CE 331: Bridge Engineering (3- 0- 0:3)

Objectives of the Course: The objective of this course is to introduce the theory and application of analysis and design of reinforced concrete and steel bridges. The course focuses on designing and understanding the structural behaviour of reinforced concrete and steel components of highway and railway bridges subjected to static and dynamic loads.

Introductions

Investigation and site selection, hydraulic factors, alignment, traffic aspects, types of bridges

Loading standard and design

Loading standard, IRC specification, Impact factor, General design consideration, Structural design of highway and railway bridges in masonry, reinforced, pre-stressed concrete and steel.

Design of bridge superstructures

Superstructures: Slab Bridge, beam and Slab Bridge, plate girder and composite bridges, Bearings and expansion joints.

Design of bridge sub-structures

Bridge foundation: types of foundation, design of well and pile foundation, Bridge vibration: traffic loading, seismic and wind effect, construction techniques and maintenance.

Text Books:

1. *Victor D. J,* "*Essentials of Bridge Engineering",* Oxford and IBH
2. *Raju N. K,* "*Design of Bridges",* Oxford and IBH

References:

1. *Raina, V. K. ,"Concrete bridge Practice: Analysis, Design and Economics"*, Tata McGraw Hill
2. *Fryba, L.* "*Dynamics of Railway Bridges"*, Thomas Telford.

Course Outcomes: Upon successful completion of this course, it is expected that students will be able to: Relate different design philosophies of the highway and railway bridges; Understand the structural behaviour of different components of a reinforced concrete and steel bridge; Analyze and design different components of a highway and railway bridge, to meet desired needs within realistic constraints such as economy, environment friendly, safety, viable construction and its sustainability under loads standardised by Indian Road Congress (IRC) and Indian Railway Standard Code of Practice for Bridges respectively and submit the designs in complete and concise manner; Use the techniques, skills, and modern engineering tools and softwares necessary for design and detailing; Analyze and interpret the results using analytical tools and further plan, design and detail different bridges using relevant and upcoming BIS standards; Interact and manage work with professionals of diverse background and talent.
