

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 : 20-MAY-05

TIME : 10.00

TIME ALLOWED : 3 Hours

CIVL2005 GEOLOGY AND GROUND INVESTIGATION FOR ENGINEERS
Second Year B.Eng./M.Eng. Degree
2005 Examination

3 HOURS

Answer 4 QUESTIONS only. All questions carry 25 marks.

- Q1. (a) Explain how bedrock is classified. **[12 marks]**
- (b) Describe the processes that cause weathering of bedrock at and near the Earth's surface. **[13 marks]**
- Q2. A ground survey is required prior to the construction of a motorway section through a region where granite lies below clay deposits. A borehole establishes that 8 m of clay covers the granite at one site on the line of the motorway. Outline TWO geophysical methods that can be used to determine the depth to the granite below the ground surface along the motorway route. **[25 marks]**
- Q3. (a) Draw labelled sketches to show THREE types of plate boundary **[7 marks]**
- (b) How is the Richter magnitude of an earthquake measured? **[8 marks]**
- (c) Outline the geological hazards for populations living close to plate margins. **[10 marks]**
- Q4. Write an essay entitled "Sedimentary rocks as an economic resource". **[25 marks]**
- Q5. You are part of a team working on the design of a river crossing. The area you have is 50m by 50m. Results from the site investigation are borehole logs at three different locations across the diagonal of the site (Figure 5.1, attached at the end of paper). They are located one at each end and one in the middle of the diagonal.
- (a) Draw a simple geological profile across the site. Describe the geological origin, the nature and the state of each of the principal strata. **[10 marks]**
- (b) Estimate the strength and compressibility of each of the principal strata. **[8 marks]**
- (c) What foundations would you provide for the offices and the crane? **[7 marks]**

TURN OVER

Q6. Hutchinson has thoroughly documented and analysed the failures at Folkestone Warren.

(a) Sketch the soil profile and the failure mechanisms in relation to mean sea level.

(b) Give reasons for the shapes of the failure mechanisms and describe in detail how various factors contribute to failure.

(c) Describe the methods used to stabilise the failures and how they contribute to increasing the factor of safety.

[25 marks]

CONTINUED

BH1

GL:

| DEPTH (m) | | | LL | PL | W % | SPT N |
|-----------|--|------------------|----|----|-----|-------|
| 0 | | STIFF BROWN CLAY | 75 | 35 | 35 | |
| 2 | | STIFF BLUE CLAY | 75 | 35 | 35 | |

BH2

GL:

| DEPTH (m) | | | LL | PL | W % | SPT N |
|-----------|--|------------------|----|----|-----|-------|
| 0 | | SOFT GREY CLAY | 75 | 35 | 55 | |
| 4.4 | | STIFF BROWN CLAY | 75 | 35 | 35 | |
| 5.4 | | STIFF BLUE CLAY | 75 | 35 | 35 | |

BH3

GL:

| DEPTH (m) | | | LL | PL | W % | SPT N |
|-----------|--|-------------------|----|----|-----|-------|
| 0 | | SOFT GREY CLAY | 75 | 35 | 55 | |
| 6 | | MEDIUM DENSE SAND | | | | 30 |
| 8 | | STIFF BLUE CLAY | 75 | 35 | 35 | |

FIGURE 5.1