BRIDGE ENGINEERING

Course Code: 22CEH114

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Course Outcomes:

At the end of the course, the student will be able to:

CO1: Discuss the IRC standard live loads and design the deck slab bridge.

CO2: Analyse and box pipe culverts for the given loading and detail the box culverts.

CO3: Design and detail the T-Beam bridges.

CO4: Design and check the stability of piers and abutments.

CO5: Discuss about the construction techniques of precast members.

UNIT-I **(10 Lectures)**

GENERAL CONSIDERATIONS FOR ROAD BRIDGES:

Introduction – Site selection – Soil exploration for site – Selection of bridge type – Economical span – Number of spans – Determination of HFL – General arrangement drawing.

STANDARD SPECIFICATIONS FOR ROAD BRIDGES:

Width of carriageway- Clearances- Loads to be considered- Dead load– I.R.C. standard live loads- Impact effect- Review of I.R.C. loadings- Application of live loads on deck slabs – Wind load – Longitudinal forces- Centrifugal forces- Horizontal forces due to water currents.

Learning outcomes:

1. Summarise the general considerations for Road Bridges (L2)
2. Describe the standard specifications for Road bridges (L2)

UNIT-II **(10 Lectures)**

CULVERTS:

Introduction, Analysis and design of box culverts- slab culverts – pipe culverts- Reinforcement detailing and bar bending schedule need to be prepared.

Learning outcomes:

1. Analyse and design different types of culverts (L3)
2. Detailing and prepare bar bending schedule (L2)

UNIT-III **(10 Lectures)**

REINFORCED CONCRETE T-BEAM BRIDGES:

Introduction–Analysis and Design of T – Beam Girder bridges- Reinforcement detailing and bar bending schedule need to be prepared.

Learning outcomes:

1. Analyse and design T-Beam Girder bridge (L1)
2. Detailing and preparing bar bending schedule(L2)

UNIT-IV **(10 Lectures)**

DESIGN OF SUBSTRUCTURE:

Analysis and Design of Abutments and pier- Reinforcement detailing to be prepared.

Learning outcomes:

1. Analyse, design and detailing of substructure abutment elements (L3)
2. Analyse, design and detailing of substructure pier elements (L3)

UNIT-V **(10 Lectures)**

BRIDGE BEARINGS:

Bearings, forces on bearings, types of bearings design of elastomeric bearings, basics for selection of bearings. Construction techniques for Via–Ducts, Methods of erection - Pre-cast girders, Launching procedures, design of launching girders.

Learning outcomes:

1. Describe the concept of bearings (L2)
2. Design of elastomeric bearings (L3)

Text Books:

1. Johnson victor D, *Essentials of Bridge Engineering*, 7th Edition, Oxford, IBH Publishing Co., Ltd., 2006.
2. Ponnuswamy, *Bridge Engineering*, 4th Edition, McGraw-Hill Publication, 2008.
3. KrishnamRaju N., *Design of Bridges,* 4th Edition, Oxford and IBH Publishing Co., Ltd.,2008.

References:

1. Vazirani, Ratvani&Aswani, *Design of Concrete Bridges*, 5th Edition, Khanna Publishers,2006.
2. Jagadish T.R. & M.A. Jayaram, *Design of Bridge Structures,* 2nd Edition,2009.
3. 3. Swami Saran, *Analysis and Design of sub-structures,* 2nd Edition, Oxford IBH Publishing co Ltd.,2006.