MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)
University Examinations for 2015/2016

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

FIRST SEMESTER EXAMINATION FOR DIPLOMA IN CIVIL ENGINEERING

BCECD 312S: FOUNDATION ENGIEERING I

Date: 2/8/2016 **Time: 2:00 – 4:00 PM**

INSTRUCTIONS:

- ***This paper comprises five questions***
- ***Question one is compulsory and carries 30 marks***
- ***All other questions carry 20 marks each***
- ***Answer question one and any other two questions***

QUESTION ONE

a) List the assumptions of Terzaghi's bearing capacity theory (8 marks)

b) Mention the limitations of Terzaghi's bearing capacity theory (6 marks)

c) What is the influence of size of footing on cohesive soils? (6 marks)

d) Define the following terms:

i. Lateral earth pressure

ii. Effective stress

iii. Coefficient of the lateral earth pressure (6 marks)

e) List FOUR factors that the magnitude of the lateral earth pressure depend on. (4 marks)

QUESTION TWO (20 MARKS)

a) Explain the soil state equilibrium with illustrations. (10 marks)

b) Calculate the ultimate bearing capacity of 2 m wide square footing resting on the ground surface of sand deposit with the following properties; unit weight 18.6 kN/m^3, angle of internal friction 35^o, N_q = 41.4, N_γ = 42.2. Also calculate ultimate bearing capacity if same footing is placed at a depth of 1 m below ground surface. (10 marks)

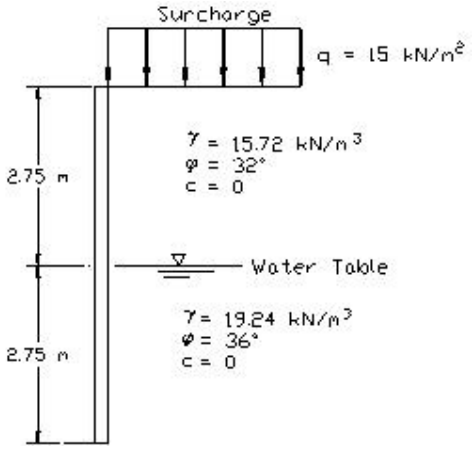
QUESTION THREE (20 MARKS)

a) Explain the Rankine's theory of earth pressure and its assumptions. (10 marks)

b) A 2 m X 2 m square footing is proposed on a ground with c = 8 kPa, $\phi = 38^o$, $\gamma = 18$ kN/m^3 at a depth of 1.5 m. If $N_c = 61.35$, $N_q = 48.93$, $N_\gamma = 74.03$, find the safe bearing capacity of soil in different seasons of the year. The depth of Ground Water Table below Ground Level in January, March, May, July, September and November are respectively 4 m, 6 m, 0 m, 1 m, 1.5 m, 2.5 m. (10 marks)

QUESTION FOUR (20 MARKS)

Draw the Rankine active earth pressure diagram for the retaining wall. Determine the magnitude and line of action of the resultant force.



(20 marks)

QUESTION FIVE (20 MARKS)

Using the Rankine analysis, determine the individual lateral earth pressures, and resultant lateral earth pressure on a 2.1 m (7 ft) rigid concrete retaining wall. The free draining gravel backfill has a soil unit weight, g, of 21.2 kN/m^3 (135 lb/ft^3), and an angle of internal friction, f, of 36 degrees. There will be vehicle surcharges of 14.4 kN/m^2 (300 lb/ft^2). The retaining wall will be constructed for passive conditions. (20 marks)