CONCRETE TECHNOLOGY

PROF. B. BHATTACHARJEE
Department of Civil Engineering
IIT Delhi

TYPE OF COURSE : Rerun | Core | UG/PG
COURSE DURATION : 12 weeks (29 Jul’19 - 18 Oct’19)
EXAM DATE : 17 Nov 2019

INTENDED AUDIENCE : B.E / B.Tech, M.E / M.Tech
PRE-REQUISITES : Basic knowledge of Statistical Mechanics
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:
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 01 : Introduction concrete as a material, ingredients, Production, composition, and properties; cement chemistry.
Week 02 : Types of cements; special cements, aggregates :properties, tests and standard
Week 03 : Water reducers, air entrainers, set controllers, specialty admixtures – structure properties, and effects on concrete properties; Introduction to supplementary cementing materials and pozzolans.
Week 04 : Fly ash, blast furnace slag, silica fume, and metakaolin – their production, properties, and effects on concrete properties; other reactive and inert mineral additives.
Week 05 : Basic principles; IS method; ACI method; new approaches based on rheology and particle packing.
Week 06 : 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 07 : Compressive strength and parameters affecting it; Tensile strength – direct and indirect; Modulus of elasticity and Poisson’s ratio; Stress strain response of concrete.
Week 08 : 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 09 : 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.