**19CE2204 - ENGINEERING GEOLOGY**

**(Civil Engineering)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Category** | Professional Core | **Credits** | 2 |
| **Course Type** | Theory | **Lecture - Tutorial - Practical** | 2-0-0 |
| **Prerequisite** | None  | **Sessional Evaluation**  | 40 |
| **Semester End Exam. Evaluation** | 60 |
| **Total Marks** | 100 |
| **Course Objectives** | 1. To introduce the basic concepts of geology, mineralogy and petrology in identification of rocks.
2. To describe the basic concepts of geomorphology.
3. To introduce the basic concepts of structural geology and different geological structures.
4. Tounderstand the basic core logging, basic properties of rocks and calculate thickness of rock beds.
5. To know the general geological hazards and its mitigation.
6. To apply the geological concepts for suitable site selection of major civil engineering structures.
 |
| **Course Outcomes** | CO1 | Recognize the importance of geology in civil engineering and identify various minerals and rocks. |
| CO2 | Classify surface geological process and landforms of Earth surface. |
| CO3 | Identify various geological structures. |
| CO4 | Understand basic properties of rock and its quality.  |
| CO5 | Summarize the different geological hazards. |
| CO6 | Apply the geological concepts for suitable site selection of major civil engineering structures. |
| **Course Content** | **UNIT - I****INTRODUCTION**: Branches of geology useful to Civil Engineering – Scope of geological studies in GSI, NIRM. Role of engineering geologist in planning, design and construction of civil engineering structural features.**MINERALOGY**: Definition, origin and physical properties of minerals and megascopic identification of common rock forming, economic and clay minerals.**PETROLOGY:**Definition, origin (Rock cycle), textures, structures and classification of igneous, sedimentary and metamorphic rocks; Physical identification of acidic igneous rocks –Granite, Rhyolite; Basic igneous rocks –Gabbro, Dolerite and Basalt; Physical identification of sedimentary rocks –Conglomerate, Breccia, Sandstone, Mudstone and Shale, Limestone; Physical identification of metamorphic rocks –Gneiss, Schist, Slate, Marble, Quartzite.**UNIT - II****PHYSICAL GEOLOGY:** Factors causing weathering, erosion and denudation. Soil as product of weathering and engineering consideration, its profile and types in India. Geomorphologic (landforms) features of various geological agents as Water fall, Gorges, River meandering, superficial deposits, alluvium, glacial deposits, laterite (engineering aspects), desert landforms, loess, residual deposits of clay with flints, solifluction deposits, mudflows, coastal deposits.**UNIT - III****BASICS OF STRUCTURAL GEOLOGY:** Concept of rock deformation and plate tectonics. Geological Structural elements as Dip and Strike. Fold: classification and nomenclature, Criteria for their recognition in the field. Faults: Classification, nomenclature and their recognition in the field. Types of joints, unconformity.**UNIT - IV****PROPERTIES of roCks:** Properties of rocks–Density, unit weight, porosity; Strength index measurements of rocks – RMR, RQD and point load.Core logging; Calculation of true thickness and vertical thickness of bed rock.**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 –Types of landslide and their prevention. Ground water: Factors controlling water bearing capacity of rock – Pervious and impervious rocks and lowering of water table. Earthquake: Magnitude and intensity of earthquake. Seismic zones in India. Importance in civil engineering. **UNIT - VI****GEOLOGICAL INVESTIGATION FOR DAMS, RESERVOIRS AND TUNNELS:**Required geological consideration for selecting dam (geological profile from catchment area to dam site, topography, slope, drainage system.), 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. Two case studies on failure of dams due to ignorance of geological aspects. |

|  |  |
| --- | --- |
| **Textbooks and Reference books** | **TEXTBOOKS:**1. ParbinSingh,*Engineering and General Geology*, S K Kataria& Sons, 2013.
2. P.C.Varghese, *Engineering Geology for Civil Engineers*, PHI Learning Private Ltd.,2012.
3. SubinoyGangopadhyay, Engineering *Geology*, Oxford University Press, 2013.

**REFERENCE BOOKS:**1. K.M.Bangar, *Principles of Engineering Geology*, Standard Publishers, 2009.
2. N. W. Gokhale, *A Manual of problems in structural geology*, CBS Publishers,2018.
3. Dimitri, P. Krynine, William R. Judd, *Principles of Engineering Geology and Geotechnics*, CBS Publishers and Distributers Private Ltd.2018.
 |

**CO-PO Mapping:**3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - -Not Mapping

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| CO1 | - | 2 | - | - | - | - | - | - | - | - | - | 1 |
| CO2 | - | - | - | - | - | - | 1 | - | 2 | - | - | - |
| CO3 | - | - | - | 2 | - | - | - | - | - | 2 | - | - |
| CO4 | - | 2 | - | - | - | - | - | - | - | - | 1 | - |
| CO5 | - | - | - | 1 | - | - | 2 | - | - | - | - | - |
| CO6 | - | - | - | 2 | - | - | - | - | - | - | - | - |