Academic Course Description

BHARATH UNIVERSITY
Faculty of Engineering and Technology
Department of Civil Engineering

BCE504 - REINFORCED CONCRETE STRUCTURES – I

Fifth Semester, 2017-18 (Odd Semester)

Course (catalog) description
To impart knowledge on common method of erecting reinforced structure investigation and design of RC Structure and to acquire the capacity of the footing with the suitable code and to investigate and design a suitable foundation.

Compulsory/Elective course : Compulsory for Civil students

Credit / Contact hours : 4 credits / 60 hours

Course Coordinator : Mr.T.P.Meikandaan

Instructors :

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@ bharathuniv.ac.in	Consultation
Mr.T.P.Meikandaan	Third year Civil	Civil Block		Ganga_meik@yahoo.co.in	9.00 - 9.50 AM

Relationship to other courses:

Pre –requisites **:** Theory of Structures

Assumed knowledge : Basics of SFD and BMD

Following courses : NIL

Syllabus Contents

UNIT I INTRODUCTION 12

Actual and idealized stress- strain diagrams of concrete and steel (Mild Steel, High Strength deformed bars) – behavior of R.C.beam in bending – introduction to the ESD philosophy – Design of rectangular beams, tee beams, shear, development length- design of one way slab, two way slabs BIS 456 2000.

UNIT II WORKING STRESS METHOD 12

Design of continuous beams and slabs – axially and eccentrically loaded column footings for individual columns and combined rectangular footings for two columns.

UNIT III DESIGN OF BEAMS 12

Limit state design of rectangular T and L shaped beams for flexure, shear, bond torsion, - design of one way slab – Lintels – sun shades.

UNIT IV LSM: DESIGN OF SLABS &COLUMNS 12

Limit state design of two way slab using BIS 456 – limit state design of short rectangular and circular columns for axial and eccentric loads using SP- 16 design of long columns.

UNIT V LSM: DESIGN OF FOOTING 12

Limit state design of square / rectangular footings for axially and eccentrically loaded columns combined rectangular footings for two columns.

TEXT BOOKS:

1. Krishna Raju, N., "Design of Reinforced Concrete Structures", CBS Publishers &Distributors, New Delhi,2003

REFERENCES:

1. Jain.A.K. Limit State Design of R.C.Structures, Nerchand Publications
2. BIS 456 – 2000
3. S.P.16 of BIS
4. W.H. & R.S. Mosely, J.H.Bungcy an R.Hulse, Reinforced Concrete Design, 5th Edition, Macmillan Co.
5. Ramamrutham S, Design of Steel Structures, Dhanpat Rai Publishing Co., New. Delhi, 2001
6. Dr.Purushothaman P Reinforced Concrete Structures Tata McGraw-Hill, 1984

Computer usage: Nil

Professional component

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

Broad area: Design RC concrete structural elements using various methods.

Test Schedule

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

Mapping of Instructional Objectives with Program Outcome

H: high correlation, M: medium correlation, L: low correlation

To introduce the students to basic theory and concepts of structural analysis and the classical methods for the analysis of structures.	Correlates to program outcome		
	H	**M**	**L**
1. Design RC concrete structural elements using various methods.	a,e,	b,d	
2. Design reinforced concrete slabs and beams by WSD for flexure	b	e	
3. Design various basic elements of reinforced concrete structures like slabs, beams, columns and footings by LSD	a,e		
4. Design reinforced concrete slabs and beams for shear and torsion by LSD	a	d	
5. Design reinforced concrete Footing		e	

