BACHELOR OF TECHNOLOGY (C.B.C.S.) (2020 COURSE)
B.Tech.Sem - IV CIVIL : WINTER- 2022
SUBJECT : GEOMECHANICS

Day : Monday | Time : 02:30 PM-05:30 PM

Date : 28-11-2022 | **W-24373-2022** | 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 of Non programmable of **CALCULATOR** is allowed.

Q.1 a) For a saturated soil whose water content w= 35% and specific gravity G = 2.65 Determine saturated and dry unit weight of soil. **04**

b) Derive the relationship for unit weight of partially saturated soil in terms of void ratio, Degree of Saturation, Unit weight of water and Specific gravity of soil **06**

OR

Q.1 a) The field density of a non-cohesive backfill was found to be 16kN/m^3 at a water content of 8%. If void ratio in the loosest and densest state found out 0.85 and 0.45. Determine the density index. **04**

b) Explain step by step procedure to classify fine grained soil as per Unified soil Classification system. **06**

Q.2 a) An oven dried soil having a mass 210gm is placed in pycnometer which then completely filled with water. The total mass of pycnometer with water and soil inside is 1650gm. The pycnometer filled with water alone has a mass of 1505gm. Calculate the specific gravity of soil. **04**

b) With the help of Particle size distribution curve explain, **06**
(i) Gap Graded soil
(ii) Uniformly Graded soil
(iii) Well Graded soil

OR

Q.2 a) Define (i) Consistency index (ii) Toughness index **04**

b) The in-situ density of an embankment at a water content of 15% was determined with the help of core cutter. The empty mass of core cutter was 1304gm and the core cutter full of soil has a mass of 3214gm, the volume of core cutter is 1000cm^3. Determine the bulk density, dry density and Degree of Saturation of the embankment. **06**

Q.3 a) State various factors that affect the coefficient of permeability. Discuss in details. **04**

b) Calculate the horizontal and vertical permeability of soil deposits consisting of three layers 120cm, 200cm, 100cm thick with permeability 1.2×10^{-3} m/sec, 2×10^{-4} m/sec and 6×10^{-5} m/sec respectively. **06**

OR

Q.3 a) A stratum, consisting of fine sand. Under what head of water, flowing in an upward direction will a quick sand condition develop? Take Specific Gravity of soil G = 2.7 and void ratio e =0.65 **04**

b) Explain Characteristics and uses of flow net. **06**

Q.4 a) State the assumptions made in Westergard's analysis in stress distribution. **04**

b) Enlist the field method of compaction. Explain suitability of various compaction equipment **06**

OR

Q. 4 a) Differentiate between standard and modified proctor test. **04**

b) A concentrated load of 20kN acts on the ground surface. Calculate the stress intensity at a depth of 10m and horizontal distance of 5.5m from the loading axis. Use Boussinesq's equation **06**

P.T.O.

Q.5	a)	For a sandy soil, the angle of internal friction is 30°. If the major principal stress is 50 kN/m^2 at failure. Calculate the corresponding minor principal stress.	04
	b)	Mention the soil type for which confined compression test give good results. Draw the Mohr's circle for this test and show all details.	06

OR

Q.5	a)	Define the terms neutral stress, total stress and effective stress. State their relationship.	04
	b)	State and explain factors affecting shear strength for cohesive and cohesionless soil.	06

Q.6		What are different types of earth pressure? State the assumptions made in the Rankine's earth pressure theory. Also explain its limitations.	10

OR

Q.6	a)	Determine the critical height of excavation of a vertical cut in a cohesive soil if C= 25 kN/m^2 and bulk unit weight of soil = 18kN/m^3.	04
	b)	Calculate active and passive earth pressure at a depth of 10m dry cohesionless soil with an angle of internal friction of 35° and unit weight of soil 16.5 kN/m^3	06

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