COURSE TITLE : DESIGN OF PRE-STRESSED CONCRETE & MASONRY WALLS
COURSE CODE : 5009
COURSE CATEGORY : E
PERIODS/WEEK : 4
PERIODS/SEMESTER : 72
CREDITS : 4

TIME SCHEDULE

MODULE	TOPIC	PERIODS
I	Introduction to working stress design	17
	Test I	1
II	Introduction to pre-stressed concrete, Different systems of Pre-stressing	17
	Test II	1
III	Losses of pre-stressing Analysis of pre-stress, Design of pre-stress beam for flexure	17
	Test III	1
IV	Design of Masonry structures	17
	Test IV	1
	TOTAL	**72**

Rationale:

Prestressed concrete *is a method for overcoming concrete's natural weakness in tension. It can be used to produce beams, floors or bridges with a longer span than is practical with ordinary reinforced concrete. Prestressing tendons (generally of high tensile steel cable or rods) are used to provide a clamping load which produces a compressive stress that balances the tensile stress. Prestressed concrete find application in situation where long span are encountered [as in bridges] or where cracks [even hairline] in concrete are not permitted [as in pressure vessels, pipes and water tanks] or where fatigue loading in encountered [as in rail track sleepers]. This subject also helps in design of load bearing masonry walls. This subject helps to understand the basic principles of working stress design.*

OBJECTIVES

Upon completion of course the student should be able to

MODULE I

1.1.0 Study the Principles of Working stress method of Design as per the IS Code
1.1.1 Understand the assumption in the working stress method,
1.1.2 Study the calculation of depth of N.A.
1.1.3 Study different types of sections.
1.1.4 Define Lever arm,.

1.1.5 Derive expression for Moment of Resistance of singly Reinforced balanced section for different grades of concrete and steel.
1.1.6 To determine the moment of resistance of singly reinforced beam for a given section, area of steel and permissible stresses.
1.1.7 To check the stresses in concrete and steel for a given dimensions, area of steel and bending moment of a singly reinforced beam.
1.1.8 To determine the area of tensile reinforcement for a given dimensions, bending moment and grade of concrete and steel of a singly reinforced beam.
1.1.9 To design a singly reinforced beam for a given bending moment and grade of concrete and steel.

MODULE II

2.1.0 Introductions of prestressed concrete
2.1.1 Explain the Basic principle of prestressed concrete
2.1.2 Write down Necessity of using high strength concrete and high tensile steel in pre stressed Concrete.
2.1.3 List the Advantages of prestresssed concrete
2.1.4 List the Applications of prestressed concrete.
2.1.5 List the different Materials for prestressed concrete.
2.1.6 Write down the basic assumptions in prestressed concrete design.
2.2.0 Know the different systems of Prestressing.
2.2.1 List different methods of applying prestress.
2.2.2 Differentiate between pre-tensioning and post tensioning system.
2.2.3 Classification of prestressing based on anchorages adopted.
2.1.0 Know the different Losses of prestress.

MODULE III

3.1.1 List different losses of prestress.
3.1.2 Determination of loss due to elastic deformation.
3.1.3 Determination of loss due to shrinkage of concrete.
3.1.4 Determination of loss due to creep of concrete.
3.1.5 Determination of loss due to anchorage slip.
3.2.0 Know the Analysis of presress:
3.2.1 Draw the stress distribution of prestressed beam with concentric tendon.
3.2.2 Draw the stress distribution of prestressed beam with eccentric tendon.
3.2.3 Draw the stress distribution of prestressed beam due to eccentric prestressing, dead and Live loads.
3.3.0 Know the simple design of presressed beam sections for flexure.
3.3.1 Determination of minimum section modulas
3.3.1 Determination of minimum possible depth of beam

3.3.2 Determination of minimum prestressing force required for the section
3.3.3 Determination of corresponding eccentricity of prestressing force

MODULE IV

4.1.0 Know the design of masonry wall.
4.1.1 Determination of effective height, effective length, effective thickness of masonry wall.
4.1.2 List design considerations of masonry wall.
4.1.3 Design a masonry wall by structural analysis method.

COURSE CONTENTS

IS 1905-1987and IS 456-2000 are permitted inside the Examination Hall..

MODULE:I

Basic Principles of Working stress method of Design as per the IS Code; the assumption in the working stress method, calculation of depth of Neutral axis ;lever arm; lever arm factor; moment of resistance factor; types of sections; derivation of moment of resistance of singly reinforced balanced section for different grades of concrete and steel. Calculation of moment of resistance; checking the stresses in concrete and steel of a singly reinforced beam; Determination of area of tensile reinforcement of a singly reinforced beam; design of singly reinforced beam for a given bending moment and grade of concrete and steel.

MODULE II

Introduction: Basic principles of prestressed concrete-materials for pre stressed concrete-necessity of using high strength concrete and high tensile steel in pre stressed concrete-advantages of prestressed concrete-applications of prestressed concrete-basic assumptions in prestressed concrete design.
Systems of prestressing: methods of applying prestress-differentiate between pre-tensioning and post tensioning system-classification of prestressing based on anchorages applied.

MODULE III

Losses of prestressing: different losses of prestress- calculation of different prestress losses [simple problems]
Analysis of prestress: sketch the stress distribution of prestressed beam.
Design of prestressed beam sections for flexure: Determination of section modulas required- determination of possible depth of beam- determination of minimum prestressing force required-determination of corresponding eccentricity
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MODULE IV

Design of Masonry Walls-Design considerations-lateral support-effective height of wall-effective
Length of wall-Effective thickness-slenderness ratio-structural design of walls-methods-Design by
Structural analysis method-Area reduction factor-Eccentricity of loading-Shape factor.

REFERENCES:

1. Prestressed Concrete – N.KRISHNA RAJU;Tata McGraw-Hill

2. Pre-Stressed Concrete - N C Sinha & Roy - S.Chand.
3. Pre-stressed Concrete-Ramamruthm- Dhanpat Rai & Sons
4. IS 1343-1980:code of practice for prestressed concrete.
5. Building construction By B C Punmia, laxmi publications
6. IS 1905-1987: code of Practice for structural use of unreinforced masonry.