

## Course syllabus

Department of Civil Engineering, Indian Institute of Technology Madras

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### CE5215 - Concrete Pavement Technology

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

**Course Type:** Theory

**Description:** To provide fundamental understanding of conventional and alternative materials available for the construction of cement concrete pavements. To provide thorough knowledge of the various factors influencing the design, construction, performance, and durability of cement concrete pavements.

**Course Content:** Introduction to Concrete Pavements: Concrete Pavements: Components, functions, factors affecting design and performance; stresses in concrete pavements; concrete pavement design methods; types of concrete pavements and their choice. Material Characterization and Mixture Design: Materials & Characterization: Cementitious materials, aggregates, chemical admixtures; Concrete Properties: Fresh properties, mechanical properties, durability properties, and characterization; Mixture Design: Aggregates blending methods; mix proportioning methods for dry lean concrete, pavement quality concrete, high strength concrete, roller compacted concrete, interlocking paving blocks, and special concrete. Construction and Quality Control, Maintenance, and Rehabilitation: Conventional Pavements: Jointed plain concrete pavements, continuously reinforced concrete pavements, fibre reinforced concrete pavements; Special Types: White topping, roller compacted concrete pavements, interlocking paving blocks, pervious concrete pavements, precast concrete pavements for highways and airfield; industrial pavements; concrete pavements for low volume road. Maintenance and Rehabilitation: Distresses: functional and structural distress in concrete pavements, evaluation of concrete pavements; maintenance, repair, rehabilitation, and retro-fitting techniques. Sustainable Materials: Characterization, Significance, and Current Practices: Use of construction & demolition waste, recycled concrete aggregates, manufactured aggregates, reclaimed asphalt pavement aggregates, agricultural and industrial wastes; mix design proportioning for sustainable mixes and characterization; Life Cycle Cost Analysis; Life Cycle Assessment; Case studies.

**Text Books:** NIL

#### Reference Books

- Delatte N. J., Concrete Pavement Design, Construction, and Performance, CRC Press, Taylor & Francis Group, 2014.
- Peter C. Taylor, Steven H. Kosmatka, Gerald F. Voigt, et al., Integrated Materials and Construction Practices for Concrete Pavement: A State-of-the-Practice Manual. Report No. FHWA HIF-07 " 004, 2007.  
Available online at [https://intrans.iastate.edu/app/uploads/2019/05/IMCP\\_manual.pdf](https://intrans.iastate.edu/app/uploads/2019/05/IMCP_manual.pdf). Accessed on March 17, 2020.
- Neville, A.M., Properties of Concrete, Fifth Edition, Pearson, 2012.
- Mehta, P. K., and Monteiro, P. J. M., Concrete: Microstructure, Properties, and Materials, Mc Graw Hill, Fourth Edition, 2013.

- Griffiths, G., and Thom, N., Concrete Pavement Design Guidance Notes, First Edition, CRC Press, 2019.
- Harrington, D., Abdo, F., Adaska, W., and Hazaree, C., Guide for Roller Compacted Concrete Pavements, Portland Cement Association, 2010.
- Tayabji S., Precast Concrete Pavement Technology Implementation, Report No. FHWA-HIF-19-013, 2019.
- All relevant codes/standards from Indian Roads Congress (IRC), Bureau of Indian Standards (BIS), American Society of Testing Materials (ASTM), and American Association of State Highway and Transportation Officials (AASHTO).

**Prerequisite:** NIL