

Course Code	Course Name	L-T-P-Credits	Year of Introduction
CE463	BRIDGE ENGINEERING	3-0-0-3	2016

**Prerequisite:** CE 301 Design of Concrete structures I

**Course objectives:**

- To impart knowledge on important types of bridge structures, their selection and planning, structural configurations, assessment of loads and perform design.

**Syllabus :**

General considerations for road bridges, Standard specifications for road bridges, Design of slab bridges and box culverts, T beam bridges, Prestressed concrete bridges, substructures, bearings, bridge foundations

**Course Outcomes:**

The students will be able to

- use IRC standards and design the deck slab
- analyse, design and detail Box culverts for the given loading
- design and detail T-Beam bridges
- design and check the stability of piers and abutments
- design bridge bearings
- detail bridge foundations and prepare the bar bending schedule

**Text Books :**

- Jagadish T.R. & M.A. Jayaram, "Design of Bridge Structures", 2nd Edition, 2009.
- Johnson victor D, "Essentials of Bridge Engineering", 7<sup>th</sup> Edition, Oxford, IBH publishing Co.,Ltd, 2006
- N.KrishnaRaju " Prestressed Concrete Bridges" CBS Publishers 2012

**References:**

- Krishna Raju N., "Design of Bridges", 4th Edition, Oxford and IBH Publishing Co., Ltd., 2008
- Ponnu Swamy, "Bridge Engineering", 4th Edition, McGraw-Hill Publication, 2008.
- Swami Saran, "Analysis and Design of sub-structures", 2nd Edition, Oxford IBH Publishing co ltd., 2006.
- Vazirani, Ratvani & Aswani, "Design of Concrete Bridges", 5th Edition, Khanna Publishers, 2006.

**COURSE PLAN**

Module	Contents	Hours	Sem. Exam Marks %
I	Introduction :Definition and Basic Forms, Component of bridge, classification of bridge, short history of bridge development, Site selection-Soil Exploration for site Importance of Hydraulic factors in Bridge Design. General arrangement drawing.	6	15

<b>II</b>	Standard specification for Road bridges : Width of carriageway- Clearances- Loads to be considered- Dead load – I.R.C. standard live loads- Impact effect – Wind load –Longitudinal forces- Centrifugal forces- Horizontal forces due to water currents – Buoyancy effect- Earth pressure.	6	15
<b>FIRST INTERNAL EXAMINATION</b>			
<b>III</b>	Solid slab bridges : Introduction, General design features, Effective width method. Simply supported and cantilever Slab Bridge, analysis and design. Box Culverts : Introduction to analysis, design and detailing, Loading conditions (detailed design not expected )	7	15
<b>IV</b>	Beam and slab bridges: Introduction, Design of interior panel of slab. Pigeaud’s method, Calculation of longitudinal moment Courbon’s theory, Design of longitudinal girder, design example. and Reinforcement detailing	7	15
<b>SECOND INTERNAL EXAMINATION</b>			
<b>V</b>	Introduction to pre-stressed concrete bridges (Design Concepts only) Determination of SMinimum Section Modulus, Prestressing Force and eccentricity (Derivation not required) Substructures : Analysis and Design of Abutments and pier-detailing.	8	20
<b>VI</b>	Bridge bearings: forces on bearings, design of elastomeric bearings, basics for selection of bearings. Types of foundations, well foundation–open well foundation, components of well foundation, pile foundations (designs not included) - detailing only	8	20
<b>END SEMESTER EXAMINATION</b>			

### QUESTION PAPER PATTERN (External Evaluation)

**Maximum Marks :100**

**Exam Duration: 3 Hrs**

Part A -Module I & II : 2 questions out of 3 questions carrying 15 marks each

Part B - Module III & IV: 2 questions out of 3 questions carrying 15 marks each

Part C - Module V & VI : 2 questions out of 3 questions carrying 20 marks each

**Note :** 1.Each part should have at least one question from each module

2.Each question can have a maximum of 4 subdivisions (a, b, c, d)