JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2024

B.Tech - V Semester (CE)

COURSE CODE (CREDITS): 18B11CE514 (3) MAX. MARKS: 35

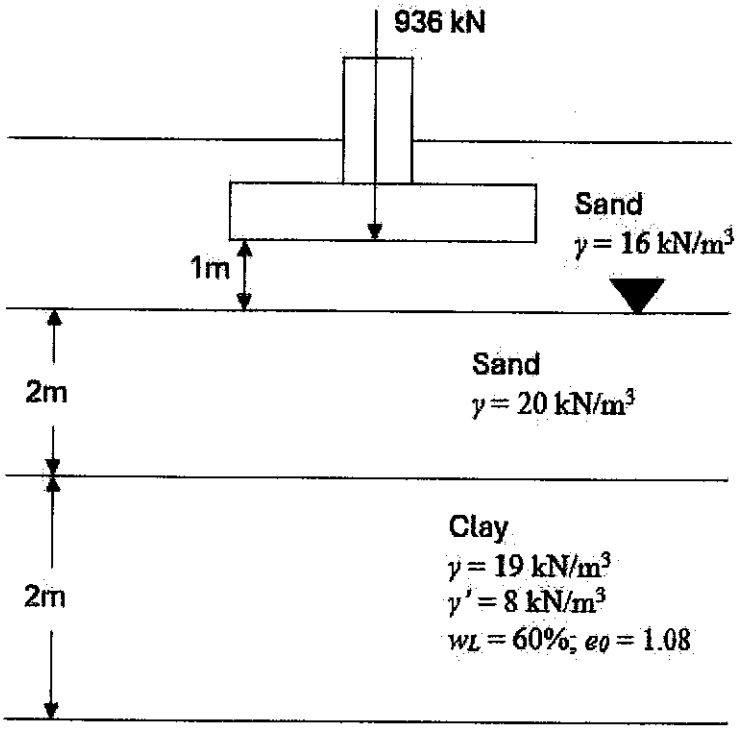
COURSE NAME: Foundation Engineering

COURSE INSTRUCTORS: Saurabh Rawat MAX. TIME: 2 Hours

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	A concrete pile, 30 cm diameter, is driven into a medium dense sand (φ = 35°; γ = 21 kN/m^3; K = 1.0; $tan\delta$ = 0.70) for a depth of 8 m. Given for φ = 35°, D_c/B = 12.0 and Nq = 60. Estimate the safe load, taking Factor of Safety of 2.50.	CO4	**5**
Q2	A precast concrete pile (35 cm × 35 cm) is driven along with the dolly by a single acting steam hammer. Estimate the allowable load using Hiley's Formula. Use the following data: i) Weight of hammer — 35 kN ii) Efficiency of hammer — 80% iii) No. of blows for last 25.4 mm — 6 iv) Maximum rated energy — 3500 kN-cm v) Elastic compression of pile, pile components and adjacent soil (C) — 0.0018 Q_u vi) Weight of pile cap — 3 kN vii) Length of pile — 25 viii) Unit weight of concrete — 24 kN/m^3 ix) Coefficient of restitution — 0.5	CO5	**6**
Q3	Answer the following with respect to Plate load test (PLT). **a)** With the help of a labelled line diagram, describe the PLT set – up. **b)** What are the parameters that can be obtained using PLT. **c)** Give the IS code for PLT. **d)** What are the codal norms for pit depth and pit width in PLT. **e)** Give the available plate sizes used in PLT.	CO3 CO4	**[2+1+1 +1+1+3 +3 = 12]**

	f) Give the step-wise procedure for carrying out the PLT and the observed load – settlement curves for different soils. Also mark the type of failure that can be deduced from the curves. g) Explain how the ultimate bearing capacity of cohesionless soils can be obtained using PLT results.		
Q4	A square footing has dimensions of 2m × 2m and a depth of 2m. Determine its ultimate bearing capacity in pure clay having an unconfined compressive strength of 150 kN/m^2 and γ = 16.67 kN/m^3. Assume Terzaghi's bearing capacity equation with $Nc = 5.7$; $Nq = 1$ and $N\gamma = 0$.	CO1 CO2	**3**
Q5	Determine the consolidation settlement of the footing as shown below  	CO2 CO3	**3**
Q6	Nine piles of 300 mm diameter and 8 m length are arranged in a square pattern on a uniform deposit of medium stiff clay having an undrained compressive strength of 100 kN/m^2. If the center-to-center spacing of piles is 900 mm and adhesion factor = 0.9, calculate the capacity of the pile group assuming a factor of safety of 2.5	CO4 CO5	**3**
Q7	Derive the relationship for ultimate load carrying capacity (Q_{up}) of a double under reamed pile in expansive clay.	CO5	**3**