

19AG201 GROUND WATER WELLS AND PUMPS

Hours Per Week :

L	T	P	C
2	0	2	3

Total Hours :

L	T	P	WA/RA	SSH/HSH	CS	SA	S	BS
30	-	30	2	30	2	5	2	2

COURSE DESCRIPTION AND OBJECTIVES:

This course covers the fundamentals of surface and subsurface flow, emphasizing the role of groundwater in the hydrologic cycle, the relation of groundwater flow to geologic structure, and the management of contaminated groundwater. The objective of the course to enable the students to have knowledge on occurrence and movement of ground water, analyzing the data of pumping test and artificial recharge of ground water methods.

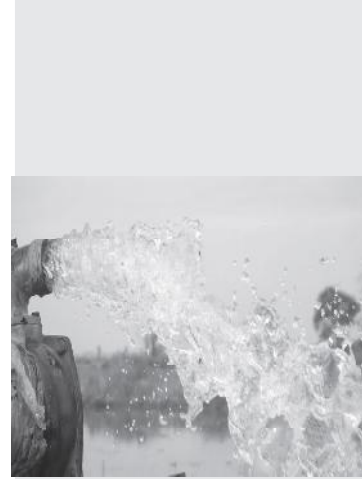
COURSE OUTCOMES:

Upon completion of the course, student will able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Apply the knowledge of aquifer parameters and yield of wells.	1
2	Analyse radial flow towards wells in confined and unconfined aquifers.	4
3	Creative design of wells and understand the construction practices.	3
4	Analyse Interpret geophysical exploration data for scientific source finding of aquifers.	4
5	Evaluate the process of artificial recharge for increasing groundwater potential.	5
6	Creative and effective measures for controlling saline water intrusion and apply appropriate measures for groundwater management.	7

SKILLS:

- ✓ Differentiating various types of pumps based on their working mechanisms.
- ✓ Identifying various components of pumps.
- ✓ Identifying the location of groundwater resources.



Source :

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- UNIT - I** **L-6**
Occurrence and movement of ground water: Aquifer and its types; classification of wells, fully penetrating tube wells and open wells, familiarization of various types of bore wells.
- UNIT - II** **L-6**
Design of open wells: Groundwater exploration techniques; methods of drilling of wells: percussion, rotary, reverse rotary; design of tubewell and gravel pack, installation of well screen, completion and development of well.
- UNIT - III** **L-6**
Groundwater hydraulics: Determination of aquifer parameters by different method such as This, Jacob and Chow's, This recovery method; well interference, multiple well systems, estimation of ground water potential, quality of ground water; artificial groundwater recharge techniques.
- UNIT - IV** **L-6**
Pumping systems: Water lifting devices; different types of pumps, classification of pumps, component parts of centrifugal pumps, priming, pump selection, installation and trouble shooting.
- UNIT - V** **L-6**
Performance curves: Effect of speed on capacity, head and power, effect of change of impeller dimensions on performance characteristics; hydraulic ram, propeller pumps, mixed flow pumps and their performance characteristics; deep well turbine pump and submersible pump.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS

TOTAL HOURS: 30

1. Verification of Darcy's law.
2. Study of different drilling equipment's.
3. Sieve analysis for gravel and well screens design.
4. Estimation of specific yield and specific retention.
5. Estimation of aquifer parameters by Theis methods.
6. Estimation of aquifer parameters - Coopers-Jacob, Chow method.
7. Theis Recovery method.
8. Open well design.
9. Tube well design.
10. Estimating ground water balance.
11. Study of artificial ground water recharge structures.
10. Study of radial flow and mixed flow centrifugal pumps.
13. Multistage centrifugal pumps, turbine, propeller and other pumps.
14. Installation of centrifugal pump.
15. Study of hydraulic ram.
16. Testing of centrifugal pump and study of cavitation's.
17. Study and testing of submersible pump.
18. Practical examination.

TEXT BOOK :

1. Michael AM, Khepar SD. and SK Sondhi. 2008, "Water Well and Pumps", 2nd edition, Tata Mc-Graw Hill.

REFERENCE BOOKS :

1. Todd David Keith and Larry W. Mays. 2004, "Groundwater Hydrology", 3rd edition, John Wiley & Sons, New York (International Book Depo).
2. Michael A.M and Ojha TP. 2014, "Principles of Agricultural Engineering Vol-II", 5th edition. Jain Brothers Publication, New Delhi.