

Academic Course Description

<p style="margin: 0;">BHARATH UNIVERSITY</p> <p style="margin: 0;">Faculty of Engineering and Technology</p> <p style="margin: 0;">Department of Civil Engineering</p> <p style="margin: 0;">BEC063 PRESTRESSED CONCRETE STRUCTURES</p> <p style="margin: 0;">Seventh Semester, 2017-18 (odd Semester)</p>
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Course (catalog) description

To introduce the students to the basic concepts and principles of Prestressed concrete structures

Compulsory/Elective course : Compulsory for Civil students

Credit/ Contact hours : 3 credits / 45 Hours

Course Coordinator : Mr.T.P.Maikandaan, Assistant Professor

Instructors :

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@bharathuniv.ac.in)	Consultation
Mr. T.P.Maikandaan	IV Year civil	Civil Block	04422290742	ganga_meik@yahoo.co.in	9.00 - 9.50 AM
Ms.R.J.Rinu Isah	IV Year civil	Civil Block	04422290742	rinuisah@gmail.com	12.45 - 1.15 PM

Relationship to other courses:

Pre –requisites : Building Construction Technology

Assumed knowledge : Basic knowledge in RC structures

Following courses : Reinforced concrete structures-II

Syllabus Contents

UNIT I INTRODUCTION – THEORY AND BEHAVIOUR

8 HOURS

Basic concepts – Advantages – Materials required – Systems and methods of prestressing. Analysis of sections. Stress concept, Strength concept, Load balancing concept -. Effect of loading on the tensile stresses in tendons - Effect of tendon profile on deflections – Factors influencing deflections – Calculation of deflections – Short term and long term deflections – Losses of prestress – Estimation of crack width.

UNIT II DESIGN OF END BLOCK

10 HOURS

Flexural strength – Simplified procedures as per codes – strain compatibility method – Basic concepts in selection of cross section for bending – stress distribution in end block- Design of anchorage zone reinforcement – Limit state design criteria – Partial prestressing- Applications.

UNIT III CIRCULAR PRESTRESSING

9 HOURS

Design of prestressed concrete tanks – Poles and sleepers

UNIT IV COMPOSITE CONSTRUCTION

8 HOURS

Analysis for stresses – Estimate for deflections – Flexural and shear strength of composite members

UNIT V PRESTRESSED CONCRETE BRIDGES

10HOURS

General aspects pretensioned prestressed bridge decks - Post tensioned prestressed bridge decks - Advantages over R.C.bridges - Principles of design only..

TEXT BOOKS:

1. Krishna Raju N. "Prestressed concrete", Tata McGraw Hill Company, New Delhi 2007

REFERENCES:

1. MallieS.K.and Gupta A.P. "Prestressed concrete", Oxford and VB publishing Co. Pvt Ltd., 1987.

Computer usage: Nil

Professional component

General	-	0%
Basic Sciences	-	0%
Engineering sciences & Technical arts	-	0%
Professional subject	-	100%

Broad area : Principles of prestressed concrete structures

Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	August 1 st week	Session 1 to 14	2 Periods
2	Cycle Test-2	September 2 nd week	Session 15 to 28	2 Periods
3	Model Test	October 2 nd week	Session 1 to 45	3 Hrs
4	University Examination	TBA	All sessions / Units	3 Hrs.

H- High correlation, M- Medium Correlation, L- Low correlation

Mapping of Instructional Objectives with Program Outcome

To introduce the students to the basic concepts and principles of Prestressed concrete structures	Correlates to program outcome		
	H	M	L
1. To design prestressed concrete beam.	c.d		
2. To design prestressed composite beams	c.d		
3.To design flexural members with partial prestressing	c.d		
4. To design prestressed concrete tanks, poles and sleepers.	c.d		
5. To design prestressed concrete bridges	c.d		

