BICEE-022

B.Tech. CIVIL ENGINEERING (BTCLEVI)

Term-End Examination

December, 2015

BICEE-022 : ADVANCED DESIGN OF FOUNDATION

Time : 3 hours   *Maximum Marks : 70*

*Note : Attempt any **five** questions. All questions carry equal marks. Use of scientific calculator is permitted. Assume suitable data, if any.*

1. Describe with sketches the equation of deflections for uniform straight beams on elastic foundation. *14*

2. (a) Explain the term "Damping" and give the characteristics of different types of damping. *7*

   (b) Determine the natural frequency of a machine foundation of base area 2 m × 2 m and weight 150 kN, assuming that the soil mass participating in the vibration is 20% of the weight of foundation.

   Take $C_u = 36,000$ kN/m^3. *7*

3. Discuss the method for the design of a Circular Cellular Coffer dam on rock. *14*

4. Describe the various classifications of bulkhead and their uses. *14*

5. (a) Describe the factors affecting the ultimate bearing capacity of soils.

   (b) A column carries a load of 1000 kN. The soil is a dry sand weighing 19 kN/m^3 and having an angle of internal friction of 40°. A minimum factor of safety of 2·5 is required and Terzaghi factors are required to be used. ($N_\gamma = 42$ and $N_q = 21$)

      (i) Find the size of a square footing, if placed at the ground surface; and,

      (ii) Find the size of a square footing required, if it is placed at 1 m below ground surface with water table at ground surface.

      Assume $\gamma_{sat} = 21$ kN/m^3. *14*

6. What is Modulus of Subgrade Reaction ? Explain modulus of subgrade reaction mentioning Winkler's model. What are the advantages and disadvantages of Winkler's model ? *14*

7. (a) What is 'contact pressure' ? How does it depend on the type of structure and soil ?   7

   (b) What is 'active zone' in soil ? Explain it with reference to the pressure bulb concept.   7

8. (a) What are the aspects for the construction of foundations for off-shore structures ?   7

   (b) Describe the general principles of design of a shell foundation.   7