THE TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR DEGREE IN BACHELOR OF SCIENCE

CIVIL ENGINEERING

ECE 2414 FOUNDATION ENGINEERING II

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 2016

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- Answer booklet

This paper consists of **FIVE** questions

Answer question **ONE (COMPULSORY)** from **SECTION A** and any other **TWO** questions from **SECTION B**

Maximum marks for each part of a question are clearly shown

This paper consists of **TWO** printed pages

SECTION A (*COMPULSORY -30 MARKS*)

QUESTION 1

(a) Define the following terms:

i. Site investigation
ii. Ground investigation
iii. Disturbed samples
iv. Undisturbed samples

(2Marks)

(b)Foundation Engineers carry out site investigations before design and construction,give four reasons why it is necessary to do that **(4Marks)**

(c) Desk study is done prior to commencing work on ground investigation.What kind of information are we likely to get from the following sources of information and what is their significance in the investigation? **(10Marks)**

i. Geological maps
ii. Topographical maps
iii. Soil survey maps
iv. Aerial photographs
v. Existing site information reports

(d)Describe 5types of shallow foundations **(10Marks)**

(e) List EIGHT factors to be considered when fixing the depth of footing **(4Marks**

SECTION B *(Answer any TWO questions from this section. Each question carries 20 marks)*

QUESTION 2

The cantilever retaining wall shown below supports a granular material of unit weight 18kN/m3.The unit weight of concrete is 24kN/m^3.The soil peak strength parameters are

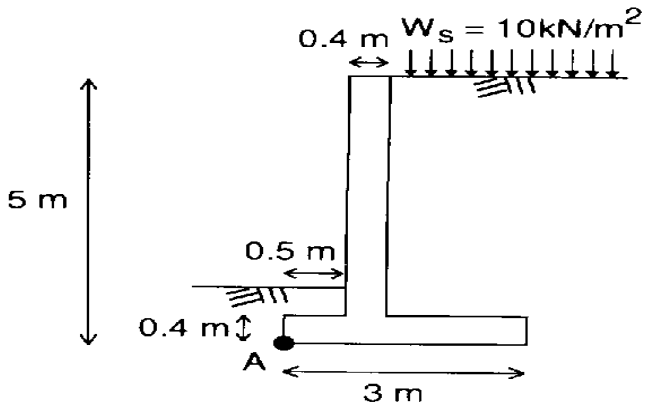
$Ø'$ =38^0, c′=0 and the safe bearing capacity of the soil is 250kN/m^2.The soil behind the wall carries a uniform surcharge of intensity 10kN/m^2.

It is required to:

i. Check the stability of the wall against sliding,overturning and bearing capacity.
ii. Determine the actual bearing pressures
iii. Design the bending reinforcement for the stem and base using high yield steel f_y=460N/mm^2 and grade 35 concrete for the wall and the base.

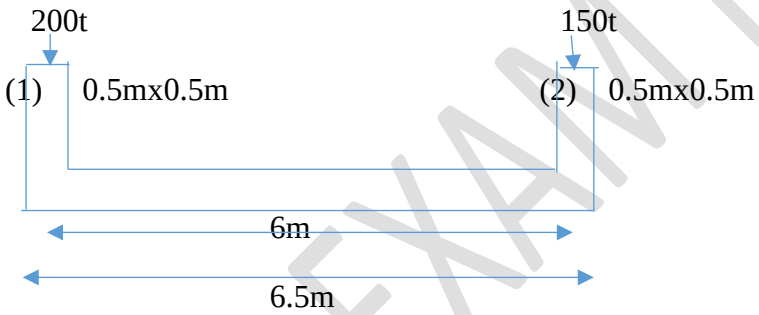
(20Marks)

(Use Rankine's Theory for K_a and/ or K_p)



QUESTION 3

Design a trapezoidal footing for the two columns shown below. The allowable soil pressure is $20t/m^2$. Determine the pressure distribution,draw the S.F. and B.M. diagram and provide reinforcement.



