



CONCRETE TECHNOLOGY

PROF. B. BHATTACHARJEE

Department of Civil Engineering
IIT Delhi

INTENDED AUDIENCE : BE/ME i.e. B,Tech/M.Tech

PRE-REQUISITES : A basic Civil Engineering Materials course

INDUSTRIES APPLICABLE TO : L&T ECC, Ultra Tech Cement, JK Cements, ACC, Star Cement and all other cement companies. CPWD and all other PWDs.

COURSE OUTLINE :

The course on “Concrete Technology” focuses on concrete making materials including supplementary cementitious materials. Concrete production process also forms a part of the discussion. Going through the course one would develop first-hand knowledge on concrete production process and properties and uses of concrete as a modern material of construction. The courses will enable one to make appropriate decision regarding ingredient selection and use of concrete.

ABOUT INSTRUCTOR :

Prof. B. Bhattacharjee, B.Tech(IIT KGP:1978), M.Tech. (IIT D:1982) and Ph.D. (IITD:1990) Field Experience: M/s Gammon India Limited:1978-80. Professor Bishwajit Bhattacharjee is working with the Department of Civil Engineering, Indian Institute of Technology Delhi, New Delhi (India). His research interests pertain to the domains of cement and concrete technology, building science, sustainable construction, and health monitoring of structures. His publications in these areas are well cited. He is also a recipient of the Indian Concrete Institute’s Life Time Achievement Award.

COURSE PLAN :

- Week 1** : Introduction concrete as a material, ingredients, Production, composition, and properties; cement chemistry..
- Week 2** : Types of cements; special cements, aggregates :properties, tests and standard
- Week 3** : Water reducers, air entrainers, set controllers, specialty admixtures – structure properties, and effects on concrete properties; Introduction to supplementary cementing materials and pozzolans.
- Week 4** : Fly ash, blast furnace slag, silica fume, and metakaolin – their production, properties, and effects on concrete properties; other reactive and inert mineral additives.
- Week 5** : Basic principles; IS method; ACI method; new approaches based on rheology and particle packing.
- Week 6** : Batching of ingredients; mixing, transport, and placement; consolidation, finishing, and curing of concrete; initial and final set – significance and measurement; workability of concrete and its measurement
- Week 7** : Compressive strength and parameters affecting it; Tensile strength – direct and indirect; Modulus of elasticity and Poisson’s ratio; Stress strain response of concrete.
- Week 8** : Modulus of elasticity and Poisson’s ratio; Stress strain response of concrete. Creep and relaxation – parameters affecting; Shrinkage of concrete – types and significance; parameters affecting shrinkage; measurement of creep and shrinkage
- Week 9** : Introduction to durability; relation between durability and permeability;
- Week 10** : Chemical attack of concrete corrosion of steel rebars; other durability issues
- Week 11** : Properties and applications of: High strength – high performance concrete, reactive powder concrete; Lightweight, heavyweight, and mass concrete;
- Week 12** : Self-compacting concrete, fibre reinforced concrete; self-compacting concrete; other special concretes.