GUJARAT TECHNOLOGICAL UNIVERSITY
Master of Engineering
Subject Code: 3722021
SUBJECT NAME: Design of Bridge Structures
Semester-II

Type of course: Program Elective-IV

Prerequisite: Design of Structures

Rationale: 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 and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE(E)	PA (M)	ESE (V)	PA(I)	
3	0	2	5	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Components of bridges and Classification of Bridges, Investigations and planning, Choice of type of bridges	2	5
2	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	7	15
3	Superstructure: General design considerations, Analysis and design of reinforced concrete slab culverts, Tee beam and slab bridges, Design of prestressed concrete T beam bridges, Box girder bridges, Balanced cantilever bridges	15	35
4	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,	15	35
5	New era methodology/technology for design and construction of bridges, Seismic resistant design provisions, load test on bridges	3	10

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks

w.e.f. AY 2018-19

R Level	U Level	A Level	N Level	E Level	C Level
5	5	14	20	20	6

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Krishnaraju, N., "Design of Bridges" Oxford and IBH Publishing Co., Bombay, Calcutta, New Delhi, 1988
2. Ponnuswamy, S., "Bridge Engineering", Tata McGraw Hill, 1989
3. Taylor, F.W., Thomson, S.E., and Smulski E., "Reinforced Concrete Bridges", John Wiley and Sons, New York
4. Raina V.K. "Concrete Bridge Practice", Tata McGraw Hill Publishing Company, New Delhi, 1991.
5. M.J. Ryall, G.A.R Parke, J.E. Harding, "The Manual of Bridge Engineering", Thomas Telford Publishers.
6. R. Rajagopalan, "Bridge Superstructure", Tata McGraw- Hills Publishing Company Limited
7. Chen Wai-Fah, Duan Lian, Bridge Engineering Handbook - Fundamentals, CRC Press.
8. Chen Wai-Fah, Duan Lian, Bridge Engineering Handbook - Superstructure Design,CRC Press.
9. Chen Wai-Fah, Duan Lian, Bridge Engineering Handbook - Construction & Maintenance, CRC Press.
10. Chen Wai-Fah, Duan Lian, Bridge Engineering Handbook - Seismic Design, CRC Press.
11. Chung C. Fu, Wang Shuqing, Computational Analysis & Design of Bridge Structures, CRC Press.
12. IRC: 5, 6, 78, 112-2011

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Analyze and design small to medium span of reinforced concrete slab culverts, T beam bridges as per IRC specifications,	40
CO-2	Apply design principles of pre-stressed concrete T beam bridges, box girder bridges, balanced cantilever bridges.	30
CO-3	Use of computational software for analysis & design of bridges	10
CO-4	Choose & apply appropriate structural form for different span of bridges	10
CO-5	Develop design basis report	10

List of Experiments:

Analysis and design of at least one full design of RC bridge and one superstructure of PSC bridge with computation analysis & design, references and all necessary drawings in the form of neat dimensioned sketches

List of Open Source Software/learning website:

http://nptel.ac.in/