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**University Examinations 2015/2016**

THIRD YEAR, FIRST SEMESTER EXAMINATION FOR THE DIPLOMA IN CIVIL ENGINEERING

**ECV 2301: FOUNDATION ENGINEERING.**

**DATE: AUGUST 2016 TIME: 11/2 HOURS**

**INSTRUCTIONS: -** *Answer question* ***one*** *and any other* ***two*** *questions*

**QUESTION ONE (30 MARKS)**

1. Define the term foundation and state two assumptions made in the design of foundations. (3 marks)
2. State three conditions under which piles can be used. (3 marks)
3. Give two examples of piles based on:
4. Method of transfer of loads (2 marks)
5. Method of construction of piles (2 marks)
6. (i) Using the table provided, interpolate the bearing capacity factors for  to two decimal places. (3 marks)
7. Use the values obtained in (i) above to calculate the ultimate bearing capacity of:
* A strip footing 1m wide
* A square footing 3m x 3m wide
* A circular footing 3m diameter

Given:

* Unit weight of soil =1.8t/m3
* Cohesion=2t/m2
* Depth of all footings=1.5m
* Angle of internal friction , (6 marks)
1. State five causes of failure in foundations. (5 marks)
2. A 2.5m strip footing is founded at a depth of 1.9m below the ground level in a homogeneous bed of dense sand having the following properties:

. Determine the ultimate, net ultimate, net safe and safe bearing capacity of the footing. Given for :

Nc=61, Nq=43, Ny=48. Assume a factor of safety of 3.0 (6 marks)

**QUESTION TWO (15 MARKS)**

1. State five types of foundations (5 marks)
2. The depth to which foundations should be carried depends upon four principal factors. State them. (4 marks)
3. A square footing of 2m x 2m size is subject to a gross vertical load of 180t. The depth of foundation is 1m. The foundation soil consists of a deposit of dense sand having a bulk density of 1.85t/m3 and an angle of internal friction of 360. Determine the factor of safety against shear failure. Given for : Nc=60, Nq=42, Ny=47. (4 marks)
4. State two conditions under which mat foundations can be used. (2 marks)

**QUESTION THREE (15 MARKS)**

Design a rectangular combined footing for two columns as shown in the figure below. Take allowable soil pressure as 10t/m2. Also draw the maximum shear force and bending moment diagrams.

**QUESTION FOUR (15 MARKS)**

1. What is another name for a mat foundation? (1 mark)
2. The plan of a mat foundation with 9 columns is shown in the figure below. Assuming that the mat is rigid, determine the soil pressure distribution at A, B, C and D. All columns are 0.5m x 0.5m. (14 marks)