

Course syllabus

Department of Civil Engineering, Indian Institute of Technology Madras

CE5125 - DESIGN AND CONSTRUCTION OF SUSTAINABLE CONCRETE PAVEMENTS

Credit Distribution: C:3 L:1 T:0 P:0 E:0 O:2 TH:0

Course Type: Theory

Description: At the end of the course, the participants will be able to describe/understand:

- Fundamentals of concrete pavement design factors
- Differentiate between mechanistic and empirical pavement design factors
- Construction practices of concrete pavements and white topping
- Techniques employed for repair, rehabilitation and retrofitting of concrete pavements
- Concrete pavement preservation techniques 6. State of the art related to continuously reinforced concrete pavements, fiber reinforced concrete pavements and pre-cast pavements

Course Content:

- Concrete Pavement Fundamentals: Concrete pavement types, Elements (typical) of concrete pavement types, evolution of concrete pavement design, types of load on concrete pavements, typical response of concrete pavements to load, typical distresses in concrete pavements, material considerations in design and construction of concrete pavements
- Design Factors: Material characterization - Portland cement concrete mixture considerations, traffic factors, climate and environmental factors, base/sub-base/road bed considerations, reinforcement, dowel bars and tie bars
- Pavement Design Methods- Empirical approaches to the design of concrete pavements as per AASHTO'93, Mechanistic - Empirical approaches to design of concrete pavements, Portland Cement Association, AASHTO'98, M-E design, Joint design considerations, Types of joints, Elements of joint design, Dowel bars vs tie bars, Dowel bar design
- Construction Considerations: Construction of concrete pavements for highways and rural roads, Portland Cement Concrete Overlays (White Topping), Bonded concrete overlays, unbonded concrete overlays
- Typical Distresses and Maintenance in Concrete Pavements: Distresses related to concrete pavements- causes types, mechanism, repair, rehabilitation and retrofitting; preservation techniques
- Recent Developments : Continuously Reinforced Concrete Pavements, Fiber Reinforced Concrete Pavements, Pre-cast Concrete Pavements

Text Books:

- Yang H. Huang, Pavement Analysis and Design, 2nd Edition, Pearson
- Norbert Delatte, Concrete Pavement- Design, Construction and Performance, Taylor & Francis

Reference Books: Relevant IRC Codes, PCA codes and manuals

Prerequisite: NIL

Prepared in January 2021