

**B.Tech. SEM -VI (Civil ) 2014 Course (CBCS) : SUMMER - 2019**  
**SUBJECT: GEOTECHNICAL ENGINEERING**

Day: Wednesday  
Date: 29/05/2019

S-2019-2717

Time: 02.30 PM TO 05.30 PM  
Max. Marks: 60

**N.B. :**

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Assume suitable data, if necessary.
- 4) Use non-programmable calculator is allowed.

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**Q.1** With usual notations, derive the following expression: **(10)**

$$\gamma = \frac{(G + S e)\gamma_w}{1 + e}$$
$$\gamma_d = \frac{G\gamma_w}{1 + e}$$

**OR**

**Q.1** Draw a typical plasticity chart for USCS & ISCS. Describe the classification of soil based on plasticity chart. **(10)**

**Q.2** What is a consistency limits of soil? Define liquid limit, plastic limit and shrinkage limit. How these limits are used to classify the soil? **(10)**

**OR**

**Q.2** Explain Sand Replacement method to determine the in situ density of soil. **(10)**

**Q.3** Explain the factors affecting permeability of soils with relations involved. **(10)**

**OR**

**Q.3** The following data were recorded in a constant head permeability test. **(10)**

Internal diameter of parameter	= 7.5 cm.
Head lost	= 24.7 cm.
Length of sample	= 18 cm.
Quantity of water collected in 60 sec	= 650 ml.
Porosity	= 44%

Calculate the coefficient of permeability, discharge velocity and superficial velocity. Also estimate the permeability of the soil for a porosity 39%.

**Q.4** Define compaction of soils & list out the various factors that influence the compaction of soil. Explain compaction curve also. **(10)**

**OR**

**Q.4** Derive the expression for vertical stress distribution at a point due to point load. Use usual notations. Draw a typical vertical stress distribution on horizontal and vertical plane. **(10)**

**P.T.O.**

**Q.5** Describe triaxial shear test with neat sketch and write its advantages, (10) disadvantages.

**OR**

**Q.5 a)** A series of shear box tests were conducted on a sample for the results (06) presented in below table, estimate the cohesion and angle of friction of soil.  
Shear box area =  $6 \times 6 = 36 \text{ cm}^2$

<b>Normal Load (N)</b>	70	160	250
<b>Shear Load (N)</b>	50	70	97

**b)** Write advantages and disadvantages of direct shear test. (04)

**Q.6 a)** Differentiate between active and passive earth pressure. (05)

**b)** State the assumptions made in Rankine's earth pressure theory. (05)

**OR**

**Q.6 a)** Explain Rebhan's graphical method of determining active lateral earth (05) pressure.

**b)** A retaining wall 5 m height with smooth backfill and a horizontal surface is (05) subjected to a surcharge is  $32 \text{ kN/m}^2$  uniformly. If unit weight of the backfill is  $18 \text{ kN/m}^3$ ,  $\phi = 30^\circ$  and  $C = 0$  find the active earth pressure and the point of application of the resistant pressure.

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