

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CIVIL ENGINEERING

I Year - I Semester		L	Т	Р	С
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ENGINEERING GELOGOY					
Integrated (Theory & Lab) (ESC1102)					

Course Learning Objectives:

The objective of this course is:

- To introduce the course: Engineering Geology to the Civil Engineering graduates.
- To enable the students, understand what minerals and rocks are and their formation and identification.
- To highlight significance/ importance/ role of Engineering Geology in construction of Civil Engineering structures.
- To enable the student, realise its importance and applications of Engineering Geology in Civil Engineering constructions.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

CO	Course Outcomes
1	Identify and classify the geological minerals
2	Measure the rock strengths of various rocks
3	Classify and measure the earthquake prone areas to practice the hazard zonation
4	Classify, monitor and measure the Landslides and subsidence
5	Prepares, analyses and interpret the Engineering Geologic maps
6	Analyses the ground conditions through geophysical surveys
7	Test the geological material and ground to check the suitability of civil engineering project
	construction
8	Investigate the project site for mega/mini civil engineering projects. Site selection for mega
	engineering projects like Dams, Tunnels, disposal sites etc

UNIT-I:

Introduction: Branches of Geology, Importance of Geology in Civil Engineering with case studies. **Weathering:** Weathering of rocks, Geological agents, weathering process of Rock, Rivers and geological work of rivers.

UNIT-II

Mineralogy and Petrology: Definitions of mineral and rock-Different methods of study of mineral and rock. Physical properties of minerals and rocks for megascopic study for the following minerals and rocks. Common rock forming minerals: Feldspar, Quartz Group, Olivine, Augite, Hornblende, Mica Group, Asbestos, Talc, Chlorite, Kyanite, Garnet, Calcite and ore forming minerals are Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Chromite, Magnetite and Bauxite. Classification, structures, textures and forms of Igneous rocks, Sedimentary rocks, Metamorphic rocks, and their megascopic study of granite varieties, (pink, gray, green). Pegmatite, Dolerite, Basalt etc., Shale, Sand Stone, Lime Stone, Laterite, Quartzite, Gneiss, Schist, Marble, Khondalite and Slate.

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UNIT-III

Structural Geology: Strike, Dip and Outcrop study of common geological structures associating with the rocks such as Folds, Faults, Joints and Unconformities- parts, types, mechanism and their importance in Civil Engineering.

UNIT-IV

Ground Water: Water table, Cone of depression, Geological controls of Ground Water Movement, Ground Water Exploration Techniques.

Earthquakes and Land Slides: Terminology, Classification, causes and effects, Shield areas and Seismic bells, Richter scale intensity, Precautions of building constructions in seismic areas. Classification of Landslides, Causes and Effects, measures to be taken prevent their occurrence at Landslides.

Geophysics: Importance of Geophysical methods, Classification, Principles of Geophysical study by Gravity method, Magnetic method, Electrical methods, Seismic methods, Radiometric method and Electrical resistivity, Seismic refraction methods and Engineering properties of rocks.

UNIT-V

Geology of Dams, Reservoirs and Tunnels: Types and purpose of Dams, Geological considerations in the selection of a Dam site. Geology consideration for successful constructions of reservoirs, Life of Reservoirs. Purpose of Tunnelling, effects, Lining of Tunnels. Influence of Geology for successful Tunnelling.

TEXT BOOKS:

- 1. 'Engineering Geology' by Subinoy Gangopadhay, Oxford University press.
- 2. 'Engineering Geology' by D. Venkat Reddy, Vikas Publishing House pvt. Ltd, 2013.
- 3. 'Engineering Geology' by N. Chennkesavulu, Trinity Press (Laxmi Publications), 2nd Edition, 2014.
- 4. 'Engineering Geology' by Vasudev Kanithi, University Press.

REFERENCES:

- 1. 'Engineering Geology for Civil Engineers' by P.C. Varghese, PHI learning pvt. Ltd.
- 2. 'Geology for Engineers and Environmental Society' by Alan E Kehew, person publications, 3rd edition
- 3. 'Fundamentals of Engineering Geology' by P.G.Bell, B.S.P. Publications, 2012.
- 4. 'Engineering Geology' by V.Parthesarathi et al., Wiley Publications
- 5. 'Environmental Geology' by K.S. Valdiya, McGraw Hill Publications, 2nded.

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Engineering Geology Lab

Syllabus

Course Learning Objectives:

The objective of this course is:

- To identify the Megascopic types of Ore minerals & Rock forming minerals.
- To identify the Megascopic types of Igneous, Sedimentary, Metamorphic rocks.
- To identify the topography of the site & material selection.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

CO	Course Outcomes
1	Identify Megascopic minerals & their properties.
2	Identify Megascopic rocks & their properties.
3	Identify the site parameters such as contour, slope & aspect for topography.
4	Know the occurrence of materials using the strike & dip problems.

SYLLABUS:

LIST OF EXPERIMENTS

- 1. Physical properties of minerals: Mega-scopic identification of
 - a. Rock forming minerals Quartz group, Feldspar group, Garnet group, Mica group & Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum, etc...
 - b. Ore forming minerals Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc...
- 2. Megascopic description and identification of rocks.
 - a) Igneous rocks Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc.
 - b) Sedimentary rocks Sand stone, Ferrugineous sand stone, Lime stone, Shale, Laterite, Conglamorate, etc.
 - c) Metamorphic rocks Biotite Granite Gneiss, Slate, Muscovite &Biotiteschist, Marble, Khondalite, etc.
- 3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.
- 4. Simple Structural Geology problems.
- 5. Bore hole data.
- 6. Strength of the rock using laboratory tests.
- 7. Field work To identify Minerals, Rocks, Geomorphology & Structural Geology.



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LAB EXAMINATION PATTERN:

- 1. Description and identification of FOUR minerals
- 2. Description and identification of FOUR (including igneous, sedimentary and metamorphic rocks)
- 3. ONE Question on Interpretation of a Geological map along with a geological section.
- 4. TWO Questions on Simple strike and Dip problems.
- 5. Bore hole problems.
- 6. Project report on geology.

REFERENCES:

- 1. 'Applied Engineering Geology Practicals' by M T Mauthesha Reddy, New Age International Publishers, 2nd Edition.
- 2. 'Foundations of Engineering Geology' by Tony Waltham, Spon Press, 3rd edition, 2009.

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