

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-III (NEW) - EXAMINATION – SUMMER 2017****Subject Code: 2130606****Date: 09/06/2017****Subject Name: Geotechnics & Applied Geology****Time: 10:30 AM to 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 Short Questions 14**
- 1 What is Alluvial soils?
  - 2 Define Specific Gravity of soils.
  - 3 Which soil is practically impermeable?
  - 4 What is the effective size of soil?
  - 5 In which type of soil honeycomb structure is observed.
  - 6 State the Darcy's law.
  - 7 Give the size of sand particles.
  - 8 What is capillary water?
  - 9 When slope of the deposit is less than  $10^\circ$ , the deposits are called\_\_\_\_\_.
  - 10 What is the thickness of mantle?
  - 11 Give the examples of colourless minerals.
  - 12 What is Aquifer?
  - 13 The smallest clay mineral is\_\_\_\_\_.
  - 14 Give the method for finding bulk density of cohesionless soils.
- Q.2 (a) Derive  $\gamma_d = \gamma_b/(1+w)$  03**
- (b) Sample of sandy soil has 33% porosity. Find density index if maximum and minimum dry unit weight of sample is respectively  $18 \text{ kN/m}^3$  and  $14 \text{ kN/m}^3$ . Take specific gravity of soil as 2.6. 04**
- (c) What is the scope of geotechnical engineering in the field of civil engineering? 07**
- OR**
- (c) With schematic diagram explain different types of soil structures. 07**
- Q.3 (a) Discuss the IS classification system. 03**
- (b) Soil sample has a liquid limit of 30%, plastic limit 17% and flow index of 13%. Water content of soil is 19%. Determine (i) Plasticity Index, (ii) Liquidity Index, (iii) Consistency Index, and (iv) Toughness Index. 04**
- (c) Explain Activity, Sensitivity and Thixotropy of soils. 07**
- OR**
- Q.3 (a) Define the following terms: (i) Gravitational Water (ii) Structural Water (iii) Adsorbed Water 03**
- (b) A soil sample of height 60 mm and cross sectional area of  $100 \text{ cm}^2$  was subjected to falling head permeability test. In a time interval of 6 minutes, the head dropped from 60 cm to 35 cm. If the cross sectional area of the stand pipe is  $2 \text{ cm}^2$ , compute the coefficient of permeability of the soil sample. If the same sample is subjected to a constant head of 20 cm, calculate the total quantity of water that will be collected after flowing through the sample. 04**
- (c) State and explain factors affecting permeability of soils. 07**
- Q.4 (a) Enlist the different causes of earthquakes. 03**
- (b) Define Weathering and discuss the process involved in chemical weathering. 04**

- (c) What is an earthquake? Describe the types of earthquake waves. **07**
- OR**
- Q.4** (a) Write short note on agents of metamorphism. **03**  
(b) Explain 'rock cycle'. **04**  
(c) Describe the applications of geology in civil engineering. **07**
- Q.5** (a) Define aquifer? How are they formed and classified? **03**  
(b) Explain permeability and porosity of rocks. **04**  
(c) Give the classification of faults based on apparent movements. **07**
- OR**
- Q.5** (a) What are landslides? How they are caused? **03**  
(b) What are the limitations of GIS. **04**  
(c) What is remote sensing? Explain the application of remote sensing in engineering geology. **07**

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