**17CE2105 - ENGINEERING GEOLOGY**

**(Civil Engineering)**

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| **Course Category** | Professional Core | **Credits** | 3 |
| **Course Type** | Theory | **Lecture - Tutorial - Practical** | 3-0-0 |
| **Prerequisite** | None | **Sessional Evaluation** | 40 |
| **Semester End Exam. Evaluation** | 60 |
| **Total Marks** | 100 |

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| **Course Objectives** | 1. To introduce the basic concepts of geology and mineralogy. 2. To acquire the knowledge of petrology in identification of rocks. 3. To understand the basic concepts of geomorphology. 4. To introduce the basic concepts of structural geology. 5. To understand the general geological hazards and their remedial measures. 6. To understand and apply the geological concepts for civil engineering works. | |
| **Course Outcomes** | CO1 | Understand the surface geological processes and importance of geology in Civil Engineering. |
| CO2 | Understand and identify various types of minerals. |
| CO3 | Understand and identify various types of rocks. |
| CO4 | Understand the elements of structural geology. |
| CO5 | Understand general geological disasters. |
| CO6 | Apply the geology concepts in major civil engineering projects. |
| **Course Content** | **UNIT - I**  **INTRODUCTION**: Branches of geology useful to Civil Engineering – Scope of geological studies in GSI, NIRM.  **MINERALOGY**: Definition, origin and composition of mineral – Physical properties of minerals – Megascopic identification of common rock forming minerals & economic minerals.  **UNIT - II**  **PETROLOGY**: Definition of rock and its forming processes.  **IGNEOUS PETROLOGY**: Different types of magma – Volcanic phenomenon and different materials ejected by volcanoes – Types of volcanic eruption –Classification of rock on the basis of depth of formation – Chemical and mineralogical composition – Texture and its types.  Various forms of igneous rocks – Detailed study of acidic igneous rocks like Granite, Rhyolite – Basic igneous rocks like Gabbro, Dolerite and Basalt – Engineering aspect of igneous rocks.  **SEDIMENTARY PETROLOGY**: Mode of formation, mineralogical composition – Structures and textures – Classification of sedimentary rocks and their characteristics – Gradation of classic rocks – Detailed study of Conglomerate, Breccia, Sandstone, Mudstone and Shale, Limestone with engineering consideration.  **METAMORPHIC PETROLOGY**: Agents and types of metamorphism, metamorphic grades, mineralogical composition, structures & textures in metamorphic rocks. Distinguishing features of metamorphic rocks as rock cleavage, Schistosity, Foliation. Classification of metamorphic rocks and detailed study of Gneiss, Schist, Slate with engineering consideration.  **UNIT - III**  **PHYSICAL GEOLOGY:** Factors causing weathering – Erosion and denudation – Product of weathering and engineering consideration – Geomorphological features by geological agents as Water fall, Gorges, River meandering, Alluvium, Glacial deposits, Laterite (engineering aspects), Desert Landforms, Loess, Residual deposits of clay with flints, Solifluction deposits, mudflows, coastal deposits.  **UNIT - IV**  **STRESS AND STRAIN IN ROCKS:** Concept of rock deformation & tectonics –Structural elements as Dip and Strike – Fold types and nomenclature, Criteria for their recognition in field – Faults: Classification, recognition in field – Types of joints, unconformity – Importance of structural elements in engineering operations.  Consequences of failure as land sliding, earthquake and subsidence – Strength of Igneous rock structures.  **UNIT - V**  **GEOLOGICAL HAZARDS**: Rock instability and slope movement: Concept of sliding blocks – Different controlling factors – Instability in vertical rock structures and measures to prevent collapse – Rock quality designation, rock mass description – Types of landslide and their prevention – (By surface drainage, slope reinforcement by rock bolting and rock anchoring, retaining wall, slope treatment) – Ground water: Factors controlling water bearing capacity of rock – Pervious & impervious rocks and lowering of water table and subsidence.  Earthquake: Magnitude and intensity of earthquake – Case study on elevation and subsidence in India – Seismic zone in India.  **UNIT - VI**  **GEOLOGY OF DAM, RESERVOIR AND TUNNEL SITE:** Required geological consideration for selecting dam, reservoir and tunnel 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 for dams, reservoirs and tunnels. | |
| **Textbooks and Reference books** | **TEXTBOOKS:**   1. Engineering and General Geology, Parbin Singh, 8th Edition, S K Kataria & Sons.   **REFERENCE BOOKS:**   1. Text Book of Engineering Geology, Kesavvalu, MacMillan India. 2. Engineering Geology by K.M. Bangar. 3. Engineering Geology for Geotechnical Engineers, J.C.Harvey, Cambridge University Press. | |