KERALA AGRICULTURAL UNIVERSITY
B. Tech. (Agrl. Engg.) 2022 & Previous Admissions
IV Semester Final Examination – July 2024

Lwre.2205   Soil Mechanics (2+1)   Marks: 50

Time: 2 hours

I   **Fill in the blanks**   (10x1=10)

1. If dry density of soil mass is 1.5 gram per cubic centimetre, the dry unit weight of soil is ………………... Kilo Newton per cubic metres.
2. Pycnometer is used to determine …………. of a soil sample.
3. Wet mechanical analysis is based on …………….. law.
4. The process opposite to consolidation is called ………………...
5. Degree of saturation for fully saturated soil is ………………..
6. Oedometer is used to measure ……………… of saturated clay-water system.
7. In active earth pressure, …………….. of backfill is responsible for movement of wall.
8. Velocity head has dimension of ………………..
9. If void ratio is 0.85, the ratio of seepage velocity to discharge velocity will be …………..
10. If void ratio is 0.7, the porosity will be …………..%.

II   **Write short notes on ANY FIVE of the following**   (5x2=10)

1. What is the difference between residual soil and transported soil?
2. What is submerged unit weight?
3. Under what condition, wet sieve analysis and dry sieve analysis is performed?
4. Write equations for uniformity coefficient and curvature coefficient of soil particles.
5. Write objectives of soil compaction?
6. What are the uses of flow net?
7. Write Laplace Equation for three dimensional steady flow for isotropic soil media.

III   **Answer ANY FIVE of the following**   (5x4=20)

1. Discuss Grain-Size Distribution Curve.
2. A sample of wet silty soil has a mass of 126 kg. The weight density, specific gravity and water content of the soil sample is 2.1 grams per cubic centimetre, 2.7 and 15% respectively. Determine void ratio and degree of saturation of this soil sample.
3. The laboratory tests on sample of soil having gave following results:

W_n =24%	W_l=62%	W_p=28%

where, w_n is natural moisture content of soil in undisturbed state; w_l is liquid limit and w_p is the plastic limit. Determine the plasticity and liquidity index. Discuss the consistency of soil based on your findings.
4. For a field pumping test, a well was sunk through a horizontal stratum of sand 14.5 thick and underlain by a clay stratum. Two observation wells were sunk at horizontal distances of 16 m and 34 m respectively from the pumping well. At a steady-state pumping rate of 1850 litres/min, the drawdowns in the observation wells were found to be 2.45 m and 1.20 m respectively. The initial position of the water table was 2.2 m below ground level. Calculate the coefficient of permeability of the sand.
5. Discuss active and passive earth pressure.
6. Discuss spring analogy of primary consolidation with well labeled diagram.
7. Discuss total vertical stress acting in the ground.

IV   **Write an essay on ANY ONE of the following**   **(1x10=10)**

1. Discuss Indian standard soil classification based on grain size distribution. Discuss the importance of wet mechanical analysis.
2. Discuss one -dimensional consolidation theory of Terzaghi. Also discuss the cases where Terzaghi theory is applicable.

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