

| B. E. CIVIL ENGINEERING Choice Based Credit System (CBCS) and Outcome Based Education (OBE) SEMESTER - VII | | | |
|---|----------------|------------|----|
| GROUND WATER HYDRAULICS | | | |
| Course Code | 18CV734 | IA Marks | 40 |
| Teaching Hours/Week(L:T:P) | (3:0:0) | Exam Marks | 60 |
| Credits | 03 | Exam Hours | 03 |
| Course Learning Objectives: This course will enable students <ol style="list-style-type: none"> 1. To characterize the properties of ground water and aquifers. 2. To quantify the ground water flow. 3. To locate occurrence of ground water and augment ground water resources. 4. To synthesize ground water development methods. | | | |
| Module -1 | | | |
| Introduction: Importance, vertical distribution of subsurface water, occurrence in different types of rocks and soils, definitions-aquifers, aquifuge, aquitard, aquiclude, confined and Unconfined aquifers. | | | |
| Module -2 | | | |
| Fundamentals of Ground Water Flow: Aquifer parameters, specific yield and specific retention, porosity, storage coefficient, derivation of the expression, Darcy's law, hydraulic conductivity, coefficient of permeability and intrinsic permeability, transmissibility, permeability in isotropic, anisotropic layered soils. | | | |
| Module -3 | | | |
| Well Hydraulics: Steady Flow, Radial flow in confined and unconfined aquifers, pumping test Unsteady Flow, General equation, derivation; theis method, Cooper and Jacob method, Chow's method, solution of unsteady flow equations, leakyaquifers (only introduction), interference of well, image well theory. | | | |
| Module -4 | | | |
| Ground Water Exploration: Seismic method, electrical resistivity method, Geo-physical techniques, electrical logging, radioactive logging, induction logging, sonic and fluid logging. | | | |
| Module -5 | | | |
| Ground Water Development: Types of wells, methods of construction, tube well design, dug wells, pumps for lifting water, working principles, power requirement, Conjunctive use, necessity, techniques and economics. Ground Water Recharge: Artificial recharge, Rainwater harvesting for ground water recharge. | | | |
| Course outcomes: After studying this course, students will be able to: <ol style="list-style-type: none"> 1. Find the characteristics of aquifers. 2. Estimate the quantity of ground water by various methods. 3. Locate the zones of ground water resources. 4. Select particular type of well and augment the ground water storage. | | | |
| Question paper pattern: <ul style="list-style-type: none"> • The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub- questions) from each module. • Each full question will have sub- question covering all the topics under a module. • The students will have to answer five full questions, selecting one full question from each module. | | | |
| Textbooks: | | | |
| <ol style="list-style-type: none"> 1. H.M. Raghunath, "Ground Water", Wiley Eastern Publication, New Delhi. 2. K. Todd, "Ground Water Hydrology", Wiley and Sons, New Delhi. 3. Bower. H., "Ground Water Hydrology" McGraw Hill, New Delhi. | | | |
| Reference Books: | | | |
| <ol style="list-style-type: none"> 1. GargSatyaPrakash, "Ground Water and Tube Wells", Oxford and IBH, New Delhi. 2. W. C. Walton, "Ground Water Resources and Evaluation" McGraw Hill, Delhi. 3. Michel, D. M., Khepar, S. D., Sondhi, S. K., "Water Wells and Pumps" McGraw Hill, Delhi. | | | |


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