**Techno India NJR Institute of Technology**



**Course File**

Engineering Geology

**Subject Code:(3CE4-08)**

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**Department of CE**

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**Course Overview:**

Student will learn basics of Engineering geology from this 28 hour course. They will know Engineering geology is the application of the geological sciences to engineering projects. ... Engineering geologists provide geological and geotechnical recommendations, analysis, and design associated with human development and various types of Structure .Geological engineering studies are conducted by a geologist or engineering geologist who is educated, trained and has experience in recognizing and interpreting natural processes ; Understanding how these processes affect human – made structures (and vice versa) and knowledge of ways to mitigate hazards caused by adverse natural or human – made conditions. The engineering geologist’s main objective is to protect life and property from damage caused by different geological

Engineering Geology is the basic requirement for the job role Civil Engineer in the companies like MINING, INDIAN OIL etc.

**Course Outcomes:**

|  |  |  |
| --- | --- | --- |
| **CO.NO.** | **Cognitive Level** | **Course Outcome** |
| 1 | **Comprehension** | Explain different types of rocks & minerals found on earth |
| 2 | **Application** | . Explain faults and folds in earth crust |
| 3 | **Analysis** | Explain the difference between several minerals by examining their physical & chemical properties |
| 4 | **Synthesis** | The students will interpret subsurface information such as thickness of soil, weathered zone, depth of hard rock and saturated zone by using geophysical methods |
| 5 | **Evaluation** | The students will learn the techniques in the interpretation of LANDSAT Imageries to find out the lineaments and other structural features for the given area.. |

**Prerequisites:**

1.Explain different types of rocks & minerals found on earth

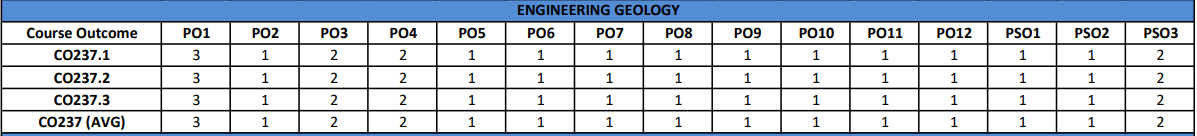
2. Explain faults and folds in earth crust.

3. Explain the difference between several minerals by examining their physical & chemical properties

4.ascertain safe, stable and economical civil structures.

5.ecognize the fundamentals of the Earth as a planet, earth’s dynamic actions and their importance for civil engineering structures.

**Course Outcome Mapping with Program Outcome:**



**Course Coverage Module Wise:**

|  |  |  |
| --- | --- | --- |
| Lecture No. | Unit | Topic |
| 1 | 1 | INTRODUCTION: Objective, scope and outcome of the course. |
| 2 | 1 | **GENERAL GEOLOGY:** internal structure of earth |
| 3 | 1 | Types of weathering, and geological work of river |
| 4 | 1 | Geological work of wind |
| 5 | 1 | Geological time scale |
| 6 | 1 | Physical properties of minerals |
| 7 | 1 | Revision |
| 8 | 2 | **PETROLOGY:** Formation, texture of igneous rocks |
| 9 | 2 | Classification of Igneous rocks |
| 10 | 2 | Formation and texture of sedimentary rocks |
| 11 | 2 | Classification of sedimentary rocks |
| 12 | 2 | Structure wind classification of metamorphic rocks |
| 13 | 2 | Engineering properties of rocks lab and field test for construction site |
| 14 | 3 | **STRUCTURE GEOLOGY:** Terminology, classification of folds |
| 15 | 3 | Causes, recognition effect of folds and engineering consideration of folds |
| 16 | 3 | Terminology and classification of faults and dip and strike problem |
| 18 | 3 | Cause, terminology, classification engineering consideration of unconformity |
| 17 | 3 | Terminology, classification of joint, cause, engineering consideration |
| 18 | 3 | Cause, terminology, classification engineering consideration of unconformity |
| 19 | 4 | **ENGINEERING GEOLOGY**: Geophysical method as application in civil  engineering |
| 20 | 4 | Electric method |
| 21 | 4 | Seismic method |
| 22 | 4 | Terminology and type of dams |
| 23 | 4 | Terminology and types of tunnels |
| 24 | 4 | Geological consideration for site selection for tunnel |
| 25 | 5 | **REMOTE SENSING AND GIS**: introduction of RS and GIS |
| 26 | 5 | Application of RS and GIS in land use |
| 27 | 5 | Application in construction |
| 28 | 5 | Application in Agricultural and irrigation |

