Academic Course Description

BHARATH UNIVERSITY
Faculty of Engineering and Technology
Department of Civil Engineering

BCE082 - ENVIRONMENTAL ENGINEERING STRUCTURES

Eighth Semester, 2016-17 (Even Semester)

Course (catalog) description
To educate the students in detailed concepts related to water transmission mains, water distribution system, sewer networks and storm water drain, with emphasis on computer application.

Compulsory/Elective course : Elective course

Credit / Contact hours : 3 credits/ 45 hours

Course Coordinator : Ms. K.ANITHA

Instructors :

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@ bharathuniv.ac.in	Consultation
Ms. K.ANITHA	Fourth year Civil	Civil Block		anithakrish26@yahoo.co.in	9.00 - 9.50 AM

Relationship to other courses:

Pre –requisites **:** Environmental Engineering

Assumed knowledge : Detailed concepts related to water transmission mains, water distribution system, sewer networks

Following courses : NIL

Syllabus Contents

UNIT I DESIGN OF PIPES 9
Structural design of a) Concrete b) Prestressed Concrete c) Steel and d) Castiron piping mains, sewerage tanks design - anchorage for pipes - massive outfalls - structural design and laying – hydrodynamic considerations. Advances in the manufacture of pipes.

UNIT II ANALYSIS AND DESIGN OF WATER TANKS 9
Design of concrete roofing systems a) Cylindrical b) Spherical and c) Conical shapes using membrane theory and design of various types of folded plates for roofing with concrete. IS Codes for the design of water retaining structures. Design of circular, rectangular, spherical and Intze type of tanks using concrete. Design of prestressed concrete cylindrical tanks - Economic analysis - introduction to computer aided design and packages.

UNIT III DESIGN OF SPECIAL PURPOSE STRUCTURES 9
Underground reservoirs and swimming pools, Intake towers, Structural design including foundation of water retaining structures such as settling tanks, clarifloculators, aeration tanks etc. - effect of earth pressure and uplift considerations - selection of materials of construction.

UNIT IV REPAIR AND REHABILITATION OF STRUCTURES 9

Diagonising the cause and damage, identification of different types of structural and nonstructural cracks - repair and rehabilitation methods for Masonry, Concrete and Steel Structures.

UNIT V EXPOSURE ON STEEL, LATTICE STRUCTURES USED IN WATER AND SEWERAGE WORK

TEXT BOOKS:

1. Reinforced Concrete by P .Dayaratnam.
2. Prestressed Concrete by Krishna Raju, Tata McGraw-ill Publishing Co. 2nd Edition 1988.
3. Reinforced Concrete by N.C.Sinha & S.K.Roy - S.Chand and Co. 1985.

REFERENCES:

1. Hulse R., and Mosley, W.H., "Reinforced Concrete Design by Computer", Macmillan Education Ltd., 1986.
2. Ramaswamy, G.S., "Design and Construction of Concrete shell roofs", CBS Publishers, India, 1986.
3. Green, J.K. and Perkins, P.H., "Concrete liquid retaining structures", Applied Science Publishers, 1981.

Computer usage: Nil

Professional component

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

Broad area: : Detailed concepts related to water transmission mains, water distribution system, sewer networks

Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	February 1st week	Session 1 to 14	2 Periods
2	Cycle Test-2	March 2nd week	Session 15 to 28	2 Periods
3	Model Test	April 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 educate the students in detailed concepts related to water transmission mains, water distribution system, sewer networks and storm water drain, with emphasis on computer application	Correlates to program outcome		
	H	**M**	**L**
1. To make them understand the fundamentals of Structural design of Concrete, Prestressed Concrete, Steel and Cast iron etc	a,e,	b,d	
2. To understand about the methods of analysis and design of water tanks and the types of cement roofing system	b	e	
3. To understand in detail about the design of special purpose structures like underground reservoirs and swimming pools	a,e		
4. To improve the knowledge on the repair and rehabilitation of structures and also diagonising and identification of the cause and damage	a	d	
5. To know about the exposure on steel, lattice structures used in water and sewerage		e	

