



MACHAKOS UNIVERSITY

University Examinations 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

SECOND YEAR SECOND SEMESTER EXAMINATION FOR DIPLOMA IN CIVIL ENGINEERING

BCECD 217: SOIL MECHANICS I

DATE: 5/6/2017

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
 - No mobile phones are allowed in the exam room
1. A sample of soil weighing 29.4 kg had a volume 0.0175m^3 . When dried out in an oven its weight was reduced to 24.6 kg. The specific gravity of the solids was found to be 2.62. 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. Describe briefly the origin of soils and summarize the factors which control their formation. (20 marks)
- 4 (a) Define soil structure. (2 marks)
- (b) With sketches, briefly explain the four principal forms of soil structure. (16 marks)
- (c) List any two soil classification systems used in soil classification. (2 marks)
5. (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)