SCHEME OF COURSE WORK

Course Details:

Course Title	**:BRIDGE ENGINEERING**		
Course Code	**: 15CE2205**	**L P C**	**: 4 0 3**
Program:	**: M. Tech.**		
Specialization:	**: Structural Engineering**		
Semester	**: I**		
Prerequisites	**: Strength of Materials, Structural Analysis, R.C Structures**		
Courses to which it is a prerequisite	**: None**		

Course Outcomes (COs):

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

1	Discuss the IRC standard live load and design the deck slab type bridges.
2	Analyze the box culvert for the given loading and detail the box culverts.
3	Design and detail of T-beam bridges.
4	Design and check the stability of piers and abutments.
5	Discuss the bridge foundations and prepare the bar bending schedule.

Program Outcomes (POs):

Post graduates will be able to:

1	Synthesize existing and new knowledge in various sub areas of structural engineering
2	Analyse complex engineering problems critically with adequate theoretical background for practical applications.
3	Evaluate a wide range of feasible and optimal solutions after considering safety and environmental factors.
4	Demonstate the ability to pursue research by conducting experiments and extract the relevant information through literature surveys.
5	Use state –of- the- art of modern tools for interpreting the behaviour and modeling of complex engineering structures.
6	Attain the capability to work in multi disciplinary teams to achieve common goals.
7	Demonstrate the knowledge to perform the projects efficiently in multi disciplinary environments after consideration of economical and financial matters.
8	Communicate effectively on complex engineering activities to prepare reports and make presentations.
9	Engage in life-long learning independently to improve knowledge.
10	Understand the responsibility of carrying out professional practices ethically for sustainable development of society.
11	Examine critically and independently one's actions and take corrective measures by learning from mistakes.

Course Outcome versus Program Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO-1	S	S	M	M							M
CO-2	S	S	M	M							M
CO-3	S	S	M	M							M
CO-4	S	S		M							M
CO-5	S	S	S	M	S						M

S - Strongly correlated, M - Moderately correlated, *Blank - No correlation*

Assessment Methods:	Assignment / Seminar / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week No.	TOPIC / CONTENTS	Course Outcomes	Sample questions	TEACHING-LEARNING STRATEGY	Assessment Method & Schedule
1	Introduction-site selection-soil exploration for site-selection of bridge type-economical span-no of spans-determination of HFL-general arrangement drawing.	CO-1	Derive the economical span length of a bridge. Discuss the characteristics of site for an ideal bridge.	▫ Lecture/ Discussion	
2	Width of carriage way- clearances-loads to be considered-dead load-IRC standard live load-impact effect-review of IRC Loading.	CO-1 CO-1	Explain about the carriage way- clearances in road bridge.	▫ Lecture	
3	Application of live loads on deck slab-wind load-longitudinal forces-centrifugal forces-horizontal forces due to water currents-buoyancy effect-earth pressure.	CO-1	Explain about the various loads to be considered in design of road bridges	▫ Lecture ▫ Problem solving	
4	Culverts: introduction, analysis and design of box culvert-slab culverts.	CO-2	Analyse and design a box culvert for the given loading. Design a solid slab bridge to suit the following requirements	▫ Lecture ▫ Problem solving	Assignment
5	Pipe culverts-reinforcement detailing and bar bending schedule need to be prepared.	CO-2	Analyse and design a pipe culvert for the given loading. Sketch the reinforcement details of a box culvert.	▫ Lecture ▫ Lecture ▫ Problem solving	
6	T-Beam Bridges: introduction-analysis of T-Beam girder bridges.	CO-3	Analyse and design a T-Beam bridge for the given loading. Sketch the reinforcement details of all the components of a bridge.	▫ Lecture ▫ Problem solving ▫ Problem solving	
7	Design of T-Beam girder bridges.	CO-3	Analyse and design a T-Beam bridge for the given loading. Sketch the reinforcement details of all the components of a bridge.	▫ Lecture ▫ Problem solving ▫ Lecture ▫ Problem solving	Assignment

8	Reinforcement detailing and bar bending schedule need to be prepared.	CO-3	Sketch the reinforcement details of all the components of a bridge. Prepare the bar bending schedule of all the components of a bridge.	Lecture Problem solving ▫ Lecture Problem solving	
9	**MID TEST - I**			▫	
10	Analysis and design of abutments	CO-4	Check the adequacy of the abutment of the briidge for the given loading Check the safety and stability of the abutment of a bridge.	▫ Lecture Problem solving	
11	Analysis and design of pier	CO-4	Check the safety and stability of the abutment of a bridge.	▫ Lecture Problem solving	Assignment
12	Reinforcement detailing and bar bending schedule need to be prepared.	CO-4	Sketch the reinforcement details of all the components of a bridge. Prepare the bar bending schedule of all the components of a bridge.	▫ Lecture Problem solving	
13	Bridge bearings: bearings, forces on bearings, design of elastomeric bearings.	CO-4	Explain about the different bearings to be used in bridges. Design the elastomeric bearing of a bridge for the given loading	▫ Lecture Problem solving	
14	Basics for selection of bearings, expansion joints and closed joints.	CO-4	Explain about the expansion joints and construction joints of a bridge.	▫ Lecture Problem solving	
15	Bridge foundation: types of foundations, well foundation-open well foundation	CO-5	Explain about the different types of foundations,	▫ Lecture Problem solving	
16	Components of well foundation, Pile foundation.	CO-5	Differentiate between the well and pile foundation.	▫ Lecture Problem solving	Assignment
17	Reinforcement detailing and bar bending schedule need to be prepared.	CO-5	Sketch the reinforcement details of the well foundation. Prepare the bar bending schedule of the well foundation	▫ Lecture Problem solving	
18	**MID TEST - II**			▫	
	END EXAM			▫	