

## Academic Course Description

<p>BHARATH UNIVERSITY Faculty of Engineering and Technology Department of Civil Engineering</p> <p><b>BCE053 Advanced Construction Techniques</b> <b>Fifth Semester, 2017-18 (Odd Semester)</b></p>
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### Course (catalog) description

To bring about a complete understanding of advanced construction techniques in sub structure super structure and repair construction

**Compulsory/Elective course** : Elective for Civil students

Credit / Contact hours : 3 credits / 45 hours

Course Coordinator : Ms.A.Arunya, Assistant Professor

**Instructors** :

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@bharathuniv.ac.in)	Consultation
Ms.A.Arunya	Third year Civil	Civil Block			9.00 - 9.50 AM
Ms.M.V.Shruthi	Third year Civil	Civil Block			12.45 - 1.15 PM

### Relationship to other courses:

Pre –requisites : Building Construction technology

Assumed knowledge : Basic knowledge in Building construction

Following courses : BECE051 Concrete Technology

### Syllabus Contents

#### UNIT I SUB STRUCTURE CONSTRUCTION

15 Hours

Box jacking - pipe jacking - Under water construction of diaphragm walls and basement - Tunneling techniques - piling techniques - driving well and caisson - sinking cofferdam - cable anchoring and grouting - driving diaphragm walls, sheet piles - laying operations for built up offshore system - shoring for deep cutting - large reservoir construction - well points - dewatering and stand by plant equipment for underground open excavation..

#### UNIT II SUPER STRUCTURE CONSTRUCTION FOR BUILDINGS

10 Hours

Vacuum dewatering of concrete flooring – concrete paving technology – techniques of construction for continuous concreting operation in tall buildings of various shapes and varying sections – launching techniques – suspended form work – erection techniques of tall structures, large span structures – launching techniques for heavy decks – insitu prestressing in high rise structures, aerial transporting handling erecting lightweight components on tall structures.

#### UNIT III CONSTRUCTION OF SPECIAL STRUCTURES

10 Hours

Erection of lattice towers and rigging of transmission line structures – construction sequence in cooling towers, silos, chimney, sky scrapers, bow string bridges, cable stayed bridges – launching and pushing of box decks – Advanced construction techniques for offshore structures – construction sequence and methods in domes and prestress domes – support structure for heavy equipment and conveyer and machinery in heavy industries – erection of articulated structures, braced domes and space decks.

**UNIT IV REHABILITATION TECHNIQUES**

6 Hours

Mud jacking grout through slab foundation - micropiling for strengthening floor and shallow profile - pipeline laying - protecting sheet piles, screw anchors - sub grade water proofing, underpinning, crack stabilization techniques.

**UNIT V DEMOLITION**

4 Hours

Advanced techniques and sequence in demolition and dismantling.

**References**

1. Robertwade Brown, Practical foundation engineering hand book, McGraw Hill Publications, 1995.
2. Patrick Powers. J., Construction Dewatering: New Methods and Applications, John Wiley & Sons, 1992.
3. Jerry Irvine, Advanced Construction Techniques, CA Rocketr, 1984
4. Peter.H.Emmons, "Concrete repair and maintenance illustrated", Galgotia Publications Pvt. Ltd., 2001.
5. Sankar, S.K. and Saraswati, S., Construction Technology, Oxford University Press, New Delhi, 2008.

**Computer usage:** Nil

**Professional component**

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

**Broad area :** Building Construction

**Test Schedule**

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

## Mapping of Instructional Objectives with Program Outcome

To bring about a complete understanding of advanced construction techniques in sub structure super structure and repair construction	Correlates to program outcome		
	H	M	L
1. Understand the various processes involved in sub-structure construction	e	a,c	
2. Understand the various processes involved in super-structure construction	e	a,c	f,j
3. Understand the construction process of special structures and offshore structures.	e	a,c	
4. Know about the rehabilitation techniques carried out for a structure	e	a,c	
5. Know about the demolition techniques carried out for a structure.	e	a,c	

### Draft Lecture Schedule

Session	Topics	Problem solving (Yes/No)	Text / Chapter
<b>UNIT I SUB STRUCTURE CONSTRUCTION</b>			
1.	Box jacking - pipe jacking	No	R1
2.	Under water construction of diaphragm walls and basement	No	
3.	Under water construction of diaphragm walls and basement	No	
4.	Tunneling techniques	No	
5.	Piling techniques	No	
6.	Driving well and caisson	No	
7.	Sinking cofferdam	No	
8.	Cable anchoring and grouting	No	
9.	Driving diaphragm walls, sheet piles	No	
10.	Laying operations for built up offshore system	No	
11.	Shoring for deep cutting	No	
12.	Large reservoir construction well points	No	
13.	Large reservoir construction well points	No	
14.	Well points dewatering and stand by plant equipment for underground open excavation.	No	
15.	Well points dewatering and stand by plant equipment for underground open excavation.	No	
<b>UNIT II SUPER STRUCTURE CONSTRUCTION FOR BUILDINGS</b>			
16.	Vacuum dewatering of concrete flooring	No	R1
17.	Concrete paving technology	No	
18.	Techniques of construction for continuous concreting operation in tall buildings of various shapes and varying sections	No	
19.	Techniques of construction for continuous concreting operation in tall buildings of various shapes and varying sections	No	
20.	Launching techniques	No	
21.	Suspended form work – erection techniques of tall structures	No	

22.	large span structures – launching techniques for heavy decks	No	
23.	Insitu prestressing in high rise structures,	No	
24.	Aerial transporting handling erecting lightweight components on tall structures.	No	
25.	Aerial transporting handling erecting lightweight components on tall structures.	No	
<b>UNIT III CONSTRUCTION OF SPECIAL STRUCTURES</b>			
26.	Erection of lattice towers and rigging of transmission line structures	No	R1
27.	Construction sequence in cooling towers, silos, chimney	No	
28.	Sky scrapers, bow string bridges, cable stayed bridges	No	
29.	Launching and pushing of box decks	No	
30.	Advanced construction techniques for offshore structures	No	
31.	Construction sequence and methods in domes and prestress domes	No	
32.	Support structure for heavy equipment and conveyor and machinery in heavy industries	No	
33.	Support structure for heavy equipment and conveyor and machinery in heavy industries	No	
34.	Erection of articulated structure	No	
35.	Braced domes and space decks.	No	
<b>UNIT IV REHABILITATION TECHNIQUES</b>			
36.	Mud jacking grout through slab foundation	No	R1
37.	Micropiling for strengthening floor and shallow profile	No	
38.	Pipeline laying - protecting sheet piles	No	
39.	Screw anchors - sub grade water proofing	No	
40.	underpinning	No	
41.	Crack stabilization techniques.	No	
<b>UNIT V DEMOLITION</b>			
42.	Advanced techniques of demolition	No	R1
43.	Advanced techniques of demolition	No	
44.	Sequence in demolition and dismantling.	No	
45.	Sequence in demolition and dismantling.	No	

### 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%

**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.

<b>Course Teacher</b>	<b>Signature</b>
Ms.A.Arunya	
Ms.M.V.Shruthi	

**Course Coordinator**

**HOD/Civil**