

## ENGINEERING GEOLOGY

**III Semester: CE**

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACEC04	Core	3	0	0	3	30	70	100
		<b>Contact Classes:45</b>		<b>Tutorial Classes: Nil</b>		<b>Practical Classes: Nil</b>		<b>TotalClasses:45</b>

**Prerequisite: Chemistry**

### I. COURSE OVERVIEW:

This course provides engineers and geologists with an overview of engineering geology. Engineering geology routinely deals with the application of geologic site characterization and the evaluation of geological and geotechnical conditions for the design, construction, operation, and maintenance of engineering structures. This course is designed to provide a general background of geologic considerations, identification, classification and engineering properties of soil and rock. Additionally, geotechnical field exploration methods used in engineering geology will be covered. The intent is to give the reader a basic understanding of some of the investigation and classification methods for soil and rock when used as a construction material in engineering applications.

### II. COURSE OBJECTIVES

**The Students will try to learn:**

1. The process of formation of rocks, their classifications and properties of minerals.
2. The identification of different geological structures encountered in nature.
3. The different hazards such as earthquakes, landslides etc. causes and their effects
4. The importance of geophysical and geological studies of sites for tunnels, dams and Reservoirs.

### III. COURSE OUTCOMES:

**After successful completion of the course, students should be able to:**

- |      |  |            |
|------|--|------------|
| CO 1 | Relate the concepts of how minerals form and their uses for identifying the rock forming.                            | Understand |
| CO 2 | Classify rocks using basic geological systems for selective construction material.                                   | Understand |
| CO 3 | Interpret graphs and models used in structural geology for demonstrating stress, strain and tectonics.               | Understand |
| CO 4 | Relate the geologic concepts and approaches of rock for engineering projects.  | Remember   |
| CO 5 | Compare past tectonic settings of an area for evaluation of current structures.                                      | Understand |
| CO 6 | List out the design and construction procedures required for controlling safety of rock behavior in dam construction | Remember   |

### IV. COURSE SYLLABUS

#### MODULE-I: INTRODUCTION AND WEATHERING OF ROCKS (09)

Introduction: Importance of geology from civil engineering point of view. Brief study of case histories of failures of some civil engineering constructions due to geological drawbacks. 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 rocks.

#### MODULE-II: MINERALOGY AND PETROLOGY (09)

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. Petrology: Definition of rock, geological classification of rocks into igneous, sedimentary and metamorphic. Dykes and Sills, common structures and textures of igneous, sedimentary and metamorphic rocks.

#### MODULE-III: STRUCTURAL GEOLOGY (09)

Indian stratigraphy, paleontology and geological time scale, out crop, strike and dip study of common geological structures associating with the rocks such as fold, faults unconformities, and joint types.

Ground water: Water table, common types of ground water movement, ground water exploration. Earth quakes, their causes and effects, shield hazards, water in landslides their causes and effects, measures to be taken to prevent their occurrence. Importance of study of ground water, earthquake and landslides.

#### **MODULE–IV:GEOLOGY OF DAMS AND RESERVOIRS (09)**

Types of dams and bearing of geology of site in their selection, geological considerations in the selection of a dam site. Factors contributing to the success of a reservoir, geological factors influencing water tightness and life of reservoirs, geo hazards, ground subsidence. Geophysical studies: 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.

#### **MODULE–V:TUNNELS (09)**

Purpose of tunneling, effects of tunneling on the ground, role of geological considerations in tunneling over break and lining in tunnels, tunnels in rock, subsidence over old mines.

#### **V. TEXT BOOKS**

1. N.Chennakesavulu, "Engineering Geology", Mc Milan India Private Limited, New Delhi, India, 12<sup>th</sup> Edition, 2009.
2. VenkatReddy, "Engineering Geology", Vikas Publications, New Delhi, India, 2<sup>nd</sup> Edition, 2011.
3. Vasudev Kanithi, "Engineering Geology", University Press, 1<sup>st</sup> Edition, 2013.
4. Gokhale, "Principles of Engineering Geology, BS Publications, 2009.

#### **VI. REFERENCE BOOKS**

1. F.G.Bell, "Fundamentals of Engineering Geology, Butterworth's Publications, 3<sup>rd</sup> Edition, New Delhi, 1992.
2. K.V.G.K.Gokhale, "Principles of Engineering Geology, BS Publications, New Delhi, India, 5<sup>th</sup> Edition, 2008.

#### **VII. WEB REFERENCES**

1. <http://ocw.mit.edu/courses/earth-atmospheric-and-planetary-sciences/12-001-introduction-to-geology-fall-2013/>
2. <http://nptel.ac.in/courses/105105106/>
3. <http://www.journals.elsevier.com/engineering-geology>
4. <http://www.springer.com/earth+sciences+and+geography/engineering+geology/journal/10706>
5. <http://www.springer.com/earth+sciences+and+geography/engineering+geology/journal/10064>
6. <http://www.sciencedirect.com/science/journal/00137952>

#### **VIII. E-TEXT BOOKS**

1. <http://cepdf.blogspot.in/2012/07/geology-for-civil-engineers-pdf-book.html>
2. <http://nptel.ac.in/courses/105105106/>
3. <https://www.studynama.com/community/threads/187-Engineering-Geology-Ebook-Lecture-Notes-PDF-download-for-Civil-Engineers>.
4. <http://www.civilengforall.com/p/engineering-geology-list-of-books.html>