CE5020W - Analysis of Bridges

Credit Distribution: C:12 L:3 T:1 P:0 E:2 O:6 TH:0

Course Type: Theory

Description: To provide students with understanding of: (1) Principles of approximate and detailed analysis of bridge components, and (2) Analysis of bridges of typical configurations, including prestress and bearings.

Course Content: Introduction Bridge types, geometry and design processes; Safety analyses of bridges Approximate analysis methods for bridges and bridge components: Types, Suitability and Accuracy of different Analysis Methods; Analysis of bridge superstructure - spine models, grillage analogy methods, orthotropic plate methods, voided, skewed and curved decks; Analysis of abutments Finite Element Analysis Displacement Method of Analysis Stiffness approach, choice of appropriate elements, modeling considerations and interpretation of results; Modeling and effects of Bearings, Dampers, Soil-flexibility, Nonlinearity, Soil-structure Interaction, and Shock Transmission Units Methods Linear static; geometric and material nonlinearity; Linear dynamic; Nonlinear dynamic analysis Material properties and hysteresis rules Analysis of Bridges Idealization and global effects â€" slab bridges; girder-slab bridges, box-girder bridges, arch bridges, steel truss bridges, cable stayed bridges, suspension bridges, extra dosed bridges, curved bridges, integral bridges; Local effects â€" pile cap and well cap idealization Special Topics Creep and Temperature Analysis; Prestressing external and internal; bonded and unbonded; Construction stage analysis; Curved bridges and on slopes; Buckling Analysis; Expansion Joints longitudinal and transverse; Redundancy analysis; Multi-support Excitation; Strut and Tie Models - Design Principles and Applications; Precast Segmental Bridges - Geometry control.

Text Books: NIL

Reference Books

- Fu,C.C., and Wang,S., (2015), Computational Analysis and Design of Bridge Structures, CRC Press, ISBN 978-1-4665-7985-9

Prerequisite: NIL