

<b>Branch Name:</b>	Civil Engineering
<b>Semester/Year:</b>	Semester IV / Second Year
<b>Subject Title:</b>	Design of Bridges (Elective - V)
<b>Subject Code:</b>	1ET2060401
<b>Pre-requisite:</b>	Design of Structures

**Course Objective:**

Bridge is an important infrastructure facility required for the passage of railways, road ways, footpaths and even for carriage of fluids. Further, the constant increase in traffic loads associated with the economic growth in modern societies imparts large demands to build such structures. Therefore, the study of analysis and design of bridges is essential for the structural engineering students.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	2	-	5	60	40	-	-	100

Subject Contents			
Sr. No	Topic	Total Hours	Weightage (%)
01	Classification, investigations and planning, choice of type of bridges	02	05
02	I.R.C. and other international specifications on live loads for road bridges, Various forces acting on bridges, Load distribution theories: Courbon's Method, Hendry Jaeger Method, Grillage analogy, Pigeaud's curves	07	15
03	Superstructure: General design considerations, analysis and design of reinforced concrete slab culverts, tee beam and slab bridges, Design principles of prestressed bridges, continuous bridges, box girder bridges, balanced cantilever bridges.	15	35
04	Substructure : Various parts of substructures, Various types of substructures, Loads acting on substructures, Design of pier and pier cap, Design of different types of foundation – Open, pile & well foundation, its construction aspects & related issues	14	35
05	New era methodology/technology for design and construction of bridges, Seismic resistant design provisions, load test on bridges.	04	10

**Course Outcome:**

After learning the course, the students should be able to design:

1. Analyze and design of reinforced concrete slab culverts, tee beam and slab bridges as per IRC specifications,
2. Understand design principles of pre-stressed bridges, continuous bridges, box girder bridges, balanced cantilever bridges,
3. Design pier and pier cap, piles and wells.

**List of Tutorials:**

Analysis and design of bridge with full analytical treatment, design procedure, references and all necessary drawings in the form of neat dimensioned sketches.

**List of Reference Books :**

1. "Bridge Deck Behaviour" by E. C. Hambly, CRC Press, 2nd edition
2. "Grillage Analogy in Bridge Deck Analysis " by C. S. Surana, Alpha Science International Ltd.
3. Raina V.K. "Concrete Bridge Practice" , Tata McGraw Hill Publishing Company, New Delhi, 1991.
4. Krishnaraju, N., "Design of Bridges" Oxford and IBH Publishing Co., Bombay, Calcutta, New Delhi, 1988
5. Bakht, B. and Jaegar, L.G., "Bridge Analysis simplified", McGraw Hill, 1985.
6. Ponnuswamy, S., "Bridge Engineering", Tata McGraw Hill, 1989
7. Derrick Beckett, "An introduction to Structural Design of Concrete Bridges", Surrey University Press, Henley Thames, Oxford Shire, 1973.
8. Taylor, F.W., Thomson, S.E., and Smulski E., "Reinforced Concrete Bridges", John Wiley and Sons, New York, 1955.
9. Edwin H.Gaylord Jr., Charles N.Gaylord, James, E.,Stallmeyer "Design of Steel
10. Structures" McGrew Hill International Editions, 1992.
11. IRC: 5, 6, 78, 112-2011

**Design based Problems (DP)/Open Ended Problem:**

Case study of RC bridge, pre-stressed bridges, continues bridges, balanced cantilever bridges

**E – Resources :**

<http://nptel.ac.in/>