

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2025

B Tech - IVth Semester (CE)

COURSE CODE (CREDITS): 18B11CE411

MAX. MARKS: 15

COURSE NAME: Geotechnical Engineering

COURSE INSTRUCTORS: Saurabh Rawat

MAX. TIME: 1 Hour

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems

Q No	Question	CO	Marks												
Q1	Justify the statements with reasons: a) 'Clays containing montmorillonite show high volume expansion and shrinkage.' b) 'Clay - water interaction results in a flocculated structure.'	1	1 + 1 = 2												
Q2	Earth is required to be excavated from borrow pits for building an embankment. The wet unit weight of undisturbed soil is 18 kN/m^3 and its water content is 8%. To build a 4 m high embankment with top width 2m and side slopes 1:1, estimate the quantity of earth required to be excavated per meter length of embankment. If the required dry unit weight of the embankment is 15 kN/m^3 , moisture content is 10% with $G = 2.67$, then determine the void ratio (e) and degree of saturation (S) of soil in both the pit and embankment.	1, 2	3+1+1 = 5												
Q3	Derive the expression for Relative Density (R_D) in terms of Dry Unit Weight (γ_d).	2	2												
Q4	Five different particle sizes are mixed in proportion shown below and water is added to make a soil suspension of volume of 1000 cc. <table border="1"><thead><tr><th>Particle size (mm)</th><th>Weight of solids (g)</th></tr></thead><tbody><tr><td>0.060</td><td>5</td></tr><tr><td>0.020</td><td>15</td></tr><tr><td>0.010</td><td>20</td></tr><tr><td>0.005</td><td>4</td></tr><tr><td>0.001</td><td>6</td></tr></tbody></table> <p>The particles have $G = 2.65$ and viscosity of water = 0.00895 poise. The suspension was thoroughly shaken, and sedimentation was allowed. Determine:</p> <p>a) The largest size present at a depth of 10 cm after 8 minutes from the start of the sedimentation?</p> <p>b) The specific gravity of the soil suspension at a depth of 10 cm after 8 minutes from the start of the sedimentation?</p> <p>c) The time (in mins.) taken by all the particles to settle down after the start of the sedimentation below the depth of 10 cm.</p>	Particle size (mm)	Weight of solids (g)	0.060	5	0.020	15	0.010	20	0.005	4	0.001	6	1, 2	2+3+1 = 6
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