

**B.TECH. SEM -VI (CIVIL) 2014 COURSE (CBCS) : WINTER
- 2017**

SUBJECT: GEOTECHNICAL ENGINEERING

Day: Thursday
Date: 23/11/2017

Time: 10.00 AM TO 01.00 PM
Max. Marks: 60

W-2017-2185

N.B:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Assume suitable data if necessary.
- 4) Use of non-programmable **CALCULATOR** is allowed.
- 5) Draw neat labeled diagram **WHEREVER** necessary.

Q.1 a) Represent soil as three phase system and use it to derive relation between porosity and void ratio. **(06)**

b) Explain Sensitivity and Thixotropy of the clay soil. **(04)**

OR

a) Explain soil structure and mention the types, explain any one. **(04)**

b) A soil sample 5 N in wet condition and 4 N in dry condition, if its volume is found to be 320 ml then what is. **(06)**

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|------------------|--------------------------|
| i) Water content | ii) Dry density |
| iii) Void ratio | iv) Degree of saturation |

Q.2 a) Define the Liquid limit and Plastic limit of a soil. If for given soil natural water content is 28%, $W_L = 30%$, $I_f = 14%$ and $W_p = 18%$. Determine plasticity Index, Toughness Index and Liquidity Index. **(06)**

b) Define and explain Co-efficient of Curvature, effective size and Uniformity Co-efficient and state the value of C_u and C_c used to classify the soil. **(04)**

OR

a) State the different methods to determine field density of soil, Explain any one of them. **(06)**

b) Define the consistency of soils and show the four states of consistency graphically with appropriate consistency limits. **(04)**

Q.3 a) Describe permeability of stratified soil deposits. **(05)**

b) Explain properties of flow net. **(05)**

OR

a) A falling head permeameter accommodates a soil sample of 6 cm high and 50 cm² in cross sectional area. The permeability of the sample is expected to be 1×10^{-5} cm/sec. If it is desired that the head in the stand pipe should fall from 50 to 20 cm in 30 minutes. Determine the size of stand pipe. **(06)**

b) What are the factors affecting coefficient of permeability. **(04)**

P.T.O.

- Q.4** a) Explain the process of field compaction control using Proctor Needle. (05)
 b) Explain laboratory method of determination of compaction. (05)

OR

- a) What is compaction curve? Give its salient feature, what is zero void line. (05)
 b) What are the factors affecting the compaction, Explain any two. (05)
- Q.5** a) Describe Unconfined compression test for cohesive soil. (07)
 b) What are the drainage conditions to perform triaxial shear test? (03)

OR

- a) Sketch the stress strain relationship for dense and loose sand and explain it. (05)
 b) A shear box test carried out on a soil sample gave the following results. (05)

Test No.	Vertical Stress	Shear Stress
1	120	85
2	195	150
3	310	225

Determine the cohesion and angle of internal friction of soil.

- Q.6** a) A gravity retaining wall retains 12 m of a backfill of $\gamma = 18.7 \text{ kN/m}^3$, $\phi = 22^\circ$ (06)
 with a uniform horizontal surface. Assume the wall interface to be vertical, determine the magnitude and point of application of the total active earth pressure. If the water table is at a height of 4 m from top surface how far do the magnitude and the point of application of active pressure change?
 b) Describe the assumptions of Coulomb's wedge theory for determining active earth pressure. (04)

OR

- a) A retaining wall, 5 m high, retains a soil with (06)
 $C = 3 \text{ N/cm}^2$, $\phi = 31^\circ$ with $\gamma = 22 \text{ kN/m}^3$. Backfill is with horizontal surface levelled with the top of the wall, compute total active and passive earth pressure with neat sketch.
 b) How to compute active earth pressure for submerged backfill and uniform surcharge, in Rankine's theory. (04)

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