2/4 B.Tech. THIRD SEMESTER

CE3T4 **ENGINEERING GEOLOGY** **Credits: 3**

Lecture: 3 periods/week **Internal assessment: 30 marks**
Tutorial: 1 period /week **Semester end examination: 70 marks**

Objectives:

- To gain knowledge in geology and the effect of geology on the design and construction of civil engineering constructed facilities.
- To understand the engineering elements of rock and geologic processes
- To identify the seismic hazards posed at any given site.

Learning outcomes:

At the end of course the student will be able to:

- Assess inter-relationships between geological processes and the behavior of the ground.
- Develop a ground investigation programme based on an in-depth knowledge of geological and engineering constraints derived from a critical evaluation of basic information of the area and the scientific literature.
- Use the geological principles in the design of structures.
- Communicate the results of their work to both a professional engineering/ geological audience or to the public at large.

UNIT - I
INTRODUCTION:
Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of physical geology, Petrology and Structural geology.

WEATHERING OF ROCKS:
Its effect over the properties of rocks importance of weathering with reference to dams, reservoirs and tunnels weathering of common rock like “Granite”

UNIT - II
MINERALOGY:
Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties. Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldsper , Quartiz , Flint , Jasper, Olivine , Augite, Hornblende , Muscovite , Biotite , Asbestos, Chlorite , Kyanite , Garnet, Talc , Calcite. Study of other common economics minerals such as Pyrite, Hematite , Magnetite, Chrorite , Galena, Pyrolusite , Graphite, Magnesite, and Bauxite.

UNIT - III
PETROLOGY:
Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of igneous. Sedimentary and metamorphic rocks. Their distinguishing features, Megascopic study of

Granite, Dolerite, Basalt, Pegmatite, Laerite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

UNIT - IV
STRUCTURAL GEOLOGY:
Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints - their important types. Their importance in Insitu and drift soils, common types of soils, their origin and occurrence in India, Stabilisation of soils.

UNIT - V
GROUND WATER:
Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration. Earth quakes, their causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Landslides, their causes and effect; measures to be taken to prevent their occurrence. Importance of study of ground water, earth quakes and landslides.

UNIT – VI
GEOPHYSICAL INVESTIGATIONS
Importance of Geophysical studies Principles of geophysical study by Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and Geothermal method. Special importance of Electrical resistivity methods, and seismic refraction methods. Improvement of competence of sites by grouting etc. Fundamental aspects of Rock mechanics and Environmental Geology.

UNIT - VII
GEOLOGY OF DAMS AND RESERVOIRS:
Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factors Contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs.

UNIT - VIII
TUNNELS:
Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (ie. Lithological, structural and ground water) in tunneling over break and lining in tunnels.

Learning resources

Text books:

1. Principles of Engineering Geology by Gokhale K.V.G.K., B.S Publications, 2010.
2. Engineering Geology, (2nd edition) by Chennakesavulu N., Mc-Millan, India Ltd, 2009.

Reference books:

1. Fundamentals of Engineering Geology by Bell, F.G., B.S. Publications, New Delhi, 2005.
2. Principles of Engineering Geology and Geotechnics by Krynine and Judd, CBS Publishers and Distribution, 2011.