S.NO	Topics	Problem solving (Yes/No)	Text / Chapter
UNIT I INTRODUCTION – THEORY AND BEHAVIOUR			
1.	Basic concepts	No	[T1] -1 & R[1]
2.	Advantages – Materials required	No	
3.	Systems and methods of prestressing	No	
4.	Analysis of sections. Stress concept, Strength concept, Load balancing concept	No	
5.	Effect of loading on the tensile stresses in tendons	No	
6.	Effect of tendon profile on	No	
7.	deflections – Factors influencing deflections	No	
8.	Calculation of deflections – Short term and long term deflections	yes	
9.	Losses of prestress – Estimation of crack width	Yes	
UNIT II DESIGN OF END BLOCK			
10.	Design of prestressed concrete tanks	No	[T1] -1 & R[1]
11.	Simplified procedures as per codes	yes	
12.	strain compatibility	No	
13.	method – Basic concepts in selection of cross section for bending	yes	
14.	stress distribution in end block	yes	
15.	Design of anchorage zone reinforcement	No	
16.	Limit state design criteria	No	
17.	Partial prestressing- Applications	No	
18.	Uses of prestressing	No	
UNIT III CIRCULAR PRESTRESSING			
19.	Design of prestressed concrete tanks	yes	[T1] -1 & R[1]
20.	Design of prestressed concrete tanks	yes	
21.	Design of prestressed concrete tanks	yes	
22.	Design of prestressed concrete tanks	yes	
23.	Design of prestressed concrete tanks	yes	
24.	Design of prestressed concrete tanks	yes	
25.	Poles and sleepers	yes	
26.	Design of ploe and sleepers	yes	
27.	Uses of poles and sleepers	yes	
UNIT IV COMPOSITE CONSTRUCTION			
28.	Analysis for stresses	yes	[T1] -1 & R[1]
29.	Stresses problem	yes	
30.	Stresses problem	yes	
31.	Stresses problem	yes	
32.	Estimate for deflections	yes	
33.	Flexural and shear strength of	yes	
34.	composite members	yes	
35.	composite members	yes	
36.	composite members	yes	
UNIT V PRESTRESSED CONCRETE BRIDGES			
37.	General aspects pretensioned prestressed bridge decks -	No	[T1] -1 & R[1]
38.	Post tensioned prestressed bridge decks	Yes	
39.	Post tensioned prestressed bridge decks	Yes	
40.	Post tensioned prestressed bridge decks	Yes	
41.	Post tensioned prestressed bridge decks	Yes	
42.	Post tensioned prestressed bridge decks	Yes	

43.	Advantages over R.C.bridges	Yes	
44.	Principles of design only.	Yes	
45.	Uses of concrete Bridges	No	

Draft Lecture Schedule

Teaching Strategies

The teaching in this course aims at establishing a good fundamental understanding of the areas covered using:

- Formal face-to-face lectures
- Laboratory sessions, which support the formal lecture material and also provide the student with practical construction, measurement and debugging skills.

Evaluation Strategies

Cycle Test – I	-	5%
Cycle Test – II	-	5%
Model Test	-	5%
Assignment	-	5%
Attendance	-	10%
Final exam	-	70%

Prepared by: Mr.T.P.Maikandaan, Assistant Professor , Department of Civil

Dated :

Addendum**ABET Outcomes expected of graduates of B.Tech / Civil / program by the time that they graduate:**

- a. An ability to apply knowledge of mathematics, science, and engineering
- b. An ability to design and conduct experiments, as well as to analyze and interpret data
- c. An ability to design a hardware and software system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- d. An ability to function on multidisciplinary teams
- e. An ability to identify, formulate, and solve engineering problems
- f. An understanding of professional and ethical responsibility
- g. An ability to communicate effectively
- h. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- i. A recognition of the need for, and an ability to engage in life-long learning
- j. A knowledge of contemporary issues
- k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Program Educational Objectives**PEO1: PREPARATION**

Civil Engineering graduates will have knowledge to apply the fundamental principles for a successful profession and/or for higher education in Civil Engineering based on mathematical, scientific and engineering principles, to solve realistic and field problems that arise in engineering and non engineering sectors

PEO2: CORE COMPETENCE

Civil Engineering graduates will adapt to the modern engineering tools and construction methods for planning, design, execution and maintenance of works with sustainable development in their profession.

PEO3: PROFESSIONALISM

Civil Engineering Graduates will exhibit professionalism, ethical attitude, communication and managerial skills, successful team work in various private and government organizations both at the national and international level in their profession and adapt to current trends with lifelong learning.

PEO4: SKILL

Civil Engineering graduates will be trained for developing soft skills such as proficiency in many languages, technical communication, verbal, logical, analytical, comprehension, team building, inter personal relationship, group discussion and leadership skill to become a better professional.

PEO5: ETHICS

Civil Engineering graduates will be installed with ethical feeling, encouraged to make decisions that are safe and environmentally-responsible and also innovative for societal improvement.

Course Teacher	Signature
Mr.T.P.Maikandaan	
Ms.R.J.Rinu Isah	

Course Coordinator

HOD/CIVIL