JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST-3 EXAMINATION- JUNE -2016

B.Tech VI Semester

COURSE CODE: 10B11CE612   MAX. MARKS: 35

COURSE NAME: Foundation Engineering

COURSE CREDITS: 04   MAX. TIME: 2 HRS

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Assume necessary data wherever required as per IS code.
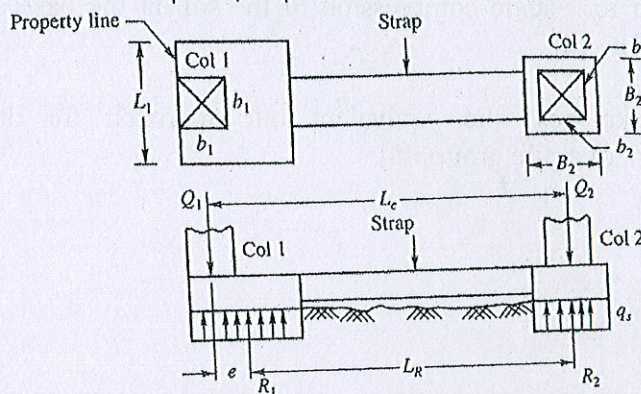
1. The following information is given for proportioning a cantilever footing with reference to the figure given below.
   Column Loads: $Q_1 = 1455$ kN, $Q_2 = 1500$ kN
   Size of column: 0.5×0.5 m
   $L_c = 6.2$ m; $q_s = 384$ kN/m^2
   It is required to determine the size of the footing for Columns 1 and 2. [5]

2. A raft foundation has to be supported by a group of concrete piles. The gross load to be carried by the pile group is 250 t, inclusive of the weight of the pile cap. The subsoil consists of a 25 m thick stratum of normally consolidated clay having an unconfined compressive strength of 4.8 t/m^2 and an effective unit weight of 0.9 t/m^3. Design the pile group with a factor of safety of 3 against shear failure. [5]

3. (a) A square footing is required to carry a net load of 1200 kN. The depth of the foundation is 2 m and the tolerable settlement is 40 mm. The soil is sandy with N=12. Taking the factor of safety as 3, determine the size of the footing using Teng's method. Assume water table to be very deep. [3]

   (b) Briefly explain the phenomenon of negative skin friction. [2]

4. Determine the safe load that can be carried by a pile having gross weight of 1.5 t, using the modified Hiley's formula. Given

Weight of hammer = 2.0 t
Height of free fall = 91 cm
Hammer efficiency = 75%
Average penetration under the last 5 blows = 10 mm
Length of pile = 22 m
Diameter of pile = 300 mm
Co – efficient of restitution = 0.55   [5]

5. A concrete pile 45 cm in diameter and 15 m long driven into a homogeneous mass of clay soil of medium consistency. The water table is at ground surface. The unit cohesion of the soil under undrained condition is 50 kN/m^2 and the average unit weight of the soil is 18 kN/m^3. Take adhesion factor α = 0.75. Use λ – method to determine the skin friction. Compute Q_u and Q_a with FOS = 2.5. [5]

6.(a) Derive the expression for maximum and minimum base pressure for eccentrically loaded footings. [3]

   (b) Derive the expression for elastic compression of the soil at the base of the pile from cyclic pile test approach. [2]

7. Explain (with neat sketches) the equivalent raft approach for determination of consolidation settlement of a pile group. [5]