



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 217: SOIL MECHANICS I

Date: 10/8/2016

Time: 2.00-4.00 PM

INSTRUCTIONS:

- This paper comprises of **five** questions
 - Question **one** is **compulsory** and carry 30 marks
 - Answer **question one** and any **other two** questions
1. A sample of soil weighing 31.4 kg had a volume 0.0192m^3 . When dried out in an oven its weight was reduced to 26.5 kg. The specific gravity of the solids was found to be 2.67. Determine the following
- a) Bulk density
 - b) Dry density
 - c) Percentage moisture content
 - d) Saturated density
 - e) Void ratio
 - f) Porosity
 - g) Degree of saturation
 - h) Critical hydraulic gradient
- (30 marks)

2. a) A proctor compaction test was carried out on a soil whose grains have a specific gravity of 2.62. The mass and moisture content of the compacted soil were 1350g and 25% respectively. If the diameter of the mould was 100mm and height was 110mm, determine the following properties of the soil.
- i. Void ratio
 - ii. Dry density(ρ_d)
 - iii. Degree of saturation(S_r) (12 marks)
- b) Briefly explain any four factors that influence permeability of a soil. (8 marks)
3. a) what is soil compaction? (2 marks)
- b) With the aid of a sketch, define the following terms as used in soil compaction process:
- i. Optimum moisture content.
 - ii. Maximum dry density (6 marks)
- c) Briefly explain four factors that affect soil compaction. (12 marks)
4. a) Define soil structure. (1 mark)
- b) With sketches, briefly explain the four principal forms of soil structure. (8 marks)
- c) List any two soil classification systems used in soil classification (1 mark)
5. Describe briefly the origins of soils and summarize the factors which control their formation. (20 marks)