works			

Draft Lecture Schedule

Session	Topics	Problem solving (Yes/No)	Text / Chapter
UNIT I	**DESIGN OF PIPES**		
1.	Structural design of Concrete	Yes	[T1, R2]
2.	Structural design of Prestressed Concrete	Yes	
3.	Structural design of steel	Yes	
4.	Structural design of Cast iron piping mains	Yes	
5.	Sewerage tanks design	Yes	
6.	Anchorage for pipes	Yes	
7.	Massive outfalls	Yes	
8.	Structural design and laying	Yes	
9.	Hydrodynamic considerations. Advances in the manufacture of pipes.	Yes	
UNIT II	**ANALYSIS AND DESIGN OF WATER TANKS**		
10.	Design of concrete roofing systems of Cylindrical shape	Yes	[T1, T2 & R3]
11.	Design of concrete roofing systems of Conical shape	Yes	
12.	Design of concrete roofing systems of spherical shape	Yes	
13.	Design of various types of folded plates for roofing with concrete. IS Codes for the design of water retaining structures	Yes	
14.	Design of various types of folded plates for roofing with concrete. IS Codes for the design of water retaining structures	Yes	
15.	Design of circular, rectangular, spherical and Intze type of tanks using concrete	Yes	
16.	Design of circular, rectangular, spherical and Intze type of tanks using concrete	Yes	
17.	Design of prestressed concrete cylindrical tanks	Yes	
18.	Economic analysis - introduction to computer aided design and packages.	Yes	
UNIT III	**DESIGN OF SPECIAL PURPOSE STRUCTURES**		
19.	Underground reservoirs and swimming pools	No	[T1, T2 & R3]
20.	Intake towers	No	
21.	Structural design including foundation of water retaining structures such as settling tanks, clarifloculators, aeration tanks etc	No	
22.	Structural design including foundation of water retaining structures such as settling tanks, clarifloculators, aeration tanks etc	No	
23.	Structural design including foundation of water retaining structures such as settling tanks, clarifloculators, aeration	No	

	tanks etc		
24.	Effect of earth pressure and uplift considerations	No	
25.	Effect of earth pressure and uplift considerations	No	
26.	Selection of materials of construction	No	
27.	Selection of materials of construction	No	
UNIT IV	**REPAIR AND REHABILITATION OF STRUCTURES**		
28.	Diagnosing the cause and damage	No	
29.	Diagnosing the cause and damage	No	
30.	Identification of different types of structural and nonstructural cracks	No	
31.	Identification of different types of structural and nonstructural cracks	No	[T1, T2 & R3]
32.	Repair and rehabilitation methods for Masonry	No	
33.	Repair and rehabilitation methods for Masonry	No	
34.	Repair and rehabilitation methods for Concrete Structures.	No	
35.	Repair and rehabilitation methods for Concrete Structures	No	
36.	Repair and rehabilitation methods for Steel Structures.	No	
UNIT V	**EXPOSURE ON STEEL, LATTICE STRUCTURES USED IN WATER AND SEWERAGE WORKS**		
37.	Exposure on steel, used in water and sewerage works	No	
38.	Exposure on steel, used in water and sewerage works	No	
39.	Exposure on lattice structures used in water and sewerage works	No	
40.	Exposure on lattice structures used in water and sewerage works	No	
41.	Exposure on lattice structures used in water and sewerage works	No	[T1, T2 & R3]
42.	Exposure on steel, used in water and sewerage works	No	
43.	Exposure on steel, used in water and sewerage works	No	
44.	Exposure on lattice structures used in water and sewerage works	No	
45.	Exposure on lattice structures used in water and sewerage works	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
- 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%
Attendance	-	10%
Assignment	-	5%
Final exam	-	70%

Prepared by: Ms.K.Anitha, 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
Ms.K.Anitha	

Course Coordinator **HOD/CIVIL**