of controlling sulphate attack, Chloride attack, Corrosion of steel and its control.

UNIT – V

L-9

MIX DESIGN: Factors in the choice of mix proportions, Quality Control of concrete, Statistical methods, Acceptance criteria, proportioning of concrete mixes by various methods, BIS method of mix design.

SPECIAL CONCRETES: Light weight aggregates, Light weight aggregate concrete, Fiber reinforced concrete, Different types of fibers, Factors affecting properties of F.R.C, High performance concrete, Self-Compacting Concrete and High Performance Concrete.

LABORATORY EXPERIMENTS

LAB EXPERIMENTS:

TOTAL HOURS : 30

1. To study the stress-strain characteristics of HYSD bars by UTM.
2. To find young's modulus of the given material (steel or wood) by conducting bending test on simply supported beam.
3. To find modulus of rigidity by conducting torsion test on solid circular shaft.
4. To find the hardness of the given material by Brinell's or Vickers hardness tester.
5. To find impact resistance of the given material by conducting Charpy test on Impact testing machine.
6. To determine the ultimate shear strength of steel rod in single and double shear.
7. To determine the modulus of rigidity of the spring.
8. Normal consistency and Initial setting and final setting time of cement
9. Fineness of cement.
10. Specific Gravity of Cement
10. Compressive strength of Cement.
11. Slump cone test to determine workability of concrete.
12. Compaction factor test to determine workability of concrete
13. Soundness Test on Cement
14. Flexural Strength of Cement
15. Split Tensile Strength of Cement

TEXT BOOKS:

1. M. S. Shetty, "Concrete Technology", 1st edition, S.Chand and Co publications, 2005.
2. S. C. Rangwala, "Engineering Materials", 36th edition, Charotar Publishing House, 2009.

REFERENCE BOOKS:

1. M. L. Gambhir, "Concrete Technology", 5th edition, Tata McGraw Hill Publishers, New Delhi, 2013.
2. A.R. Santha Kumar, "Concrete Technology", 3rd edition, Oxford University Press, New Delhi, 2009.