

Day : Thursday  
Date : 09/05/2019

**S-2019-3057**

Time: 10.00 AM TO 01.00 PM  
Max. Marks: 80

**N.B.:**

- 1) **Q.No.1 and Q.No.5 are COMPULSORY.** Out of the remaining attempt **ANY TWO** questions from each section.
- 2) Answers to both the section should be written in **SEPARATE** answer books.
- 3) Use of non-programmable **CALCULATOR** is allowed.
- 4) Figures to the right indicate **FULL** marks.
- 5) Assume suitable data if necessary.

**SECTION – I**

- Q.1** a) Define the following terms: [05]  
i) Void ratio                      ii) Porosity                      iii) Degree of saturation  
iv) Percentage air voids          v) Air content
- b) Describe the procedure to determine specific gravity by density bottle method. [05]  
c) Describe Newmark Chart. [04]
- Q.2** a) Derive the following relation with usual notations  $w = G \cdot S \cdot e$ . [07]  
b) Define the following terms: [06]  
i) Water content                  ii) Specific gravity                  iii) Bulk density
- Q.3** a) Write the procedure to determine in-situ density of soil by core cutter method. [07]  
b) Sketch the grain size distribution curve for uniformly graded, well graded and gap graded soils and discuss their characteristics. [06]
- Q.4** a) Distinguish between Boussinesq's and Westergaard's theory of stress distribution in soil. [07]  
b) Explain types of soil structures with neat sketch. [06]

**SECTION – II**

- Q.5** a) Define coefficient of permeability and explain any one laboratory method. [05]  
b) Differentiate between compaction and consolidation. [05]  
c) Write advantages of Triaxial shear test as compared to Direct Shear Test [04]
- Q.6** a) A falling head permeability test to be performed on a soil sample whose permeability is estimated about  $3 \times 10^{-5}$  m/s. What diameter of stand pipe should be used? If head to drop from 27.5 to 20 cm in 5 min and if the cross sectional area and length of the sample are respectively 15 cm<sup>2</sup> and 8.5 cm. Will it take the same time to drop from 37.5 to 30 cm? [07]  
b) Explain the applications of flow net. [06]
- Q.7** a) In a standard proctor compaction test on a soil the following results were obtained [07]

Bulk density (kg/m <sup>3</sup> )	2070	2139	2187	2212	2228	2211	2193
Water content (%)	6.8	8.5	9.4	10.2	11.3	12.5	13.6

What is the OMC and MDD? If specific gravity of soil solids is 2.65, plot the zero air void line.

- b) What are the assumptions in Coulomb's Earth Pressure theory? [06]
- Q.8** a) A soil specimen having  $C = 86$  kN/m<sup>2</sup> and  $\phi = 30^\circ$  is tested in a Triaxial apparatus. Estimate a deviator stress at which sample will fail when cell pressure is 60 kN/m<sup>2</sup>. [07]  
b) What are the various drainage conditions in triaxial shear test? [06]