

BACHELORS WITH GEOLOGY AS MAJOR (CT – II)

6th SEMESTER

GLY622J2 GEOLOGY _ HYDROGEOLOGY AND ENVIRONMENTAL GEOLOGY

CREDITS: THEORY: 4; PRACTICAL: 2

OBJECTIVE/EXPECTED LEARNING OUTCOMES

This course deals with information on hydrology and various process associated with it. The student will acquire skills to understand various processes determining the movement of groundwater. Water rock interaction and its effects on water chemistry. Procedures for checking the quality of water for various purposes. The students will also gain an understanding of the impact of climate change on water resources, including the cryosphere. Besides, the student will understand the hydrological processes acting on and below the surface of the earth.

UNIT -1 (15 HOURS)

Introduction to Hydrogeology. Precipitation, Evaporation, Transpiration, Evapotranspiration, Condensation, runoff, infiltration, and water balance. Hydrological Cycle, Groundwater, Water table. Zone of Aeration and Saturation, storage coefficient of aquifers. Aquifer and its types (confined, Unconfined and perched). Hydrological properties of Aquifer: porosity, permeability, specific yield, hydraulic conductivity.

UNIT 2 (15 CONTACT HOURS)

Principles of Groundwater flow: Hydraulic head, hydraulic gradient, Darcy's Law its validation and application. Radial flow, steady and transient flow. Basic equations governing groundwater flow. Geological controls of groundwater. Hydrochemistry, Artificial recharge. Groundwater exploration-geological and geophysical methods.

UNIT 3 (15 CONTACT HOURS)

Climate change and environment: Change in temperature and precipitation due to global warming. Greenhouse gases. Climate change and food security. Glacier recession with special emphasis on the Third Pole. Response of cryosphere to climate change. Vulnerability of mountain ecosystem to climate change. Redistribution and availability of water resources for various uses. Milankovitch cycles and Quaternary climatic change.

UNIT 4 (15 CONTACT HOURS)

Air, water and soil pollution, causes and remedial measures. Geogenic and anthropogenic sources of pollution. Point and diffuse sources vis-à-vis industries, agriculture, and domestic sources. Pollution treatment. Quality criteria of water for domestic, agriculture and industry. BIS and WHO standards.

TUTORIAL (2 CREDITS: 30 HOURS)

The course will include discussions on topics determined by students in the Tutorial. There would be 4 presentations per student apart from the lectures. The topics would be assigned to students based on their interest with at least one topic from each unit.

BOOKS RECOMMENDED

- Environmental geology, Edward A. Keller
- Environmental geology, Carla W. Montgomery - 9th edition.
- Applied hydrogeology, C.W. Fetter
- Ground Water Hydrogeology, Todd, D.K