Name of Programme: M. Sc. Applied Geology
Course Code: GEO-523
Title of the Course: Groundwater Geology (Skill Based Course)
No of Credits: 03
Effective from AY: 2022-23

Prerequisites for the course:	Degree of Bachelor of Science in Geology from any UGC recognized University or an equivalent examination.	
Objective:	To understand occurrence and circulation of groundwater To study the functioning, methods and problems related to Groundwater.	
Content:	**Module 1: Introduction:** Genetic classification of water, GLEbal distribution of water. Hydrologic cycle: Precipitation, runoff, infiltration and evapotranspiration. Historical developments in science of hydrogeology. Vertical distribution of sub surface water, classification of aquifers and confining layers, hydraulic properties of aquifers, water table fluctuations. Concepts of drainage and groundwater basins. Water table and piezometric surface. **Module 2: Well Hydraulics and well designs**: Theory of groundwater flow, Darcy's law, its validity and applications, determination of permeability in laboratory and in field. Types of wells, drilling methods, construction, design, development and maintenance of wells. Specific capacity and its determination steady and unsteady and radial flow conditions. Pumping tests-methods, data analysis and interpretations. Rainwater Harvesting and conservation. **Module 3: Groundwater Chemistry, Contamination and occurrence:** Groundwater Chemistry: Groundwater quality- physical, chemical, biological properties of water quality criteria for different uses, graphical presentation of water quality data. Groundwater contamination. Problems of arsenic and fluoride in India. Saline water intrusion and Sub-marine Groundwater Discharge (SGD) in coastal aquifers and its modelling. Classification of rocks with respect to their water bearing characteristics, aquifer modelling and groundwater provinces of India. Groundwater exploration techniques.	15 hours 15 hours 15 hours
Pedagogy:	Lectures / Assignments / Seminars/ Self-study	
References/ Readings	1. Mays, L. W., and Todd, D. K. (2005). *Groundwater Hydrology*. John Wily and Sons, Inc., Arizona State University, Third addition. 2. Fetter, C. W. (2018). *Applied hydrogeology*. Waveland Press. 3. Hiscock, K. M., and Bense, V. F. (2021). *Hydrogeology: principles and practice*. John Wiley and Sons. 4. Raghunath, H. M., and Raghunath, H. M. (2007). *Ground water*. New Age International (P) Limited Publishers.	

	5. Davis, S. N., and De Wiest, R. J. (1966). *Hydrogeology* New York: Wiley.	
Course outcomes	1. Students will understand the natural occurrence and circulation of surface and groundwater. 2. Learn about different types of aquifers and their relation to the groundwater flow and quality. 3. Identify problems related to water pollution and precautionary measures. 4. Understand use of various techniques in exploration of water.	