Code No: RR420101 **Set No. 1**

IV B.Tech II Semester Supplementary Examinations, June 2007
ADVANCED FOUNDATION ENGINEERING
(Civil Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) List the type of foundations which are subjected by eccentric inclined loads. Explain in detail the procedures of analyzing such foundations.
   (b) A square footing has to carry a gross allowable load of 200 kN. The depth of foundation is 1.0m. The properties of soil are: c= 0, $\emptyset = 30^0$, $\gamma = 18kN/m^3$. The load is inclined at an angle of 20^0 to the vertical. Determine the width of the footing by taking F.S= 3.0. For $\emptyset = 30^0$, N_q= 18.4, N_γ= 22.4. [8+8]

2. Discuss the various methods of estimating the settlement of footings embedded in different soils of finite thickness. [16]

3. (a) Discuss the settlement of a pile group in sand with the help of settlement of an individual test pile data.
   (b) Discuss the settlement of pile groups in cohesive soils. [8+8]

4. (a) What is downward drag force? How to determine the downward drag force of piles?
   (b) A bored pile with enlarged base is to be installed in a stiff clay, the undrained shear strength at base level being 220 kN/m^2. The saturated unit weight of the clay is 21 kN/m^3. The diameters of the pile shaft and base are 1.0m and 3.0m respectively. The pile extends from a depth of 4m to a depth of 22m, the top of the under-ream being at a depth of 20m. Past experience indicates that a skin friction coefficient of 0.70 is appropriate for the clay. Compute the allowable load on the pile to ensure
      i. an overall load factor of 2, and
      ii. a load factor of 3 under the base, when shaft resistance is fully mobilized. [6+10]

5. (a) Discuss the problems associated with well sinking.
   (b) Describe the component parts of a Pneumatic Caisson with a neat sketch. [8+8]

6. Describe the methods of designing anchored bulkheads by
   (a) Equivalent beam method and
   (b) Fixed earth support method [16]

7. Discuss the various laboratory methods of determining the swelling pressure and swelling potential of expansive soils. [16]

8. (a) Explain briefly various methods that are to be used to improve the expansive soils for foundations.
   (b) Discuss the properties of CNS layer material. [8+8]

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Code No: RR420101 **Set No. 2**

IV B.Tech II Semester Supplementary Examinations, June 2007
ADVANCED FOUNDATION ENGINEERING
(Civil Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain how to estimate the bearing capacity of shallow foundation when it is subjected to
   i. Eccentric loads and
   ii. Inclined loads
   (b) A square footing has to carry a gross allowable load of 155 kN. The depth of foundation is 0.7m. The properties of the soil are: c= 0, $\emptyset$= 30^0, γ= 18 kN/m^3. The load is inclined at an angle of 20^0 to the vertical. Determine the width of footing by taking F.S= 3.0. For $\emptyset$= 30^0, N_q= 18.4, N_γ= 22.4. [8+8]

2. (a) Discuss the estimation of settlement of footing embedded in sand by Schmertmann's method.
   (b) Determine the settlement of a 10 m square area loaded at 100 kN/m^2, placed at 1 m below the ground level in a bed of sand. Ground water level is just below the footing. The SPT values are as follows.

Depth	Average SPT
1m to 5m	20
5m to 10m	25
10m to 20m	30

[8+8]

3. (a) Discuss the elastic settlement of pile groups in sandy soils.
   (b) What inputs are required for the estimation of settlement of a group of friction piles in clay? Mention the assumptions made. [8+8]

4. Discuss in detail negative skin friction in piles and under-reamed piles. [16]

5. (a) Discuss the problems associated with well sinking.
   (b) Describe the component parts of a Pneumatic Caisson with a neat sketch. [8+8]

6. Determine the depth of embankment and the force in the tie rod of the anchored bulkhead shown in Figure 1. The backfill and the soil below the dredge line is sand, having the following properties: G=2.6, e=1.0 and $\emptyset$=30^0. Use the free earth support method. [16]

7. (a) Explain how expansive soils are formed in nature and discuss the structure of montmorillonite clay mineral

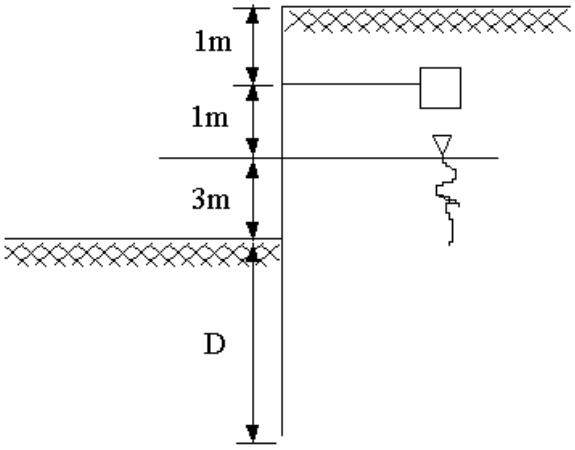

Figure 1:

(b) Explain the clay mineral identification by various methods. [8+8]

8. Discuss the various foundation practices used in expansive soils. [16]

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Code No: RR420101 **Set No. 3**

IV B.Tech II Semester Supplementary Examinations, June 2007
ADVANCED FOUNDATION ENGINEERING
(Civil Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Discuss critically and in a comparative manner, the bearing capacity theories of Terzaghi and Meyerhof with special reference to
   i. the suitability of the theories to different foundation conditions
   ii. the rupture surfaces and the failure planes
   iii. the assumptions made
   iv. the bearing capacity equations and the charts provided and
   v. the procedure to find the bearing capacity of soils.

