CE6301 ENGINEERING GEOLOGY

UNIT I PHYSICAL GEOLOGY

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.

Part – A

1. Define engineering geology.
2. Describe briefly the layers of interior of earth.
3. Define weathering.
4. What is meant by seismic zone?
5. What is physical weathering?
6. What is chemical weathering?
7. What is spheroidal weathering?
8. Define mohorovicic and Guttenburg discontinuity.
9. Define plate tectonics.
10. Define exfoliation.
11. Differentiate between water table and perched water table.
12. Define aquifer and mention its types.
13. What is meant by subduction zone? Mention its importance.
14. Differentiate aquifer and aquiclude.
15. Write about Mercalli scale.
16. Describe the interior of the earth.
17. Define confined aquifer.
18. Define unconfined aquifer.
19. Mention the seismic zones of India.

Part – B

1. Write in detail about the structure of the earth and its composition with a neat diagram.
2. Give an account on mode of occurrence and prospecting of ground water.
3. Describe in detail about plate tectonics.
4. Explain in detail about weathering of rocks and its engineering importance.
5. Explain in detail about the earthquake belts of India.
6. Write in detail about the scope of geology and importance of geology in Civil Engineering.
7. Explain physical and chemical weathering process in detail. Add a note on weathering grade and its engineering significance.
8. Explain the process associated with river. Write their engineering significance.
9. Explain the process associated with winds. Write their engineering significance.
10. Explain the process associated with sea. Write their engineering significance.

UNIT II MINEROLOGY

Physical properties of minerals – Quartz group, Feldspar group, Pyroxene - hypersthene and augite, Amphibole – hornblende, Mica – muscovite and biotite, Calcite, Gypsum and Clay minerals.

Part – A

1. Define mineralogy.
2. Define hexagonal, isometric, tetragonal, orthorhombic, triclinic, monoclinic system of crystals.
3. Write the physical properties of mica.
4. Define mineral.
5. What are the different physical properties of minerals?
6. Give the physical properties and uses of quartz, augite.
7. What is moh's scale of hardness?
8. Give the physical properties and uses of hornblende, biotite.
9. Name at least 4 clay minerals and their important engineering properties.
10. Give the physical properties of muscovite, calcite.
11. Define ore minerals.
12. Define isometric system of crystals.
13. Define tetragonal system of crystals.
14. Define orthorhombic system of crystals.
15. Define triclinic system of crystals.
16. Define monoclinic system of crystals.
17. Define colour.
18. Define lusture.
19. Define form,streak.
20. Define hardness, fracture and specific gravity.

Part – B

1. Elaborate the various physical properties which help in identification of minerals.
2. Explain the physical properties of Feldspar group of minerals.
3. Explain the physical properties of Quartz group of minerals.
4. Explain the physical properties of Augite, hornblende.
5. Explain the physical properties of Mica group of minerals.
6. Give a detailed account on chemical composition, physical properties, origin, occurrence, engineering behaviour and uses of clay minerals.
7. Explain the physical properties biotite, calcite.

UNIT III PETROLOGY

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.

Part – A

1. Define petrology.
2. Write the classification of petrology.
3. What are metamorphic rocks?
4. What are igneous rocks?
5. What are sedimentary rocks?
6. Write about the occurrence of granite.
7. Write about the occurrence of basalt.
8. Classify igneous rocks.
9. Classify metamorphic rocks.
10. Write the composition uses of shale, slate and marble.
11. Write about the structure of igneous rocks.
12. Write about the occurrence of sandstone.
13. What are the factors controlling the specific gravity, porosity and strength of rocks?
14. List out the tests to be carried out to determine the strength of building stones.
15. What is black granite? List its uses.
16. Bring out the differences between granite and slate.
17. What is ductility of rocks?
18. Describe the uses of black granite.
19. How igneous rocks are classified according to their occurrences?
20. What is ductility of rocks?

