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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2013/2014**

COURSE NAME : SOIL MECHANICS AND FOUNDATIONS
COURSE CODE : BNP 20903
PROGRAMME : 2 BNB
DATE : JUNE 2014
DURATION : 3 HOURS
**INSTRUCTIONS : THERE ARE FIVE (5) QUESTIONS.
ANSWER ONLY FOUR (4).**

THIS QUESTION PAPER CONSISTS OF SIX (6) PAGES

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- Q1**
- (a) List and describe the main sources of information for planning a site exploration.
(10 marks)

 - (b) With suitable sketches, illustrate the importance of stabilising a borehole by filling it with water to a level higher than the GWT.
(5 marks)

 - (c) Briefly propose how you would protect nearby structures by minimising soil movements in an excavation.
(5 marks)

 - (d) With suitable sketches, examine **TWO (2)** methods of groundwater management to avoid flooding or collapse of an excavation pit.
(5 marks)

- Q2**
- (a) List the factors to be considered in the estimation of soil's settlement. (5 marks)
- (b) With the aid of suitable sketches, compare the following stress distribution analytical methods.
- (i) Using Fadum's chart. (3 marks)
- (ii) The 1:2 method. (3 marks)
- (c) Discuss in brief why there is no need for any support when making a vertical cut to the depth of $z = 2c/\gamma$ in a soil of $c = c$ and $\phi = 0$. Include the lateral earth pressure distribution diagram in the answer. (8 marks)
- (d) The q_{ult} of a 2 m x 2 m ($B' \times L'$) footing is 150 kN/m^2 and the ultimate vertical load it can carry is thus 600 kN. Calculate the altered dimensions of the footing so that it can also carry an ultimate moment of 90 kNm in one direction and 60 kNm in the other direction. (6 marks)

- Q3** (a) Explain briefly the **FOUR (4)** factors to be considered in choosing a suitable shallow foundation based on the imposed load. (8 marks)
- (b) Examine the purpose of raising existing ground level to construct the following earth structures.
- (i) Earth fills and embankments. (2 marks)
 - (ii) Earth dams. (2 marks)
 - (iii) Incrementally raised dams. (2 marks)
- (c) Illustrate **TWO (2)** internal drainage systems for discharging seepage water from an earth dam. (4 marks)
- (d) Compare the earth pressure distributions and the P_A developed behind a cantilever retaining wall and the wall of a braced excavation if both are supporting a soil of $c = 0$, $\phi = 30^\circ$ and $\gamma = 20 \text{ kN/m}^3$ for a height of 5 m. Take $K_A = 0.33$. (7 marks)

- Q4** (a) Outline **FOUR (4)** common causes of ground subsidence resulting in structural damage and collapse. (8 marks)
- (b) List and explain the main disadvantages of using lightweight foam platforms for construction on soft soil deposits. (4 marks)
- (c) Differentiate between the vibro-floatation and vibro-replacement methods for improving granular soils. (13 marks)

- Q5** (a) Not all wastes are suitable as soil replacements in geotechnical construction works. List **FOUR (4)** essential characteristics of the waste material for consideration. (4 marks)
- (b) Briefly examine **FIVE (5)** of the key components of an engineered landfill. (10 marks)
- (c) Propose the operation plan for a slurry waste containment pond, including the arrangement, size, inflow and outflow components (beach and accumulated water). (11 marks)

- END OF QUESTION -