No. of Printed Pages : **4 + Drawing Sheet** **BICEE-022**

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B.TECH. CIVIL ENGINEERING (BTCLEVI)

Term-End Examination

June, 2013

BICEE-022 : ADVANCED DESIGN OF FOUNDATION

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt **any seven** questions. All questions **equal** marks.*

1. (a) Give the salient features of Winkler two parameter model with special reference to Filonenko-Borodich model. 5

   (b) Illustrate with suitable sketches the contact pressure diagram for distribution of pressure beneath a rigid footing of a column loaded uniformly and concentrically resting on : 5

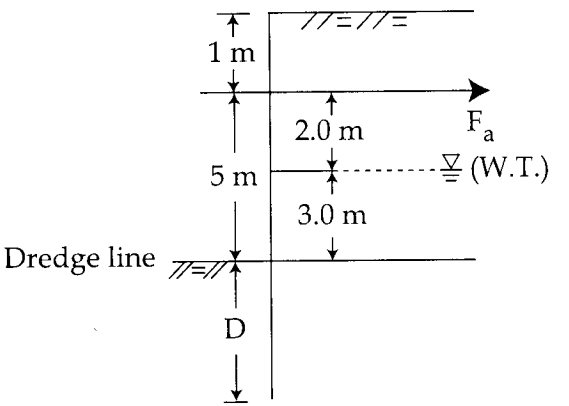
   (i) Cohesionless Soil

   (ii) Cohesive Soil and

   (iii) C-ϕ Soil.

2. (a) Give the different classifications of sheet piles based on types and uses with suitable sketches. 5

(b) Compute the embedment length and the pull in the anchor rod for the sheet pile structure shown in Fig. below. The soil of the backfill and that below the dredge line is the same, having following properties : $\phi' = 30^o$, $c = 0$; $\gamma_{sat} = 20 kN/m^3$, $\gamma = 18 kN/m^3$, use free Earth support method. 5



3. (a) Based on Winkler's model give the classical solution of beams of infinite length subjected to central concentrated load. Use Modulus of sub-grade reaction approach. 5

(b) Design a strip footing to carry a load of 750 kN/m at a depth of 1.6m in a $C - \phi$ soil having a unit weight of $18 kN/m^3$ and shear strength parameters as $c = 20 kN/m^2$ and $\phi = 25^o$. Determine the width of footing, using a factors of safety of 3 against shear failure. Use Terzaghi's equations. 5
(For $\phi = 25^o$, $N_c = 25.1$, $N_q = 12.7$ and $N_r = 9.7$)

4. (a) Illustrate with suitable sketches different types of Coffer dams. 5

(b) Describe the various uses of Coffer dams. Give sketches wherever required. 5

5. (a) Derive an expression for determination of natural frequency of a mass spring system of vibration having single degree of freedom. 5

(b) Assuming resonance to have occured at the frequency of 22 cycles/second in a vertical vibration of a testblock 1.0x1.0x1.0m size, determine the coefficient of elastic Uniform Compression of soil. The weight of oscillator is 62 kg and the force produced by it at 12 cycles/seconds is 100 kg. Also compute the maximum amplitude in vertical direction at 12 cycles/seconds. 5

6. (a) How P-wave and S-wave velocities are measured in field ? Describe in detail. 5

(b) Give the Barkan's formula for determining the natural frequency and amplitude of vibration of a machine foundation. 5

7. (a) Describe the various types of shell foundations. 5

(b) Give the general principles of design of a shell foundation. 5

8. (a) Discuss the structural form and efficiency of a shell foundation Vis-a-Vis raft foundation. 5

(b) Describe the special features which are considered in the design of foundation for a transmission line towers. 5

9. (a) What forces are required to be considered at the time of designing the foundation of a gravity retaining wall. 5

(b) Explain briefly the design considerations for designing the foundation of Jack-up type structures. 5

10. (a) Explain the following terms briefly. 2.5x2=5

(i) Resonance frequency

(ii) Limiting amplitudes of vibrations for design of machine foundation as per I.S.2974, Part - I-1964.

(b) Write assumptions made in I.S.Code of practice for the design of foundation for Impact type machines. 5

(I.S.2974 Part-II, 1966).