Engineering Geology
BEG255CI

Year: II **Semester: I**

Teaching Schedule hrs/week			Examination Scheme						Total Marks
			Final				Internal Assessments		
			Theory		Practical		Theory	Practical	
L	T	P	Duration	Marks	Duration	Marks			
3	1	2/2	3	80	-	-	20	25	125

Course Objective:

Course Contents:

1.0 Introduction (2 hrs)
- 1.1 Scope of geology in civil engineering
- 1.2 Basic review of earth sciences
- 1.3 Various Landforms on the surface of the earth: Mountains, plateaus, shields

2.0 The Earth's Interior and its Effect (5 hrs)
- 2.1 The earth: Its internal structure and environment
- 2.2 Plate tectonics
- 2.3 Causes and effects of earthquakes
- 2.4 Volcanism

3.0 Geology in Civil Engineering (4 hrs)
- 3.1 Definition of engineering geology
- 3.2 Scope and objective of engineering geology
- 3.3 Importance of engineering geological studies in civil engineering

4.0 Petrology (4 hrs)
- 4.1 Definition
- 4.2 Petrographic classification: Igneous, Sedimentary and Metamorphic rocks
- 4.3 Engineering significance of the three rock classes

5.0 Structural Geology (6 hrs)
- 5.1 Rock deformation and reasons
- 5.2 Study of folds , faults and joints cleavage
- 5.3 Introduction to dip , strike and outcrop
- 5.4 Unconformity
- 5.5 Orientation of geological strata using geological maps , plans and cross-sections
- 5.6 Planes of discontinuities in rock masses
- 5.7 Engineering classification of rock masses

6.0 Mass Movement and Rock Slope Engineering (6 hrs)
- 6.1 Types of landslides and factors affecting slope stability

6.2 Preventive measure for landslides and corrective methods for maintaining stability
6.3 Rock fall, rock slide and mud flow

7.0 Hydrogeology (5 hrs)

7.1 Morphology of river channel , transportation and disposition
7.2 Groundwater movement and its origin
7.3 Permeability and porosity
7.4 Aquifer, Aquiclude, water level and piezometric levels
7.5 Confined and unconfined aquifers
7.6 Springs and reservoirs

8.0 Site Investigation (7 hrs)

8.1 Interpretation of Topographic Maps
8.2 Aerial photographs and geological maps
8.3 Geophysics and use of engineering geological map for terrain Evaluation
8.4 Site exploration: drinking, test methods and borehole logs
8.5 Geological investigations for dams and reservoirs , roads and Pavements , foundations, bridge and tunnels

9.0 Engineering Geology of Nepal (6 hrs)

9.1 Geological division of Nepal
9.2 Distribution of different rock /soil types
9.3 Geological structures and their engineering significance

Laboratories:

Six Laboratory exercises will be performed in this course:

(i) Identification of rocks and minerals.
(ii) Study of rock structures.
(iii) Study of effects of weathering and outcrop.
(iv) Study of topographic maps, preparation of profiles, interpretation of geological cross-sections and stratum contours.
(v) Preparation of interpretative engineering geological maps.
(vi) Study of fault and fold maps, borehole and three point problems.
(vii) Brunton's compass
(viii) Schmidt's hammer

Field Visit:

3-day field work

References:

- "Principles of Physical Geology", Sanders, John Wiles & Sons, New York
- "Principles of Structural Geology", A. Holmes, ELBS English Language Society
- "Principles of Structural Geology", M. P. Billings, Prentice Hall of India, Delhi
- "Geology of Nepal", Dr. C. K. Sharma, Educational Enterprises