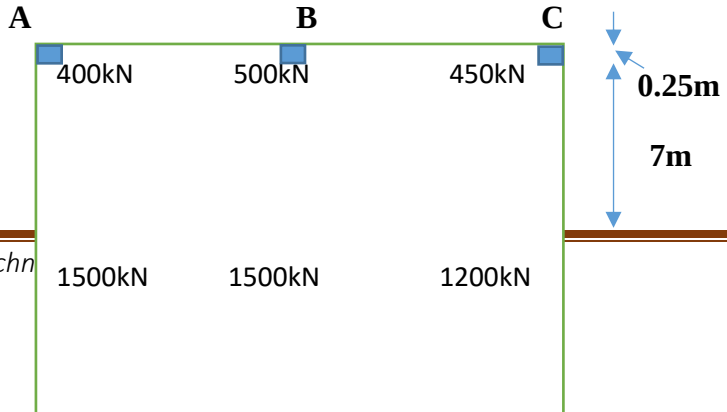
Section

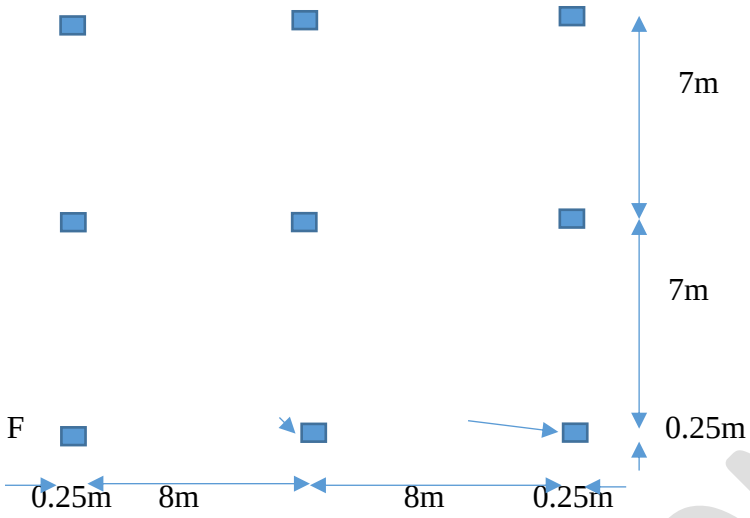
f_y=460kN/mm^2 , fcu=35N/mm2 , γ_{conc} = 24kN/m^3

QUESTION 4

The plan of a mat foundation with column loads is as shown below.Calculate the soil pressures at point A,B,C,D,E and F.The size of the mat is 16.5m x 21.5m.All columns are 0.5m x 0.5m in section.Given $q_{allowable}$=60kN/m^2.Determine that the soil pressures are less than the net allowable soil bearing capacity.

(20Marks)

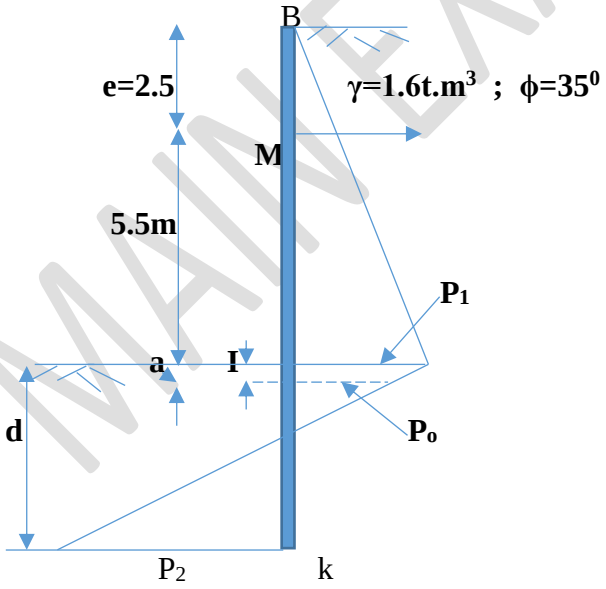




QUESTION5

(a) Determine the depth of embedment for the anchored sheet pile shown below.Also determine the force in the anchor per metre run.Assume fixed-end support conditions.

(8Marks)D



(b)Determine the loads in the three struts shown below.The centre to centre spacing of the struts along the length of the cut is 2.5m.The soil is stiff,fissured clay(γ=1.9t/m^3 , c=4t/m^2).

Also determine the maximum bending moments in wales and sheet piles. **(12Marks)**