

Course syllabus

Department of Civil Engineering, Indian Institute of Technology Madras

CE5115 – Admixtures and Special Concretes

Credit Distribution: C:9 L:3 T:0 P:0 E:0 O:6 TH:0

Course Type: Theory

Description: Objective: To explore the science of additive materials used in concrete and evaluate their use in making special concretes. Learning outcome: At the end of the course, the student should be able to independently perform material selection and design concretes for niche applications.

Course Content: 1. Overview of cement chemistry and concrete performance 2. Chemical admixtures Water reducers Set controlling agents Air entrainers Viscosity modifying agents Corrosion inhibitors Other chemicals for special concretes 3. Mineral admixtures Fly ash Ground granulated blast furnace slag, and other types of slag Silica fume Calcined clays including metakaolin Agricultural ashes Limestone as a supplementary material Ternary blended binder system 4. Mixture proportioning, performance requirements and properties of special concretes High strength concrete Self-compacting concrete Fiber-reinforced concrete High density concrete Lightweight concrete Mass concrete. Concrete for low temperature applications Recycled concrete Sprayed concrete Underwater concrete Grouts and grouting.

Textbooks

- Mehta, P. K., and Monteiro, P. J. M - Concrete: Microstructure, Properties, and Materials, Fourth Edition (Indian Edition), McGraw Hill, 2014.

Reference Books:

- Neville, A. M., Properties of Concrete, Pitman Publishing, Inc., MA, 1981.
- Thomas M.D.A., Supplementary Cementing Materials in Concrete, CRC Press, Francis & Taylor Group, Florida, USA, 2013.
- Bentur, A., Diamond, S., and Berke, N.S., Steel Corrosion in Concrete, E&FN Spon, UK, 1997.
- Taylor, H. W. F., Cement Chemistry, Academic Press, Inc., San Diego, CA, 1990.
- Lea, F. M., The Chemistry of Cement and Concrete, Chemical Publishing Company, Inc., New York, 1971.
- Mindess, S., and Young, J. F., Concrete, Prentice Hall, Inc., NJ, 1981.
- J. Newman and B. S. Choo, Eds., Advanced Concrete Technology, Four Volume Set, Elsevier, 2003

Prerequisite: NIL