

Academic Course Description

<p>BHARATH UNIVERSITY Faculty of Engineering and Technology Department of Civil Engineering</p> <p>BCE064 ADVANCED CONCRETE DESIGN Seventh Semester, 2015-16 (Odd Semester)</p>

Course (catalog) description

To apprise the students about the basics of design of flat slabs, folded plates and cylindrical shells.

Compulsory/Elective course : Elective course for civil students

Credit hours : 3 credits

Course Coordinator : Dr.D.S.Vijayan, Associate Professor

Instructors :

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@bharathuniv.ac.in)	Consultation
Dr.D.S.Vijayan	Second year Civil	Civil Block	044-22290742		9.00 - 9.50 AM

Relationship to other courses:

Pre –requisites : BCE507 Construction Technology

Assumed knowledge : Basic knowledge in Design in floor, Beam, plates, etc

Following courses : BCE 5L1 Construction Engineering Lab

Syllabus Contents

UNIT I	9
Limit Analysis of beams in Flexure: Behaviour of reinforced concrete members in bending and shear. Plastic hinge Rotation capacity. Factors affecting rotation capacity of a section. Plastic moment. Moment curvature relationship. Redistribution of moments – Analysis and limit state design of continuous beams.	
UNIT II	9
Limit Analysis & Design: Limit analysis and design of Portal frames.	
UNIT III	9
Design of Flat Slabs Using BIS 456: Analysis and design of orthogrid floors/roofs.	
UNIT IV	9
Analysis and design of prismatic folded plates and circular cylindrical shells using beam approximation.	
UNIT V	9
Design of bunkers and silos.	
Total No. of Periods:	45

Text Books:

1. Krishna Raju N, " Advanced Concrete Design", CBS Publishers and Distribution, Delhi, 1988.

References:

1. Jain OP and Jaikrishna, "Plain and reinforced Concrete Vol.2", Nemchand and bros, Roorkee, 1958
2. Dunham C W, "Advanced Concrete Design", Mc Graw Hills Company, 1992
3. Malick and Rangasamy, "Reinforced Concrete Design", Khanna Publishers, Delhi, 1976

Computer usage: Design in Stadd pro v8 and Tekla structures

Professional component

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

Broad area: Beam | Silo | Bunkers | Design | Slab | Floors

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.

Mapping of Instructional Objectives with Program Outcome

This Course is to introduce the principles of various surveying methods and applications to Civil Engineering projects.	Correlates to program outcome		
	H	M	L
1. Behaviour of reinforced concrete members in bending and shear. Plastic hinge Rotation capacity. Factors affecting rotation capacity of a section. Plastic moment. Moment curvature relationship. Redistribution of moments – Analysis and limit state design of continuous beams.	a,e,	b,d	
2. Limit Analysis & Design: Limit analysis and design of Portal frames.	b	e	
3. Design of Flat Slabs Using BIS 456: Analysis and design of orthogrid floors/roofs.	a,e		
4. Analysis and design of prismatic folded plates and circular cylindrical shells using beam approximation.	a	d	
5. Design of bunkers and silos.		e	

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

Draft Lecture Schedule

Session	Topics	Problem solving (Yes/No)	Text / Chapter
UNIT I			
1.	Introduction	No	[T1& R2]
2.	Effective span	No	
3.	Span / Depth ratio	No	
4.	Load distribution method	No	
5.	Bending moment and shear forces	No	
6.	Continues beam with simple supports	Yes	
7.	Behaviors of reinforced concrete members in bending and shear	Yes	
8.	Continues beam of two spans supported	Yes	
9.	Redistribution of moments – Analysis and limit state design of continuous beams.	Yes	
UNIT II			
10.	Introduction Limit Analysis & Design	No	[T1, R1]
11.	Limit Analysis & Design step by procedure	Yes	
12.	Limit Analysis & Design problems	Yes	
13.	Introduction of portal frames	No	
14.	Analysis and design of portal frames	Yes	
15.	Design a portal frame hinged at base	Yes	
16.	Example Design problems	Yes	
17.	Design a supported on a portal frame spaced	Yes	
18.	Example Design problems	Yes	
UNIT III			
19.	Introduction of flat slabs and flat plates	No	[T1& R1]
20.	Checking for one way shear	No	
21.	Two way shear	Yes	
22.	Permissible punching shear	Yes	
23.	Shear due to unbalanced moment	Yes	
24.	Strength of column area for moment transfer by torsion	Yes	
25.	Shear reinforcement design	Yes	
26.	Effect of opening in flat slab	Yes	
27.	Shear in two way slab with beams	Yes	

UNIT IV			
28.	General feature of folded plates	No	[T1]
29.	Analysis of folded plates	No	
30.	Structural behavior of folded plates	Yes	
31.	Whituey's method	Yes	
32.	Simpson's method	Yes	
33.	Iteration method and beam method	Yes	
34.	Winter and pei's method	Yes	
35.	Equation of three shears	Yes	
36.	Stress condition in hipped plates	Yes	
UNIT V			
37.	Introduction of bunkers	No	[T1]
38.	Introduction of silo	No	
39.	Design of square bunkers	Yes	
40.	Design of rectangular bunkers	Yes	
41.	Design of circular bunkers	Yes	
42.	Design problems	Yes	
43.	Design of battery of bunkers	Yes	
44.	Design of silos	Yes	
45.	- silos for storage of cement	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	-	5%
Final exam	-	70%

Prepared by: Dr D S Vijayan , 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
Dr D S Vijayan	

Course Coordinator

HOD/CIVIL