

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST-3 EXAMINATION- MAY 2019

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.*

1. A strip footing 1 m wide at its base is located at a depth of 0.8 m below the ground level. The properties of soil are  $\gamma=18 \text{ kN/m}^3$ ,  $c=30 \text{ kN/m}^3$  and  $\phi=20^\circ$ . Determine the safe bearing capacity with a factor of safety of 3 using Terzaghi's analysis. What will be the change in bearing capacity if water table rises to the base of the footing. Take  $\gamma_{\text{sat}}=19.5 \text{ kN/m}^3$  [6]
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  $4.8 \text{ t/m}^2$  and an effective unit weight of  $0.9 \text{ t/m}^3$ . Design the pile group with a factor of safety of 3 against shear failure. Assume a suitable square pile group formation with 400 mm diameter. Take  $\alpha=0.9$ . [6]
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) A square pile group passes through a recently filled up soil of 3 m depth. The diameter of the pile is 30 cm and they are spaced 90 cm apart. If the soil is cohesive has  $q_u=60 \text{ kN/m}^2$  and  $\gamma=15 \text{ kN/m}^3$ , compute the negative frictional load on the pile group. [3]
4. A square group of bored piles with three piles on each row having diameter of 0.3 m and spacing 60 cm and length 3 m are driven in a firm clay of depth 10 m deep. The clay properties are  $C_c=0.3$ ,  $\gamma=17 \text{ kN/m}^3$  and initial void ratio=0.5. Assume water table 1 m below the ground level. Find the consolidation settlement of the pile group for a column load of 400 kN. [5]
5. Write short notes on the following:
  - (a) Under-reamed piles
  - (b) Cyclic Pile Load Test
  - (c) Cone Penetration Test[4x3=12]