BRIDGE ENGINEERING
(SYLLABUS)

Course Code	23CE4602B	Year	III	Semester	I
Course Category	Professional Elective -III	Branch	CIVIL	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Structural Analysis
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks:	100

Course Objectives:
The objective of this course is to:

1. Familiarize students with different types of Bridges and IRC standards.
2. Equip student with the concepts and design of Slab Bridges, T Beam Bridges, Box Culverts.
3. Understand concepts of design of Plate Girder Bridges.
4. Familiarize with different methods of inspection of bridges and their maintenance.

Course Outcomes:
Course will enable the student to:

CO	Statement	Blooms level
CO 1	Understand the types of bridges and culverts, bridge components, foundations, bearings, loading standards, and basic inspection and maintenance practices.	**L2**
CO 2	Explain load distribution, structural behavior, and analysis methods used in slab, T-beam, plate girder bridges, and box culverts under IRC and railway loading.	**L3**
CO 3	Apply standard analytical methods and loading codes to determine forces and effects in bridge decks, girders, foundations, bearings, and culverts.	**L3**
CO 4	Analyze and evaluate structural components of bridges and culverts, including slabs, girders, stiffeners, foundations, and maintenance requirements.	**L4**
CO 5	Design and detail bridge and culvert components with appropriate foundations, bearings, and maintenance strategies as per IRC specifications.	**L4**

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3											1	
CO2	3	2										2	
CO3	3	3	2									3	
CO4	3	3	2									3	
CO5	3	3	3								2	3	2

Syllabus

Unit No	Content	Mapped COs
I	**General Introduction to types of Bridges**- (Slab bridges, TBeam, Arch bridges, Cable Stayed bridges, pre stressed concrete bridges, Truss Bridges, Culverts) - Nomenclature- Selection of Bridge Site- Economical span- Abutments pier and end connections- types of foundations- Open, Pile, Well Foundations, Bearings – Types- Introduction to Loading standards- Railway and IRC Loading.	**CO1, CO2**
II	**Slab bridges**- Wheel load on slab- effective width method- slabs supported on two edges- cantilever slabs-dispersion length-Design of interior panel of slab-Guyon's–Massonet Method–Hendry-Jaegar Methods- Courbon's theory- Pigeaud's method.	**CO2, CO3, CO4**
III	**T-Beam bridges**- Analysis and design of various elements of bridge–Design of deck slab, longitudinal girders, Secondary beams- Reinforcement detailing.	**CO2, CO3, CO4, CO5**
IV	**Plate Girder Bridges**: Elements of plate girder and their design-web-flange- intermediate stiffener- vertical stiffeners- bearing stiffener- Splices, Design problem with detailing.	**CO2, CO4, CO5**
V	**Box Culverts:** Loading–Analysis and Design-Reinforcement detailing. **Inspection and Maintenance of Bridges:** Procedures and methods for inspection–Testing of bridges- Maintenance of Sub Structures and Super structures-Maintenance of bearings- Maintenance Schedules.	**CO1, CO3, CO4, CO5**

Learning Resource(s)

Text Book(s)

1. 'Essentials of Bridge Engineering 'by Johnson Victor D
2. 'Design of Bridge Structures' by T.R. Jagadeesh, M.A. Jayaram, PHI
3. 'Design of RC Structures' by B. C.Punmai, Jain & Jain, Lakshmi Publications.

Reference Book(s)

1. 'Design of Concrete Bridges' by Aswini, Vazirani,Ratwani
2. 'Design of Steel Structures' by B.C.Punmai, Jain & Jain, Lakshmi Publications
3. 'Design of Bridges' by Krishna Raju.

Faculty **HoD-CE**