ENGINEERING GEOLOGY

Lectures	: 4 Periods/Week	Sessional Marks	: 40
Semester Exam	. : 3 Hrs	Semester End. Exam Marks :	60

Course objectives:

1. To develop the ability to understand the importance of geology in civil engineering

2 To develop the ability to analyze the natural geological process such as weathering and erosion of the region before planning a civil engineering project.

Credits: 4

3. To provide knowledge to evaluate the formation and engineering properties and strength of the minerals, rocks and soil and associated structural elements

4. To teach the geological problems in seismic areas.

5. To give an idea to create suitable geological and geo physical investigation methods to solve foundation problems.

Course out comes:

Student will be able to:

1. Understand the importance of geology in civil engineering

2. Become familiar with identifying the geological process of the region related to the civil engineering works

3. Able to evaluate the formation and properties of the minerals, rocks and soil

4. Develops the ability to analyze the rock deformation process and associated structural elements.

UNIT-I

Introduction

Branches of geology; Importance of geology in Civil engineering.

Physical Geology

Geological processes; Weathering, Erosion, and Civil engineering importance of weathering and Erosion **Mineralogy**

Definition of mineral; Importance of study of minerals; Significance of different physical

Properties in mineral identification; Study of physical properties, structure and chemical composition of the following common rock forming and economic minerals:

Feldspar, Quartz, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Apatite, Kyanite, Garnet, Beryl, Talc, Calcite, Dolomite, Pyrite, Hematite, Magnetite, Galena, Graphite, Magnesite, Bauxite and Clay minerals.

UNIT- II

Petrology

Introduction; Definition of Rock, Civil engineering importance of petrology; Rock cycle,

Geological Classification of rocks:

Igneous Rocks Forms, Structures and textures of igneous rocks. Megascopic description and uses of Granite, Basalt, Dolerite, Diorite, Syenite Pegmatite and Charnockite:

Sedimentary Rocks

Formation; Structures and textures of sedimentary rocks. Megascopic description and uses of Laterite, Conglomerate, Sand stone, Lime stone and Shale:

Metamorphic Rocks

Types of metamorphism; Structures and textures of metamorphic rocks. Megascopic Description and uses of Gneiss, Schist, Quartzite, Marble and Slate

UNIT-III

Structural Geology

Introduction; Out crop, Strike and dip, Causes for development of secondary structures; Classification of Secondary structures like Folds, Faults, Joints, Unconformities and their Civil engineering importance

Earthquakes

Classification and causes; Intensity and magnitude and their measuring scales; Effects of earthquakes; Seismic belts and shields; Civil Engineering considerations in seismic areas; Seismic zones of India

Land Slides

Classification; Causes and effects; Preventive measures of landslides:

<u>UNIT- IV</u>

Geophysical Investigations

Geophysical methods of investigation – Over view; Electrical resistivity method; Seismic refraction method:

Dams

Types of Dams; Geological considerations for the selection of dam sites; Stages of investigation; Case histories of some dam failures; Geology of some Indian dam sites:

Tunnels

Purpose of Tunneling; Geological considerations for tunneling; Effects of tunneling; Over break.

Improvement in the Properties of Rock Mass

Materials and Methods of Grouting, Principles and mechanism of Rock bolting:

NOTE:

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK:

1. A text Book of Engineering Geology by N. Chennakesavulu, 2nd Edition, Macmillan India Ltd., Delhi,2009.

REFERENCE BOOKS:

- 1. Principles of Engineering Geology- KVGK Gokhale, B S Publications, 2010.
- 2. Fundamentals of Engineering Geology, FG Bell, BS Publications, 2005.
- 3. Principles of Engineering Geology and Geotechnics- CBS Publishers & Distribution.
- 4. Engineering Geology for Civil Engineers by PC Verghese, PHI Learning, 2012.
- 5. Engineering and General Geology by Parbin Singh; S. K. Kataria & Sons, 2010.
- 6. Rock Mechanics for Engineers by Dr.B.P.Varma, Khana Publishers.
- 7. Principles of Engineering Geology by K M Bangar, Standard Book House, 2012.

WEB REFERENCES:

NPTEL COURSE- Developed by Prof. Debasis Roy, IIT, Kharagpur - 721302 http://www.eos.ubc.ca/academic/undergraduate/appsci.html http://web.mst.edu/~rogersda/umrcourses/ge341/ http://web.env.auckland.ac.nz/course_pages/geology771/