COURSECONTENT

DESIGN OF BRIDGES								
II Semester: SE								
CourseCode	**Category**	**Hours/ Week**			**Credits**	**Maximum Marks**		
2522052	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	0	0	3	40	60	100
contactClasses:45	**Tutorial Classes:Nil**	**Practical Classes:Nil**				**TotalClasses:45**		
Prerequisites: Structural Analysis I&II ,Reinforced Concrete Design								

Course Overview:

This course covers analysis and design of concrete bridges, including load considerations such as dead, live, wind, seismic, and temperature effects. It introduces solid slab and RCC girder bridges using methods like Courbon's theory and grillage analogy. The syllabus includes design of box culverts and prestressed concrete bridges with composite sections. It also addresses substructure elements such as piers and abutments, focusing on design loads, dimensions, and overall structural safety requirements.

Course Objectives:

1. To understand types of concrete bridges, loading concepts, and the analysis and design of solid slab bridges.
2. To learn the analysis and design of RCC girder bridges using methods like Courbon's theory and grillage analogy.
3. To study the analysis and design of single-cell box culverts under various design loads.
4. To understand principles and design requirements of prestressed concrete bridges, including composite and staged prestressing.
5. To learn the design of bridge substructures such as piers, abutments, and bed blocks under specified loads.

Course Outcomes: After Completion of the Course,Students should be able to

1. Describe the types, loads, and general design requirements of concrete and solid slab bridges.
2. Analyze RCC girder bridges using Courbon's theory and grillage analogy.
3. Design single-cell box culverts for critical sections under various loading conditions.
4. Apply principles of prestressed concrete for the analysis and design of road bridges.
5. Evaluate the design of substructures including piers, abutments, and bed blocks.

UNIT-I

ConcreteBridges: Introduction-Typesof Bridges-Economic spanlength -Typesof loading-Deadload- live load-Impact Effect-Centrifugal force-wind loads-Lateral loads-Longitudinal forces-Seismic loads-Frictional resistance of expansion bearings-Secondary Stresses-Temperature Effect-Erection Forces and effects-Width of roadway and footway-General Design Requirements. SolidslabBridges:Introduction-MethodofAnalysisandDesign.

UNIT-II

RCCGirderBridges: Introduction-MethodofAnalysisandDesign-Courbon'sTheory,Grillageanalogy

UNIT-III

BoxCulverts:-SingleCellBoxCulvert–DesignLoads,DesignMoments,ShearsandThrusts. Design of Critical sections.

UNIT-IV

Pre-Stressed Concrete Bridges: Basic Principles-General Design Requirements-Mild steel reinforcement in prestressed concrete member-Concrete cover and spacing of pre-stressing steel- Slender beams- Composite Section-Propped-Design of Propped Composite Section-Unpropped compositesection-Two-stagePrestressing-ShrinkingStresses-General DesignrequirementsforRoad Bridges.

UNIT-V

Sub-structure of bridges: Substructure- Beds block-Piers- Pier Dimensions- Design loads for piers-Abutments- Design loads for Abutments.

REFERENCEBOOKS:

1. Designof Concrete Bridges by M.G.Aswani,V.N.VaziraniandM.M.Ratwani.
2. Bridge Deck Behaviour byE.C.Hambly.
3. Concrete Bridge Design and Practice byV.K.Raina.
4. Essentials of Bridge Engineering by JohsonVictor,Oxford&IBH
5. Design of Bridges by V. V.Sastry,Dhanpat Rai& Co.

ELECTRONICRESOURCES:

https://nptel.ac.in/courses/105105165

MATERIALS ONLINE:

1. Course template
2. Tutorialquestionbank
3. Definitionsand terminology
4. Assignments
5. Modelquestionpaper–I
6. Modelquestionpaper–II
7. Lecturenotes
8. E-LearningReadinessVideos(ELRV)