

**2CE04: ENGINEERING GEOLOGY**

**CREDITS - 3.5 (LTP:3,0,0.5)**

**Course Objectives:**

The objectives of the course are to:

1. Identify earth constituents their genesis and physical - mechanical properties
2. Evaluate geological dynamic processes and their influence
3. Diagnose geological and tectonic structures, causes and impact on civil structure.
4. Evaluate stress and strain on earth material with respect to rock mechanic
5. Appreciate advance geological explorations methods and techniques in civil engineering projects

**Teaching and Assessment Scheme:**

Teaching Scheme (Hours per week)			Credits	Assessment Scheme				Total Marks
L	T	P		C	Theory Marks		Practical Marks	
			ESE		CE	ESE	CE	
3	0	1	3.5	60	40	20	30	150

**Course Content:**

Unit No.	Topics	Teaching Hours
1	<p><b>General &amp; Physical Geology:</b>                      Introduction: Scope of Geology and branches, Objectives of Engineering Geology                      Dynamic Earth: Surface features and internal structure of the Earth ; Work of natural agencies and associated features:                      Earthquakes: Definitions, Basics of earthquake, Causes of earthquake, Earthquake zones of India ; Plate tectonics: Concepts and plate boundaries, Case studies                      Mass Movement: Definition, Types, Causative internal and external factors, protective measures; Case studies</p>	10
2	<p><b>Mineralogy and Petrology:</b>                      Minerals: Definition, way of formation of minerals, physical properties of mineral, Study of common rock forming minerals                       Rock cycle: Study of three types of rocks with reference to their formation, identification, textural and structural features.                      Rock as Construction materials and their physical properties.</p>	08
3	<p><b>Structural Geology and Rock Mechanics:</b>                      Outcrop, Primary and Secondary structures in rocks, stratification, dip and strike relation.                      Folds and Faults, types, classification, causative factors, identification in Field and their Engineering implication. Joints in rocks, classification, causative factors; Unconformity, their types and genesis and their Engineering significance.                      Introduction to rock mechanics, relevance of rock mechanics in evaluating rock and rock mass properties                      Mechanical Properties of rock for strength parameters and determining</p>	12

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<b>Unit No.</b>	<b>Topics</b>	<b>Teaching Hours</b>
	common properties Measurement of strength of Intact rock and stress in underground rock, Elastic properties of rock Estimation of rock mass rating, Rock mass classification, classification of rock based on rock mass rating, Geological strength Index for Blocky and Heterogeneous rock mass	
4	<b>Engineering Geology and Geo-Exploration:</b> Geology of Gujarat, types of soil and rocks and general idea of Indian geology Engineering perspective. Geological and Geophysical Exploration methods, Drilling, Logging, Stages for Geological investigation: Preparation of Geological maps and report, Interpretation of geological maps, Source of geological information for civil engineers. Geology for Site selection of Dam, Tunnel, Reservoir and Highways; Ground water: Basics and engineering difficulties Remote sensing applications for geo-environmental issues and issues pertaining to civil engineering structures and site selection. Important international and Indian examples of failures of civil structures due to geological constrains.	15
<b>Total</b>		<b>45</b>

**List of References:**

1. Prabin Singh, “*Engineering & General Geology*” 8th S K KATARIA & SONS (KATSON)
2. Blyth, F.G.H. and D E’Freits M.H, “*Geology for Engineers*” 1st ELBS, London 1974.
3. Gokhale and K.V.G.K, “*Principles of Engineering geology*” 1st TataMcGraw Hill, New Delhi 1981.
4. Gokhale, K.V.G.K. and Rao D.M, “*Experiments in Engineering Geology*” Tata Mc Graw Hill, New Delhi 1981.
5. Reddy V, “*Engineering Geology for Civil Engineers*” 1st Oxford & IBH, NewDelhi 1997.
6. Bangar K.M., “*Principles of Engineering Geology*” 3rd Standard Publishers Distributors, New Delhi 1995.
7. Kesavulu, “*Textbook of Engineering Geology*” 1st Macmillan India Ltd, NewDelhi 1993.
8. Mukharjee P.K., “*A text book of Geology*” 7th The World Press Pvt. Ltd 1978.
9. Vasudev Kanithi, “*Engineering Geology*” 1st Universities Press pvt. Ltd. (Hyderabad) 2012.
10. Subinoy Gangopadhyay, “*Engineering Geology*” Oxford University Press 2013.
11. Basudev Bhatta, “*Remote sensing*”. OXFORD
12. F.G.Bell, “*Fundamentals of Engineering Geology*” 1st BS Publication 2005.

**Course Outcomes (COs):**

1. Recognize relative geo-dynamics and geo environment pertaining to civil works
2. Assess the influence of geological actions on civil project.
3. Analyze and interpret geological process, tools-techniques, products for feasibility of site selection
4. Ascertain safe, suitable and economic civil engineering projects.