

CE6301 ENGINEERING GEOLOGY

SUBJECT DESCRIPTION AND OBJECTIVES

DESCRIPTION:

Engineering geology is the application of the **geologic sciences** to engineering practice for the purpose of assuring that the geologic factors affecting the location, design, construction, operation and maintenance of **engineering** works are recognized and adequately provided for. **Engineering geologists** investigate and provide geologic and geotechnical recommendations, analysis, and design associated with human development. The realm of the engineering geologist is essentially in the area of earth-structure interactions, or investigation of how the earth or earth processes impact human made structures and human activities.

Engineering geologic studies may be performed during the planning, environmental impact analysis, civil or structural engineering design, value engineering and construction phases of public and private works projects, and during post-construction and forensic phases of projects. Works completed by engineering geologists include; **geologic hazards, geotechnical**, material properties, **landslide** and slope stability, **erosion, flooding, dewatering**, and **seismic** investigations, etc. Engineering geologic studies are performed by **ageologist** or engineering geologist that is educated, trained and has obtained experience related to the recognition and interpretation of natural processes, the understanding of how these processes impact man-made structures (and vice versa), and knowledge of methods by which to mitigate for hazards resulting from adverse natural or man-made conditions. The principal objective of the engineering geologist is the protection of life and property against damage caused by geologic conditions.

Engineering geologic practice is also closely related to the practice of **geological engineering, geotechnical engineering, soils engineering, environmental geology** and **economic geology**. If there is a difference in the content of the disciplines described, it mainly lies in the training or experience of the practitioner.

OBJECTIVES:

At the end of this course the students will be able to understand the importance of geological knowledge such as earth, earthquake, volcanism and to apply this knowledge in projects such as dams, tunnels, bridges, roads, airport and harbor as well as to choose types of foundations.

OUTCOMES:

The students completing this course

Will be able to understand the importance of geological knowledge such as earth, earthquake, volcanism and the action of various geological agencies.

Will realize the importance of this knowledge in projects such as dams, tunnels, bridges, roads, airport and harbor

Can choose the types of foundations and other related aspects.

UNIT I	PHYSICAL GEOLOGY	9
Geology in civil engineering – branches of geology – structure of earth and its composition – weathering of rocks – scale of weathering – soils - landforms and processes associated with river, wind, groundwater and sea – relevance to civil engineering. Plate tectonics – Earth quakes – Seismic zones in India.		
UNIT II	MINEROLOGY	9
Physical properties of minerals – Quartz group, Feldspar group, Pyroxene - hypersthene and augite, Amphibole – hornblende, Mica – muscovite and biotite, Calcite, Gypsum and Clay minerals.		
UNIT III	PETROLOGY	9
Classification of rocks, distinction between Igneous, Sedimentary and Metamorphic rocks. Engineering properties of rocks. Description, occurrence, engineering properties, distribution and uses of Granite, Dolerite, Basalt, Sandstone, Limestone, Laterite, Shale, Quartzite, Marble, Slate, Gneiss and Schist.		
UNIT IV	STRUCTURAL GEOLOGY AND GEOPHYSICAL METHODS	9
Geological maps – attitude of beds, study of structures – folds, faults and joints – relevance to civil engineering. Geophysical methods – Seismic and electrical methods for subsurface investigations.		
UNIT V	APPLICATION OF GEOLOGICAL INVESTIGATIONS	9
Remote sensing for civil engineering applications; Geological conditions necessary for design and construction of Dams, Reservoirs, Tunnels, and Road cuttings - Hydrogeological investigations and mining - Coastal protection structures. Investigation of Landslides, causes and mitigation.		

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Varghese, P.C., Engineering Geology for Civil Engineering Prentice Hall of India Learning Private Limited, New Delhi, 2012.
2. Venkat Reddy. D. Engineering Geology, Vikas Publishing House Pvt. Lt, 2010.
3. Gokhale KVGK, "Principles of Engineering Geology", B.S. Publications, Hyderabad 2011.
4. Chenna Kesavulu N. "Textbook of Engineering Geology", Macmillan India Ltd., 2009.
5. Parbin Singh. "A Text book of Engineering and General Geology", Katson publishing house, Ludhiana 2009.

REFERENCES:

1. Muthiayya, V.D. "A Text of Geology", Oxford IBH Publications, Calcutta, 1969
2. Blyth F.G.H. and de Freitas M.H., Geology for Engineers, Edward Arnold, London, 2010.
3. Bell .F.G.. "Fundamentals of Engineering Geology", B.S. Publications. Hyderabad 2011.
4. Dobrin, M.B "An introduction to geophysical prospecting", McGraw Hill, New Delhi, 1988.

MICRO LESSON PLAN

WEEK	LECT. NO.	TOPICS TO BE COVERED	TEXT / REFER BOOKS
UNIT I PHYSICAL GEOLOGY			
I	1	Geology in civil engineering	T-1
	2	Branches of geology	
	3	Structure of earth and its composition	
	4	Weathering of rocks, scale of weathering	
	5	Soils , landforms and processes associated with river, wind, groundwater and sea	
II	6	Relevance to civil engineering	
	7	Plate tectonics	
	8	Earth quakes	
	9	Seismic zones in India	
UNIT II MINEROLOGY			
III	10	Physical properties of minerals	T-1
	11	Quartz group	
	12	Feldspar group	
	13	Pyroxene - Hypersthene and augite	
	14	Amphibole – Hornblende	
IV	15	Mica – Muscovite and biotite	
	16	Calcite	
	17	Gypsum	
	18	Clay minerals.	
UNIT III PETROLOGY			
V	19	Classification of rocks	T-1
	20	Distinction between Igneous, Sedimentary and Metamorphic rocks.	
	21	Engineering properties of rocks	
	22	Description, occurrence, engineering properties, distribution and uses of Granite,	
	23	Dolerite, Basalt, Sandstone	
VI	24	Limestone, Laterite	
	25	Shale, Quartzite	
	26	Marble, Slate	
	27	Gneiss and Schist	

UNIT IV STRUCTURAL GEOLOGY AND GEOPHYSICAL METHODS			
VII	28	Geological maps	T-1
	29	Attitude of beds	
	30	Study of structures – folds	
	31	Faults	
	32	Joints	
VIII	33	Relevance to civil engineering	
	34	Geophysical methods	
	35	Seismic method	
	36	Electrical methods for sub surface investigations	
UNIT V APPLICATION OF GEOLOGICAL INVESTIGATIONS			
IX	37	Remote sensing for civil engineering applications	T-1
	38	Geological conditions necessary for design and construction of Dams	
	39	Reservoirs, tunnels and road cuttings	
	40	Hydrogeological investigations	
	41	mining	
X	42	Coastal protection structures	
	43	Investigation of Landslides	
	44	Causes	
	45	Mitigation	

Prepared by,

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