

ENGINEERING GEOLOGY

IV Semester: CE									
Course Code	Category	Hours / Week			Credits	Maximum Marks			
		L	T	P	C	CIA	SEE	Total	
ACEB05	Core	3	-	-	3	30	70	100	
Contact Classes: 45		Tutorial Classes: Nil		Practical Classes: Nil			Total Classes: 45		
I. COURSE OVERVIEW:									
<p>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.</p>									
II. OBJECTIVES:									
The course should enable the students to:									
<p>I. Asses engineering properties of rock and unconsolidated materials in the characterization of geologic sites for civil work projects and the quantification of processes such as rock slides, soil-slope stability, settlement, and liquefaction.</p> <p>II. Involves the collection, analysis, and interpretation of geological data and information required for the safe development of civil works.</p> <p>III. Assessment and mitigation of geologic hazards such earthquakes, landslides, flooding; the assessment of timber harvesting impacts; and groundwater remediation and resource evaluation.</p>									
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 forengineering 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. SYLLABUS:									
MODULE – I	INTRODUCTION						Classes: 12		
<p>Branches of geology useful to civil engineering, scope of geological studies in various civil engineering projects. Department dealing with this subject in India and their scope of work- GSI, Granite Dimension Stone Cell, NIRM. Mineralogy-Mineral, Origin and composition. Physical properties of minerals, susceptibility of minerals to alteration, basic of optical mineralogy, SEM, XRD., Rock forming minerals, megascopic identification of common primary & secondary minerals.</p>									
MODULE – II	PETROLOGY						Classes:14		
<p>Rock forming processes. Specific gravity of rocks. Ternary diagram. Igneous petrology- Volcanic Phenomenon and different materials ejected by volcanoes. Types of volcanic eruption. Concept of Hot spring and Geysers. Characteristics of different types of magma. Division of rock on the basis of depth of formation, and their characteristics. Chemical and Mineralogical Composition. Texture and its types. Various forms of rocks. IUGS Classification of phaneritic and volcanic rock.. Field Classification chart. Structures. Classification of Igneous rocks on the basis of Chemical composition. Detailed study of Acidic Igneous rocks like Granite, Rhyolite or Tuff, Felsite, Pegmatite, Hornfels. Metamorphic Aureole, Kaolinization. Landform as Tors. Engineering aspect to granite. Basic Igneous rocks Like Gabbro, Dolerite, Basalt. Engineering aspect to Basalt. Sedimentary petrology- mode of formation, Mineralogical Composition. Texture and its types,</p>									

Structures, Gradation of Clastic rocks. Classification of sedimentary rocks and their characteristics. Detailed study of Conglomerate, Breccia, Sandstone, Mudstone and Shale, Limestone Metamorphic petrology Agents and types of metamorphism, metamorphic grades, Mineralogical composition, structures & textures in metamorphic rocks. Important Distinguishing features of rocks as Rock cleavage, Schistosity, Foliation. Classification. Detailed study of Gneiss, Schist, Slate with engineering consideration.		
MODULE – III	PHYSICAL GEOLOGY AND ROCK MECHANICS	Classes: 10
Weathering. Erosion and Denudation. Factors affecting weathering and product of weathering. Engineering consideration. Superficial deposits and its geotechnical importance: Water fall and Gorges, River meandering, Alluvium, Glacial deposits, Laterite (engineering aspects), Desert Landform, Loess, Residual deposits of Clay with flints.		
Solifluction deposits, mudflows, Coastal deposits. Sub surface investigations in rocks and engineering characteristics or rocks masses; Structural geology of rocks. Classification of rocks, Field & laboratory tests on rocks, Stress deformation of rocks, Failure theories and sheer strength of rocks, Bearing capacity of rocks.		
MODULE – IV	GEOLOGICAL HAZARDS	Classes: 12
Rock Instability and Slope movement: Concept of sliding blocks. Different controlling factors. Instability in vertical rock structures and measures to prevent collapse. Types of landslide. Prevention by surface drainage, slope reinforcement by Rock bolting and Rock anchoring, retaining wall, Slope treatment. Case study on black clay. Ground water: Factors controlling water bearing capacity of rock. Pervious & impervious rocks and ground water. Lowering of water table and Subsidence. Earthquake: Magnitude and intensity of earthquake. Seismic sea waves. Revelation from Seismic Records of structure of earth. Case Study on Elevation and Subsidence in Himalayan region in India. Seismic Zone in India.		
MODULE – V	GEOLOGY OF DAM AND RESERVOIR SITE	Classes: 12
Required geological consideration for selecting dam and reservoir site. Failure of Reservoir. favorable & unfavorable conditions in different types of rocks in presence of various structural features, precautions to be taken to counteract unsuitable conditions, significance of discontinuities on the dam site and treatment giving to such structures.		
Text Books:		
1. Parbin Singh, “Engineering and General Geology, , 8 th Edition,2010, S K Kataria & Sons. 2. Text Book of Engineering Geology, N. Chenna Kesavulu, 2 nd Edition 2009, Macmillan Publishers India.		
Reference Books:		
1. J. C. Harvey, “Geology for Geotechnical Engineers”, Cambridge University Press 1982.		
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		
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.civilenggforall.com/p/engineering-geology-list-of-books.html		

