

ENGINEERING GEOLOGY GLY 363

MEMO SEMESTER TEST

24 May 2011

Question 1

[25]

Two important properties of soil and rock material that may influence their engineering behaviour due to changed stress conditions are strength and deformation. Give a short definition of each parameter and explain how each can be determined for both soil and rock. Describe and explain the general relationships between stress and strain in a rock mass.

Material strength – internal resistance per unit area that the material can offer to resist failure and sliding along any plane

Deformation – change of shape due to applied stress. Strain is proportional to stress.

SOIL – shear box (load, cohesion, friction angle with Mohr envelopes) plate load, consolidometer. Failure in shear

ROCK – UCS + LVDT, 3-axial, plate load. Failure through material or along discontinuities

Elastic

Elastic-Plastic

Plastic-Elastic

Elastic-Plastic-Elastic

Question 2

[35]

Discuss the most important engineering geological properties and problems associated with the following stratigraphic units. Specifically mention the predominant rock type(s) and climatic environment.

2.1 Cape Granite Suite (6)

granite

N < 5 – decomposition

Deep weathering steep slopes – slope instability

Corestones – excavation & foundation problems

Good construction material

2.2 Ventersdorp Supergroup (12)

andesite

N > 5: shallow bedrock; few problems except excavation

N > 5; 8 – 12 m weathering; intermediate rock (amphibole & plag); expansive smectite clay (red - yellow – green – rock)

N < 2; deep weathering (50 m); protected from erosion by graben structure into WWR quartzites; shallow water table cause compressible conditions

Good construction material

2.3 Chuniespoort Group (6)

dolomite & chert

N < 5 (decomposition) causes dissolution of carbonate rocks

Karst – sinkholes & subsidences

Good construction material in concrete

2.4 Central Rand Group (7)

mainly quartzite intercalated with shale

shallow weathering, but N < 5 (decomposition)

good foundations & construction material depending on pyrite content

mining subsidence – sinkholes and surface subsidence

induced seismicity

AMD

2.5 Magaliesberg Formation (4)

quartzite

shallow weathering – thin soil cover, resistant to weathering in N < 5 (decomposition)

good construction material & foundations

slope stability

TOTAL

[60]