

Academic Course Description

<p>BHARATH UNIVERSITY Faculty of Engineering and Technology Department of civil Engineering BCE 075 Ground Water Engineering Sixth Semester, 2016-17 (even Semester)</p>
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Course (catalog) description

To introduce the student to the principles of Groundwater governing Equations and Characteristics of different aquifers,

To understand the techniques of development and management of groundwater

Compulsory/Elective course : Elective course for CE students

Credit / Contact hours : 3 credits / 45 hours

Course Coordinator : Dr. A.MANI

Instructors :

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@bharathuniv.ac.in)	Consultation
Dr. A.MANI	Third year	Civil block			9.00 - 9.50 AM
Mr.S.Rajesh	Third year	Civil block			12.45 - 1.15 PM

Relationship to other courses:

Pre –requisites : BCE 603 Irrigation Engineering

Assumed knowledge : Basic knowledge in Characteristics of Ground water

Following courses :

Syllabus Contents

UNIT I FUNDAMENTALS OF GROUND WATER

9hrs

Introduction – Characteristics of Ground water – Global distribution of water – ground water column Permeability- Darcy's Law, laboratory permeability test Types of aquifers. Hydro geological Cycle, water level fluctuations.

UNIT II HYDRAULICS OF FLOW

9hrs

Storage coefficient, Specific yield, Heterogeneti and Anisotrophy Transmissivity – governing equations of ground water flow – Steady state flow – Dupuit Forchheimer assumption. Velocity potential flow nets.

UNIT III ESTIMATION OF PARAMETERS

9hrs

Transmissivity and Storativity Pumping test - Unsteady state flow- Thies method- Jacob methods - Image well theory - Effect of partial penetrations of well – collectors wells

UNIT IV GROUND WATER DEVELOPMENT**9hrs**

Collector wells – infiltration gallery – Conjunctive use – Artificial recharge – Safe yield – Yield test – Geophysical method – Selection of pumps.

UNIT V WATER QUALITY**9 hrs**

Ground water chemistry – origin, movement and quality – water quality standards – salt water intrusion – Environmental concern

Total 45 hours**TEXT BOOK:**

1. Reghunath H.M. "Ground Water Hydrology", Wiley Eastern Ltd., Second reprint, 2000

REFERENCES:

1. Tood D.K,"Ground Water Hydrology", Johnand Sons, 2000.
2. Ramakrishnan S,"Ground Water Groundwater"„Ramakrishnan Publication,Chennai 1998.
3. William C Walton, "Ground Water Resource Evaluation", McGraw Hill New York 1970.

Computer usage: micro soft office Excel**Professional component**

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

Broad area : sources of ground water, ground water quality chemistry**Test Schedule**

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	February 1 st week	Session 1 to 14	2 Periods
2	Cycle Test-2	March 2 nd week	Session 15 to 28	2 Periods
3	Model Test	April 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

To introduce the student to the principles of Groundwater governing Equations and Characteristics of different aquifers, To understand the techniques of development and management of groundwater	Correlates to program outcome		
	H	M	L
1. To learn about the basics of ground water Engineering including the hydrogeological cycle and water level fluctuations.	a,	d	j
2. To learn about the basics of hydrology of ground water and to make a clear understanding of ground water flow equations of velocity equations.	f	k	h
3. To study the basics of unsteady flow and various methods unsteady flow.	d	i	
4. To know about the various sources of ground water like collector wells, infiltration galleries.	d	i	
5. To study about the ground water quality chemistry its origin and water quality standards.	i	f	j

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

Draft Lecture Schedule

S.NO	Topics	Problem solving (Yes/No)	Text / Chapter
UNIT I FUNDAMENTALS OF GROUND WATER			
1.	Introduction	No	[T1] [R3]
2.	Characteristics of Ground water	No	
3.	Global distribution of water	No	
4.	ground water column	No	
5.	Permeability- Darcy's Law	No	
6.	laboratory permeability test Types of aquifers.	No	
7.	Hydro geological Cycle	No	
8.	water level fluctuations.	No	
9.	water level fluctuations.	No	
UNIT II HYDRAULICS OF FLOW			
10.	Storage coefficient,	No	[T1] [R1]
11.	Specific yield	No	
12.	Heterogeneti	No	
13.	AnisotrophyTransmissivity	No	
14.	governing equations of ground water flow	No	
15.	Steady state flow	No	
16.	DupuitForchheimer assumption	No	

17.	Velocity potential flow nets	No	
18.	Velocity potential flow nets	No	
UNIT III ESTIMATION OF PARAMETERS			
19.	Transmissivity	No	[T1] [R1]
20.	Storativity Pumping test	No	
21.	Unsteady state flow	No	
22.	Thies method-	No	
23.	Jacob methods	No	
24.	Image well theory	No	
25.	Effect of partial penetrations of well	No	
26.	collectors wells	No	
27.	collectors wells	No	
UNIT IV GROUND WATER DEVELOPMENT			
28.	Collector wells	No	[T1] [R2]
29.	infiltration gallery	No	
30.	Conjunctive use	No	
31.	Artificial recharge	No	
32.	Safe yield	No	
33.	Yield test	No	
34.	Geophysical method	No	
35.	Selection of pumps.	No	
36.	Selection of pumps.	No	
UNIT V WATER QUALITY			
37.	Ground water chemistry	No	[T1] [R3]
38.	Ground water chemistry	No	
39.	origin, movement and quality	No	
40.	origin, movement and quality	No	
41.	water quality standards	No	
42.	salt water intrusion	No	
43.	salt water intrusion	No	
44.	Environmental concern.	No	
45.	Environmental concern.	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%
Assignment	-	5%
Attendance	-	10%
Final exam	-	70%

Prepared by: Mr S.Rajesh Asst Prof , Department of CE

Dated :

BCE 075 Ground Water Engineering

Addendum

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

- a) The ability to apply knowledge of mathematics, science, and engineering fundamentals.
- b) The ability to identify, formulate, and solve engineering problems
- c) The ability to design a system, component, or process to meet the desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- d) The ability to design and conduct experiments, as well as to analyze and interpret data
- e) The ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
- f) The ability to apply reasoning informed by the knowledge of contemporary issues
- g) The ability to broaden the education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- h) The ability to understand professional and ethical responsibility and apply them in engineering practices
- i) The ability to function on multidisciplinary teams
- j) The ability to communicate effectively with the engineering community and with society at large
- k) The ability in understanding of the engineering and management principles and apply them in project and finance management as a leader and a member in a team.

Program Educational Objectives

PEO1: PREPARATION:

To provide strong foundation in mathematical, scientific and engineering fundamentals necessary to analyze, formulate and solve engineering problems in the chosen field of Engineering and Technology.

PEO2: CORE COMPETENCE:

To enhance the skills and experience in defining problems in the appropriate field of Engineering and Technology, designing, implementing, analyzing the experimental evaluations, and finally making appropriate decisions.

PEO3: PROFESSIONALISM:

To enhance their skills and embrace new thrust areas through self-directed professional development and post-graduate training or education.

PEO4: SKILL:

To provide Industry based training for developing professional skills and soft skills such as proficiency in languages, technical communication, verbal, logical, analytical, comprehension, team building, inter personal relationship, group discussion and leadership skill to become a better professional.

PEO5: ETHICS:

Apply the ethical and social aspects of modern Engineering and Technology innovations to the design, development, and usage of new products, machines, gadgets, devices, etc.

BCE 075 Ground Water Engineering

Course Teacher	Signature
Dr. A.MANI	
Mr.S.Rajesh	

Course Coordinator

HOD/Civil