   (b) What is the ultimate load carrying capacity of a square footing of size 2.0m×2.0m with an eccentricity of 0.4 m? The depth of the footing is 0.6m. The soil properties are: γ= 20 kN/m^3, c= 12 kN/m^2 and $\emptyset$= 30^0. For $\emptyset$= 30^0, N$_c$= 30, N$_q$= 18 and Nγ= 15. [10+6]

2. (a) Write brief critical note on 'settlement of foundations' resting on different soils.
   (b) How to proportion the footings for equal settlements. [10+6]

3. (a) How to determine the settlement of single pile with the help of pile load test? Discuss.
   (b) Discuss the estimation of settlement of pile groups in cohesionless soils using Skempton and Meyerhof's methods. [8+8]

4. (a) What is downward drag force? How to determine the downward drag force of piles?
   (b) A bored pile with enlarged base is to be installed in a stiff clay, the undrained shear strength at base level being 220 kN/m^2. The saturated unit weight of the clay is 21 kN/m^3. The diameters of the pile shaft and base are 1.0m and 3.0m respectively. The pile extends from a depth of 4m to a depth of 22m, the top of the under-ream being at a depth of 20m. Past experience indicates that a skin friction coefficient of 0.70 is appropriate for the clay. Compute the allowable load on the pile to ensure
      i. an overall load factor of 2, and
      ii. a load factor of 3 under the base, when shaft resistance is fully mobilized. [6+10]

5. (a) Discuss the various forces acting on a well foundation.
   (b) Explain the process of sinking of an open well. [8+8]

6. (a) What are the differences between the anchored sheet pile wall with 'free-earth support' and the anchored sheet pile wall with 'fixed-earth support'?

   (b) The height of a cantilever sheet pile from the top of the dredge level is 8 m. The water level in the backfill is 2 m from the top. The soil above the water table can be assumed to be dry. The saturated unit weight of the soil is 20 kN/m^3 and the dry unit weight is 17.6 kN/m^3. The specific gravity of soil particles is 2.70. The coefficients of active and passive earth pressures are 0.33 and 3 respectively. Calculate the depth of penetration for a factor of safety of 1.0. [8+8]

7. Discuss in detail various methods of identifying the expansive soils. [16]

8. (a) Explain briefly various methods that are to be used to improve the expansive soils for foundations.

   (b) Discuss the properties of CNS layer material. [8+8]

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Code No: RR420101 **Set No. 4**

IV B.Tech II Semester Supplementary Examinations, June 2007
ADVANCED FOUNDATION ENGINEERING
(Civil Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) How would you determine the contact pressure for a footing subjected to loads placed eccentrically placed?
   (b) Compute the ultimate load that an eccentrically loaded square footing of width 2.1m with an eccentricity of 0.35m can take at a depth of 0.5m in a soil with γ= 18 kN/m^3, c= 9 kN/m^2, $\emptyset$= 36^0, N$_c$= 52, N$_q$= 35 and N$_\gamma$= 42. [8+8]

2. Discuss the various methods of estimating the settlement of footings embedded in different soils of finite thickness. [16]

3. (a) Discuss the settlement of a pile group in sand with the help of settlement of an individual test pile data.
   (b) Discuss the settlement of pile groups in cohesive soils. [8+8]

4. (a) Write a note on multi under-reamed pile.
   (b) A square pile group of 9 piles passes through a recently filled up soil. The depth of fill =3m. The diameter of pile is 300 mm and they are spaced at 90cm apart. If the soil is cohesive with q$_u$ = $60kN/m^2$, γ = $15kN/m^3$, compute the negative skin frictional load on the pile group. [8+8]

5. (a) Discuss the various forces acting on a well foundation?
   (b) A circular well foundation of 5m external diameter and steining thickness of 1 m is used as a foundation for a bridge pier in a sandy stratum. The submerged unit weight of sand is 10 kN/m^3 and angle of shearing resistance is 36^0. The well is subjected to a horizontal force of 500 kN and a total moment of 4500 kNm at the scour level. The depth of well below scour level is 12 m, Assuming the well be light, check the lateral stability of the well. [8+8]

6. (a) Distinguish between free-earth support method and fixed-earth support method.
   (b) A cantilever sheet pile is to be constructed to retain sandy soil to a depth of 6 m. The dry unit weight of sand is 16 kN/m^3 and the saturated unit weight is 20 kN/m^3. The angle of shearing resistance of sand is 32^0. The water level is 3 m above the dredge line. Compute the depth of embedment of the sheet pile. [4+12]

7. (a) Define swell potential? How do you correlate the swelling potential of clay soils with activity and percent of clay fraction?
   (b) Discuss the swelling characteristics of compacted expansive soils. [8+8]

8. (a) Discuss the principle and functioning of under-reamed piles with a neat sketch.
   (b) Explain the construction procedure and function of granular piles. [8+8]

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