**TEXT/REFERENCE BOOKS**

1. Parbin Singh-A Text Book of Engineering & General Geology- S.K.Kataria & Sons.
2. S.K.Garg- Physical & Engineering Geology- Khanna Publishers.
3. Remote Sensing and GIS: B.Bhatta- Oxford Publishers.
4. M.T.Maruthesha Reddy- A Text book of Applied Engineering Geology- New Age International Publisher.

**Course Level Problems (Test Items):**

|  |  |
| --- | --- |
| **CO.NO.** | **Problem description** |
| 1 | A. Explain detail scope of geology  B. What is mineralogy Explain in detail  C. Write a note on use of geology in construction  D. Write a short note on use of geology in water resource development  E. Write a note on physical geology |
| 2 | A. Write a note on Igneous rock in detail.  B. Write Chemical composition of Igneous rock in detail  C. Explain in detail Sedimentary rock  D. Explain in detail the Texture of Sedimentary rock  E. Write a note Metamorphic rock and process of metamorphosis |
| 3 | A. Explain detail Structural features in detail.  B. Write a note on Fold in detail.  C. Explain in detail Classification of Fold in detail  D. Explain in detail effects of Folds on Engineering projects  E. Write about faulting in rocks in detail |
| 4 | 1. Write about Surface investigation in geology 2. Explain in detail Geophysical method of investigation 3. Write a note on Resistivity method of Investigation 4. Explain in detail Seismic Method of Investigation 5. Write a note on Tunnels and Dams |
| 5 | 1. Explain in detail Remote Sensing 2. Explain in detail GIS 3. Write a note on EMR 4. Write a note on Signatures in detail 5. Explain in detail application of Remote Sensing and GIS in civil Engineering |

**Assessment Methodology:**

1. Practical exam in lab where they have to write practical of Subject . (Once in a week)
2. Assignments one from each unit.
3. Midterm subjective paper where they have to write about Subject (Twice during the semester)
4. Final paper at the end of the semester subjective.

**Teaching and Learning resources unit-wise:**

**Unit-1**

**General Geology**

Video Tutorials: <https://www.youtube.com/watch?v=aTVDiRtRook>

Theory concepts: <https://web.viu.ca/earle/geol111/notes-1.pdf>

Sample Quiz: <https://www.geeksforgeeks.org/data-structure-gq/stack-gq/>

**Unit-2**

**Petrology**

Video Tutorials: <https://www.youtube.com/watch?v=kqbLyfWfmxE>

Theory concepts: <https://web.viu.ca/earle/geol111/notes-4.pdf>

Sample Quiz: <https://www.geeksforgeeks.org/data-structure-gq/queue-gq/>

**Unit-3**

**Structural Geology**

Video Tutorials: <https://www.youtube.com/watch?v=EBiLLJAxBuU>

Theory concepts: <https://www.soest.hawaii.edu/martel/Courses/GG303/>

Sample Quiz: <https://quizizz.com/admin/quiz/5908846d159cc1110045422c/structural-geology-quiz-review>

**Unit-4**

**Engineering Geology**

Video Tutorials: <https://www.youtube.com/watch?v=aTVDiRtRook>

Theory concepts: <https://www.iare.ac.in/sites/default/files/lecture_notes/EG_LECTURE_NOTES.pdf>

Sample Quiz: <http://redmine.coolbluei.com/cgi-bin/content/view.php?data=engineering_geology_exam_question_with_answer&filetype=pdf&id=5dc6e7fff5195c5214cbc15abb769040>

**Unit-5**

**Remote sensing and GIS**

Video Tutorials: <https://www.youtube.com/watch?v=qGBA_RVM-t0>

Theory concepts: <https://lecturenotes.in/subject/572/remote-sensing-and-gis>

Sample Quiz: <https://www.proprofs.com/quiz-school/story.php?title=pp-mjk2mza0oa46qc>

Previous Year Question Papers:

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