JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech. II Year I Semester

CE303PC: ENGINEERING GEOLOGY

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Course Objectives:

- To introduce the fundamentals of geology relevant to civil engineering.
- To provide understanding of site characterization and geologic hazards.
- To impart knowledge on rock and mineral identification, and their importance in construction.
- To address the geological considerations in planning and execution of dams, reservoirs, and tunnels.

Course Outcomes:

- Characterize a site geologically for engineering applications.
- Understand engineering properties of rocks, minerals, and soils.
- Identify geological hazards and propose appropriate mitigation strategies.
- Explain the influence of geology on major civil engineering structures.
- Analyze geological data for safe and economic construction planning.

UNIT – I

- Importance of geology in civil engineering.
- Case studies of failures in civil constructions due to geological factors.
- Physical geology, petrology, structural geology – their significance.
- Weathering of rocks: types and effects, particularly on construction.
- Importance of weathering in dam, reservoir, and tunnel construction.
- Weathering of granite.

UNIT – II

- Definition and importance of minerals in civil engineering.
- Methods and physical property-based identification of minerals.
- Study of physical properties of common rock-forming minerals: Feldspar, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite.
- Economic minerals: Pyrite, Hematite, Magnetite, Galena, Pyrolusite, Graphite, Magnesite, Bauxite.
- Petrology: Geological classification of rocks: igneous, sedimentary, metamorphic.

- Structures and textures; megascopic and microscopic identification of: Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sandstone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble, Slate.

UNIT – III

- Structural geology: Outcrop, strike, dip, folds, faults, unconformities, joints.
- Case studies and significance in engineering.
- Soils: types, origin, occurrence in India, stabilization.
- Ground water: water table, types, springs, cone of depression.
- Geological control and exploration of ground water.

UNIT – IV

- Earthquakes: causes, seismic belts, Richter scale, seismic waves, construction precautions.
- Landslides: causes, effects, preventive measures.
- Geophysical methods: Gravity, magnetic, electrical, seismic, radiometric, geothermal methods.
- Emphasis on electrical resistivity and seismic refraction.
- Site improvement techniques – e.g., grouting.
- Basics of rock mechanics and environmental geology.

UNIT – V

- Geology in selection of dam sites, types of dams.
- Analysis of past dam failures.
- Factors affecting success and lifespan of reservoirs.
- Geological aspects of tunneling: lithology, structure, groundwater.
- Overbreak and lining issues in tunnels.

Textbooks:

- Engineering Geology – N. Chennakesavulu, McMillan India Ltd., 2005.
- Engineering Geology – D. Venkat Reddy, Vikas Publishing House, 2015.
- Engineering Geology – S.K. Duggal & H.K. Pandey, McGraw Hill Education, 2014.
- Principles of Engineering Geology – K.V.G.K. Gokhale, B.S. Publications.

Reference Books:

- Fundamentals of Engineering Geology – F.G. Bell, B.S. Publications, 2005.
- Principles of Engineering Geology & Geotechnics – Krynine & Judd, CBS Publishers.
- Engineering Geology – Subinoy Gangopadhyay, Oxford University Press.
- Engineering Geology for Civil Engineers – P.C. Varghese, PHI Learning Pvt. Ltd.