R18

Code No: 155BN

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, March - 2021
GEOTECHNICAL ENGINEERING
(Civil Engineering)

Time: 3 Hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1.a) Define and distinguish the following in terms of their use in soil engineering:
i) Consistency index
ii) Relative Density
b) A soil has water content 10%, Specific gravity 2.7 and degree of saturation 35%. Find the void ratio, porosity, bulk unit weight and dry unit weight of soil. [8+7]

2.a) Discuss the importance of consistency limits.
b) A sieve analysis on a soil sample gave the following results:

Sieve size (mm)	4.75	2.0	0.84	0.42	0.25	0.15	0.075
% Finer	65	55	44	30	24	15	9

Sketch the grain size distribution curve and determine the % of sand fractions as per the IS nomenclature. Also determine effective size and uniformity coefficient. [7+8]

3.a) Discuss the constant head method to determine coefficient of permeability of soils.
b) Determine the average horizontal and vertical permeability of a soil mass made up of three horizontal strata. The thicknesses of each layer are 2m, 3m, and 2.5m and their respective coefficient of permeabilities are 2×10^{-3} mm/s, 4×10^{-3} mm/s, and 9×10^{-3} mm/s. [7+8]

4.a) Discuss the effective stress concept of Terzaghi and define (i) neutral stress and (ii) effective stress.
b) For a homogeneous earth dam having water head 26m, a flow net was constructed with four flow channels. The number of potential drops was 12. The dam has a horizontal filter at the base near the toe. The coefficient of permeability of the soil was 2×10^{-4} mm/s. Determine the anticipated seepage, if the length of the dam is 300m. Assume no tail water level at the downstream. [8+7]

5.a) Define pressure bulb. Discuss the variation of vertical stress due to point load along horizontal and vertical plane.
b) An annular circular raft has outer and inner diameters as 12m and 8m respectively. If the load intensity on the raft is 150 kPa, estimate the increase in vertical stress at a depth of 4m and 6m from the ground surface and exactly below the centre of the raft. [7+8]

6.a) Discuss the following: (i) Zero air void line, (ii) Degree of compaction.
b) Discuss the factors affecting compaction. [8+7]

7. Explain the following:
a) Primary consolidation settlement
b) Degree of consolidation
c) Compression index and
d) Double drainage system. [15]

8. Elaborate the following:
a) UU test
b) Critical void ratio and
c) Stress- strain curves for normally and over consolidated clays. [5+5+5]

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