Part – B

1. What are sedimentary rocks? Explain the properties of any 4 sedimentary rocks.
2. What are metamorphic rocks? Explain the properties of any 4 metamorphic rocks.
3. What are igneous rocks? Explain the properties of any 4 igneous rocks.
4. Describe the engineering properties of rocks.
5. Describe the different types of rocks. Give the classification, texture and structure of igneous, sedimentary and metamorphic rocks.
6. List the various field and laboratory tests to determine the engineering properties of rocks.
7. Describe in detail about the mineral composition, structure, texture, origin, engineering properties and uses of basalt, dolerite, sandstone and slate.
8. Describe the composition, texture, characteristics, occurrence and uses of black granite and basalt
9. Describe the composition, texture, characteristics, occurrence and uses of limestone and slate.
10. Describe the engineering properties of igneous rocks.

UNIT IV STRUCTURAL GEOLOGY AND GEOPHYSICAL METHODS

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.

Part – A

1. Define structural geology.
2. Define dip and strike.
3. Define recumbent fold and overturn fold.
4. Differentiate anticline and syncline.
5. Describe wenner's configuration of electrodes.
6. What are joints? Explain their significance.
7. What are folds? Explain their significance.
8. What are faults? Explain their significance.
9. Differentiate Wenner and berger methods.
10. Define outcrops.
11. What are true and apparent dips?
12. What are the types of dips?
13. What is a geological map?
14. Draw and describe the parts of folds.
15. Classify folds.
16. Write the causes of foldings?
17. What are the engineering considerations of a fold?
18. What are the engineering considerations of a fault?
19. What are the mechanisms of faulting?
20. Write about the origin of joints.

Part – B

1. What is a fault? Discuss the various types of faults and write about the engineering applications.
2. What is a fold? Discuss the various types of faults and write about the engineering applications.
3. What is a joint? Discuss the various types of faults and write about the engineering applications.
4. Explain in detail the role of electrical methods of subsurface investigation in civil engineering practice.
5. Describe seismic refraction survey to de conducted for determining the depth of bed rock.
6. Discuss in detail electrical method of investigation for ground water exploration.
7. Classify folds and faults in rocks and explain how they influence the design of dams.
8. Classify and describe joint structures with neat sketches and also write their role in dam and tunnel construction.
9. Give a detailed account of the various geological structures and their role in selection of sites for engineering projects.
10. Describe fault structures with neat sketches and also write their role in dam and tunnel construction.

UNIT V APPLICATION OF GEOLOGICAL INVESTIGATIONS

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.

Part – A

1. List a few measures of coastal protection.
2. What is the function of groynes in coastal protection?
3. Enumerate the coastal protection structures.
4. What is the application of satellite imagery?
5. Define overlap.
6. Define overbreak.
7. Describe sea wall and jetties in coastal protection structures.
8. List any 4 methods to prevent landslides.
9. Define stand up time in dam construction.
10. Define pay line in dam construction.
11. Differentiate swelling ground and running ground in construction site.
12. Define the term parallax in aerial photograph.
13. What are the various types of aerial photographs?
14. Explain how the study of bed rocks is essential before the construction of tunnels.
15. Define overbreak and pay line in tunnelling operations.
16. Write the applications of remote sensing techniques.
17. What are multipurpose dams?
18. Give the functions of breakwater.

Part – B

1. Write in detail about landslides and their causative effects. Explain about the measures to prevent them.
2. What are the various geological factors to be considered for the construction of dams? Explain with examples.
3. Explain in detail the role of aerial photographs and satellite images in planning and execution of civil Engineering projects.
4. Write in detail about sea erosion and coastal protection structures.
5. Using case studies, describe the various aspects of coastal erosion and the various methods of coastal protection.
6. What are the various geological factors to be considered for the construction of tunnels? Explain in detail with examples.
7. What are the various geological factors to be considered for the construction of, road cuttings? Explain in detail with examples.
8. What are the various geological factors to be considered for the construction of buildings? Explain in detail with examples.