

UNIVERSITY COLLEGE LONDON

University of London

EXAMINATION FOR INTERNAL STUDENTS

For The Following Qualifications:-

B.Eng. M.Eng.

Civil Eng 2005: Geology for Engineers

COURSE CODE : CIVL2005

UNIT VALUE : 0.50

DATE : 18-MAY-06

TIME : 10.00

TIME ALLOWED : 3 Hours

CIVL2005 GEOLOGY AND GROUND INVESTIGATION FOR ENGINEERS
Second Year BEng/MEng Degree
2006 Examination

3 HOURS

Answer 4 **QUESTIONS** only. All questions carry 25 marks.

Q1. (a) Explain the following terms, using sketches where appropriate:

- Earthquake epicentre
- Earthquake surface wave
- Earthquake intensity
- Richter magnitude of an earthquake
- Subduction zone
- Transform plate boundary

[6 marks]

(b) Briefly describe the elastic rebound theory of earthquakes

[4 marks]

(c) Outline the geological hazards faced by populations living in regions where earthquakes occur

[15 marks]

Q2. (a) Review the characteristics of igneous rocks occurring at and near the Earth's surface

[8 marks]

(b) What factors cause weathering of igneous rocks?

[9 marks]

(c) Define the terms safe bearing pressure (SBP) and unconfined compressive strength (UCS).

[4 marks]

(d) How are the following affected by rock weathering?

- (i)** the UCS of a granite
- (ii)** the SBP of chalk

[4 marks]

Q3. (a) Write a brief account of the following topics:

Permafrost regions

Glacial deposits

[8 marks]

(b) List three engineering site problems that might arise from geological conditions in a permafrost environment

[3 marks]

(c) Describe two geophysical methods for mapping the variability in ground conditions at a site selected for the construction of a highway in a permafrost region

[14 marks]

Q4. (a) Draw sketches to illustrate the following features in sedimentary rocks:

A normal fault

A reverse fault

An unconformity

A syncline

A monocline

[5 marks]

(b) Review the characteristics and origin of the following types of sedimentary and metamorphic bedrock

conglomerate

limestone

shale

slate



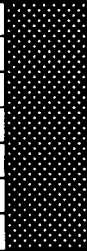



gneiss

[20 marks]

Q5. Describe the Geological processes and climate changes that led to the formation, folding and subsequent slip failure of the Folkestone beds. List the remedial measures that have been undertaken to ensure stability of the beds and indicate how each contributed to increasing the overall stability.

[25 marks]

Q6. (a) You have been given the borehole log below; estimate the drained and undrained strengths (ϕ and S_u) and compressibility parameters (C_c and C_s) for the 5 soil layers.

Depth (m)	Log	Description	N SPT	Classification tests			
				LL (%)	LP (%)	Natural w (%)	
2		Soft blue grey clay		70	27	47	
4				62	26	41	
5							
6		Firm blue grey clay		54	22	32	
8				54	23	30	
9							
10		Sandy Medium Gravel	27				
13			35				
15			32				
16							
17							
19		Coarse gravel	45				
21			>50				
22			47				
23							
24		Stiff grey clay		55	22	23	
26		Fractured chalk					
Boring stopped at 26 m							

[13 marks]

(b) Explain what kind of samples can be used for classification tests and why.

[6 marks]

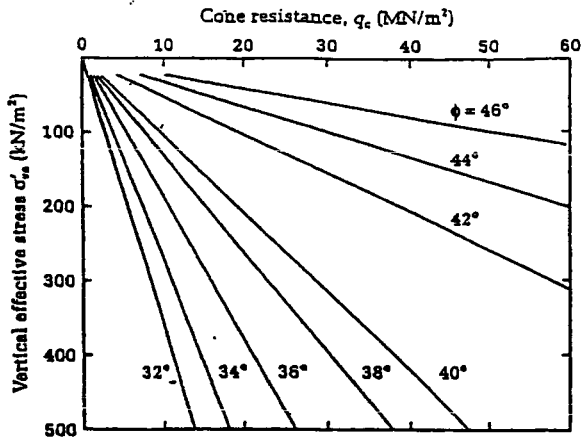
(c) Explain the following stages of Site investigation

Preliminary Survey

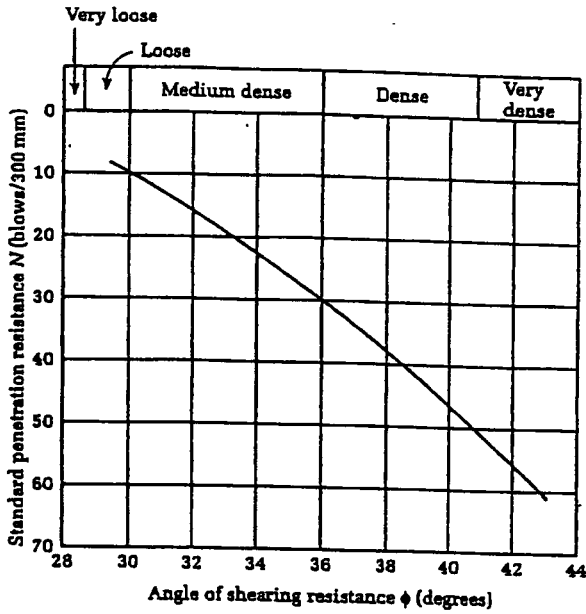
Desk Study

Reporting

[6 marks]



N_{60} (blows/300 mm of penetration)	Relative density	D_r (%)
Below 4	Very loose	<20
4-10	Loose	20-40
10-30	Medium-dense	40-60
30-50	Dense	60-80
Over 50	Very dense	>80



PI	ϕ_{cs}'
15	30
30	25
30	25
50	20

