



MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY

P.O. Box 972-60200 – Meru-Kenya.

Tel: 020-2069349, 061-2309217. 064-30320 Cell phone: +254 712524293, +254 789151411

Fax: 064-30321

Website: www.must.ac.ke Email: info@must.ac.ke

University Examinations 2013/2014

THIRD YEAR, SECOND SEMESTER EXAMINATION FOR DIPLOMA IN CIVIL
ENGINEERING

ECV 0250: FOUNDATION ENGINEERING II

DATE: APRIL 2014

TIME: 1 ½ HOURS

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

QUESTION ONE – (30 MARKS)

- (a) Define the term foundation and state two assumptions made in the design of foundations. (3 Marks)
- (b) State five causes of failure in foundations. (5 Marks)
- (c) The depth to which foundations should be carried depends upon four principal factors. State them. (4 Marks)
- (d) State five types of foundations. (5 Marks)
- (e) Give two examples of piles based on;
 - (i) Method of transfer of loads (2 Marks)
 - (ii) Method of construction of piles (2 Marks)
- (f) State three conditions under which piles can be used. (3 Marks)
- (g) State two conditions under which mat foundations can be used. (2 Marks)
- (h) Define the following terms as used in foundations;
 - (i) Shallow foundation
 - (ii) Ultimate bearing capacity
 - (iii) Safe bearing capacity
 - (iv) Footing (4 Marks)

QUESTION TWO – (15 MARKS)

Design a rectangular combined footing for two columns as shown below. Take allowable soil pressure as $10t/m^2$. Also draw the maximum shear force and bending moment diagrams.

(15 Marks)

QUESTION THREE – (15 MARKS)

- (a) What is another name for a mat foundation? (1 Mark)
- (b) 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. All the columns are $0.6m \times 0.6m$. (14 Marks)

QUESTION FOUR – (15 MARKS)

- (a) What are the main differences between a drilled pier and a caisson. (3 Marks)
- (b) State three types of caissons. (3 Marks)
- (c) Determine the outside diameter of an open caisson to be sunk through 40m of sand and water to bedrock if the allowable bearing capacity $200t/m^2$. The caisson receives a load of 5350t from the superstructure. The mantle friction is $3t/m^2$. Test the feasibility of sinking and also calculate the thickness of the seal. $\gamma_c = 2.4t/m^3$ and $\delta_c = 350t/m^3$. (9 Marks)