MACHAKOS UNIVERSITY

University Examination 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

FOURTH YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE (CIVIL ENGINEERING)

ECV 411: FOUNDATION ENGINEERING II

DATE: 26/9/2019 **TIME: 2.00-4.00 PM**

INSTRUCTIONS:

- *THIS QUESTION PAPER HAS **FOUR** QUESTIONS*
- *ANSWER QUESTION **ONE** AND ANY OTHER **TWO** QUESTIONS*
- *SHOW ALL YOUR WORKINGS CLEARLY ON ANSWER BOOKLET*

QUESTION ONE (30 MARKS) - COMPULSORY

a) The plan of mat foundation is shown in Figure Q1 below. Using conventional rigid design method, calculate the pressure at points A, B, C, D, E and F. Given; $q_{(all)\ net}$ = 150 KN/m^2 determine that solid pressures are less than the net allowed soil bearing capacity. All the columns are of the size 0.6m by 0.6m. (14 marks)

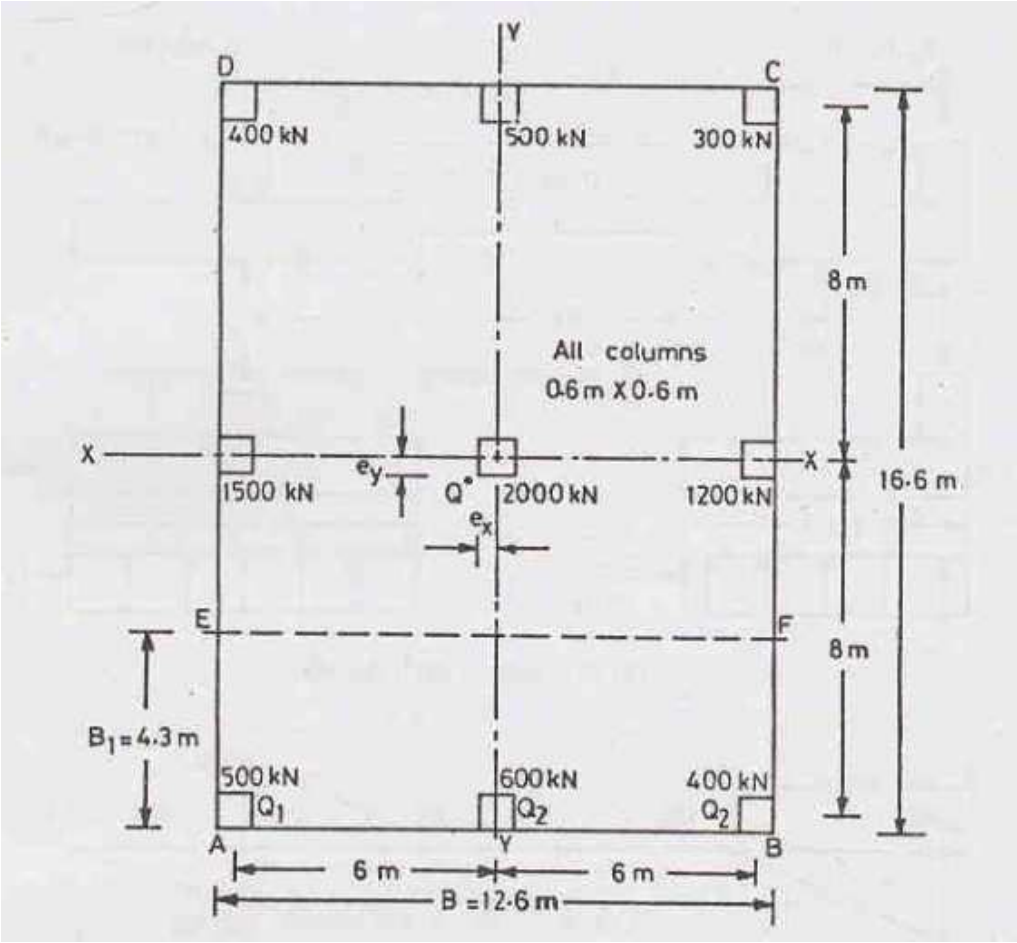

Figure Q1

b) Find the plan dimensions of trapezoidal combined footing for two columns of size 500mm x 500 mm carrying loads of 2000KN and 1500KN. The columns are spaced 6 metres c/c and no extension permitted. The allowable bearing capacity is 200KN/m^2. (6 Marks)

c) Briefly explain the methods of providing support to drilled piers during construction. (4 marks)

d) What is a coffer dam? Explain atleast THREE types of coffer dams. (4 marks)

e) Briefly explain at least two methods of determining the bearing capacity of an individual pile. (2 Marks)

QUESTION TWO (20 MARKS)

a) Mention atleast four factors that govern the depth of a foundation (2 marks)

b) Briefly explain at least FOUR possible retaining wall drainage methods, illustrating your answers with appropriate sketches. (4 Marks)

c) Check the stability of the gravity retaining wall shown in Fig Q2 below. Take allowable soil pressure equal to 600 kN/m^2. Use Coulomb's theory. (14 Marks)

