Optional Courses (Theory)

GLO-201: Groundwater Geology	3-0-0 = 3 credits

Introduction: Genetic classification of water, global 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.

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. Seawater intrusion. Groundwater Chemistry: Groundwater quality-physical, chemical, biological properties of water quality criteria for different uses, graphical presentation of water quality data, problems of arsenic and fluoride in India Saline water intrusion in coastal aquifers and its prevention. Groundwater contamination.

Groundwater occurrence and exploration: Classification of rocks with respect to their water bearing characteristics, groundwater provinces of India. Groundwater exploration techniques.

List of Books

1. Todd D.K.: Groundwater hydrology, Johm Wiley, NY , 1980
2. Raghunath, H.M.: Ground Water, New Age International Publishers, 2007
3. Fetter, C.W.: Applied hydrogeology, NY, Macmillon, 1994
4. Davis and De Wiest: Hydrogeology

GLO-202: Petroleum Geology	3-0-0 = 3 credits

Introduction to petroleum. Physical properties and chemical composition of petroleum. Origin of Petroleum. Petroleum Traps and Reservoir rocks. Primary and secondary migration and Accumulation. Petroleum exploration. Petroliferous basins of India. Oil belts of the world.

List of Books

1. Selley, R.C., 1998, Elements of Petroleum Geology: W.H. Freeman & Company, New York. 2. Tissot, B.P., and Welte, D.H., 1978, Petroleum Formation and Occurrence - A New Approach to Oil and Gas Exploration: Springer -Verlag, Berlin.
3. Levorsen , A.I., 1967, Geology of Petroleum: W.H. Freeman and Company.
4. North, F.K., 1986, Petroleum Geology: Allen & UnWin, 607p

GLO-203: Exploration Geophysics	3-0-0 = 3 credits

Introduction to exploration geophysics: Electrical methods: instrumentation, field procedure and interpretation using electrical methods. Electrical profiling and sounding using Wenner and Schlumberger configurations. Principles and fundamental procedures of data collection and interpretation.

Seismic Methods: Principles, instrumentation, survey procedures and interpretation using seismic methods. Correction applied to seismic data.

Geophysical well logging: Introduction well logging methods, porosity logs, well log interpretation.

Gravity and magnetic methods: Principles-field methods-gravimeters-corrections, interpretation of gravity data. Principles, instrumentation, field procedures and interpretation of magnetic data.

List of Books

1. Fundamentals of geophysics by William Lowrie,Cambridge university press, 1997
2. An introduction to exploration geophysics by Kearey and Brooks,Blackwell scientific publication, 1984
3. Geophysical methods in geology by Sharma PV. Elsevier, 1986
4. An introduction to geophysical prospecting by Dobrin M.B., McGraw Hill New Delhi, 1984 5. Outline of geophysical prospecting by Ramachandra Rao, M.B, Wesley press, 1975.

GLO-204: Micropalaeontology	**3-0-0 = 3 Credits**

Surface and sub-surface sampling methods, sample processing techniques; morphology, classification and evolution of foraminifera. Study of selected benthic and planktonic foraminifera. Morphology and geological distribution of ostracoda, calcareous nannofossils, radiolaria, conodonts and bryozoa. Applications of microfossils in biostratigraphy, palaeoenvironmental interpretation and sequence stratigraphy. Deep sea record and stable isotopes studies of calcareous microfossils. Role of micropalaeontology in hydrocarbon exploration.

List of Books

1. Haynes, J.R. Foraminifera. John Wiley and Sons, 1981.
2. Armstrong, H.A. and Brasier, M.D. Microfossils, II Edition, Blackwell Publishing, 2005.
3. Haq, B.U. and Boersma, A. (Eds) Introduction to Marine Micropaleontology. Elsevier, 1978. 4. Murray, J.W. Ecology and Palaeoecology of Benthic Foraminifera. Longman, 1991.

GLO-205: Environmental Geology	**3-0-0 = 3 credits**

Scope of environmental geology, ecosystem, lithosphere, hydrosphere, cryosphere and Atmosphere. Natural and man-made hazards. Mass movements, landslides, rock falls, subsidence and causes.

Volcanic and seismic hazards and mitigation measures. Dams and reservoirs-silting, Deforestation, seismicity, water logging and related hazards. Floods and droughts and their mitigations.

Groundwater pollution and management-case studies related to fluoride, pesticide, fertilizers and arsenic contaminations in India. Sea level changes, causative factors and related coastal hazards. Geological and hydrogeological aspects of waste disposal, site selection for solid waste disposal-sanitary landfills. Pollution from waste disposal sites. Conservation and protection of natural resources with special reference to water. Alternative sources of energy. Nuclear waste disposal and associated hazards . EIA legislative measures in India .