Draft Lecture Schedule

Session	Topics	Problem solving (Yes/No)	Text / Chapter
UNIT I	**INTRODUCTION**		
1.	Actual and idealized stress- strain diagrams of concrete and steel (Mild Steel, High Strength deformed bars)	Yes	[T1, R2]
2.	Behavior of R.C.beam in bending	Yes	
3.	Introduction to the ESD philosophy	Yes	
4.	Design of rectangular beams	Yes	
5.	Design of rectangular beams	Yes	
6.	Design of tee beams	Yes	
7.	Design of tee beams	Yes	
8.	Shear, development length-	Yes	
9.	Design of one way slab	Yes	
10.	Design of one way slab	Yes	
11.	Design of two way slab	Yes	
12.	Design of two way slab	Yes	
UNIT II	**WORKING STRESS METHOD**		
13.	Design of continuous beams	Yes	[T1, T2 & R3]
14.	Design of continuous beams	Yes	
15.	Design of continuous slabs	Yes	
16.	Design of continuous slabs	Yes	
17.	Axially loaded column footings for individual footings	Yes	
18.	Axially loaded column footings for individual footings	Yes	
19.	Eccentrically loaded column footings for individual footings	Yes	
20.	Eccentrically loaded column footings for individual footings	Yes	
21.	Axially loaded column footings for combined footings	Yes	
22.	Axially loaded column footings for combined footings	Yes	
23.	Eccentrically loaded column footings for combined footings	Yes	
24.	Eccentrically loaded column footings for combined footings	Yes	
UNIT III	**DESIGN OF BEAMS**		
25.	Limit state design of rectangular beams for flexure	Yes	[T1, T2 & R3]
26.	Limit state design of rectangular beams for flexure	Yes	
27.	Limit state design of T shaped beams for flexure	Yes	
28.	Limit state design of T shaped beams for flexure	Yes	
29.	Limit state design of L shaped beams for flexure	Yes	
30.	Limit state design of L shaped beams for flexure	Yes	
31.	Shear, bond torsion	Yes	
32.	Shear, bond torsion	Yes	
33.	Design of one way slab	Yes	
34.	Design of one way slab	Yes	
35.	Lintels	Yes	
36.	Sun shades	Yes	

UNIT IV	**LSM: DESIGN OF SLABS &COLUMNS**		
37.	Limit state design of two way slab using BIS 456	Yes	[T1, T2 & R3]
38.	Limit state design of two way slab using BIS 456	Yes	
39.	Limit state design of short rectangular columns for axial loads using SP- 16	Yes	
40.	Limit state design of short rectangular columns for axial loads using SP- 16	Yes	
41.	Limit state design of short circular columns for axial loads using SP- 16	Yes	
42.	Limit state design of short circular columns for axial loads using SP- 16	Yes	
43.	Limit state design of short rectangular and circular columns for eccentric loads using SP- 16	Yes	
44.	Limit state design of short rectangular and circular columns for eccentric loads using SP- 16	Yes	
45.	Limit state design of short rectangular columns for eccentric loads using SP- 16	Yes	
46.	Limit state design of short circular columns for eccentric loads using SP- 16	Yes	
47.	Design of long columns.	Yes	
48.	Design of long columns.	Yes	
UNIT V	**LSM: DESIGN OF FOOTING**		
49.	Limit state design of square footings for axially loaded columns	Yes	[T1, T2 & R3]
50.	Limit state design of square footings for axially loaded columns	Yes	
51.	Limit state design of rectangular footings for axially loaded columns	Yes	
52.	Limit state design of rectangular footings for axially loaded columns	Yes	
53.	Limit state design of square footings for eccentrically loaded columns	Yes	
54.	Limit state design of square footings for eccentrically loaded columns	Yes	
55.	Limit state design of rectangular footings for eccentrically loaded columns	Yes	
56.	Limit state design of rectangular footings for eccentrically loaded columns	Yes	
57.	Combined rectangular footings for two columns	Yes	
58.	Combined rectangular footings for two columns	Yes	
59.	Combined rectangular footings for two columns	Yes	
60.	Combined rectangular footings for two columns	Yes	

Teaching Strategies

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

- Formal face-to-face lectures
- Tutorials, which allow for exercises in problem solving and allow time for students to resolve problems in understanding of lecture material.
- Laboratory sessions, which support the formal lecture material and also provide the student with practical construction, measurement and debugging skills.
- Small periodic quizzes, to enable you to assess your understanding of the concepts.

Evaluation Strategies

Cycle Test – I	-	5%
Cycle Test – II	-	5%
Model Test	-	5%
Assignment	-	5%
Attendance	-	10%
Final exam	-	50%

Prepared by: T.P.Meikandaan, Assistant Professor , Department of Civil Engineering **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.Meikandaan	

Course Coordinator **HOD/CIVIL**