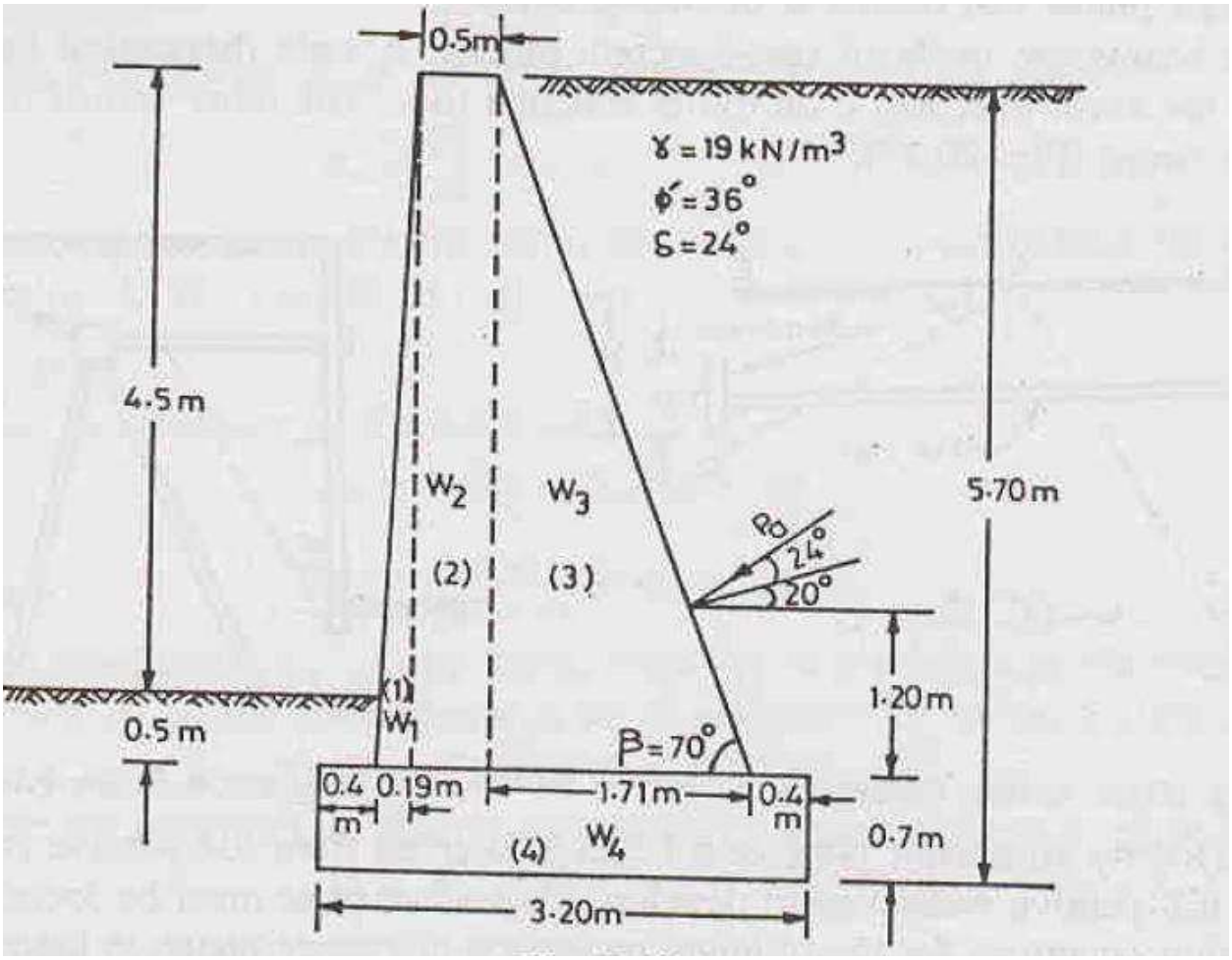

Figure Q2

QUESTION THREE (20 MARKS)

a) What is negative skin friction and what effect does it have on a pile? (2 marks)

b) Describe two types of piles using load classification method (2 marks)

c) Mention atleast four types piles known by their material composition (2 marks)

d) A group of 12 piles, each having a diameter of 500mm and 30m long, supports a raft foundation. The piles are arranged in 3 rows and spaced at 1.25 m c/c. The properties of the foundation soilare as follows: q_u = 75 KN/m^2, Ø = 0^o and γ = 11 KN/m^3. Assuming α = 0.8 and Fs = 2.5, determine the capacity of the pile group. (14 marks)

QUESTION FOUR (20 MARKS)

a) What are the different types of retaining walls? (2 marks)

b) What are the advantages and disadvantages of piers as compared to piles. (4 Marks)

c) Outline atleast four reasons why a pile foundation may be used. (4 Marks)

d) An open caisson 19 m deep has external and internal diameters of 8 m and 6 m, respectively.

If the water level is 2 m below the top of the well, and the depth of the base below the scour level is 5 m, determine the minimum thickness of the seal that will enable complete dewatering of the caisson. Take δ_c = 200 t/m^2, γ_c =2.4 t/m^3 and allowable perimeter shear of 65 t/m^2. (10 Marks)