Code No: R05410107 **R05** **Set No. 2**

IV B.Tech I Semester Examinations,November 2010
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 the design of foundation when a dense stratum overlie a loose one.
   (b) A footing 2m × 2m has to carry an axial load of 600 kN with M_x = 180 kN.m and M_y = 60 kN.m. The soil has c = 15 kN/m^2, $\phi = 25^0$ and γ = 20 kN/m^3. The depth of foundation is 1.5 m. Find the safety of the footing, if the ground water level can be assumed to rise up to the foundation level. [6+10]

2. (a) How do you estimate the settlement of a footing on clay using Janbu's method?
   (b) A rectangular footing 2m × 3m carries a column load of 600 kN at a depth of 1 m. The footing rests on c-ϕ soil strata of 6 m thick having Poisson's ratio of 0.25 and modulus of elasticity as 20000 kN/m^2. Calculate the immediate elastic settlement of the footing. Influence factor = 1.06. [8+8]

3. (a) What are the various problems associated with expansive soils in Civil Engineering.
   (b) When are the uses of under-reamed piles? Analyse a typical under-reamed pile and give the various design implications. [16]

4. The pressure surface of a retaining wall slopes up and away from the backfill with a batter of 1 in 10. The backfill is a non-cohesive soil with a density of 19.2 kN/m^3 and angle of internal friction 35^0. The angle of surcharge is 4^0, the angle of wall friction is estimated to be 20^0, and the vertical height of the wall is 12 m. Compute the maximum active thrust on the wall. [16]

5. (a) Explain the Reese and Matlock's approach for laterally loaded piles analysis.
   (b) A 200 mm diameter, 5 m long piles are used as foundations for a column carrying 500 kN in a uniform deposit of normally consolidated clay having γ_{sat} = 19 kN/m^3, liquid limit 40%, void ratio 1.05. There are nine piles in the group arranged in a square pattern with centre to centre spacing 500 mm. Hard stratum exists at a depth of 7 m. Estimate the settlement of a pile group. [8+8]

6. A circular well of 5 m external diameter and steining thickness 1 m is used as 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, ϕ is 30^0. The well is subjected to a horizontal force of 50 tones and a total moment of 500 t - m at the scour level. The depth of well below scour level is 12 m. Assuming the well to be a heavy well, calculate the total horizontal equivalent resisting force the well can resist: Further, what will be the change in value, if the maximum scour level is subjected to a surcharge equivalent to 2 m height of soil. [16]

7. (a) Classify the piles based on the material and use.
   (b) A group of 9 piles, 12 m long and 250 mm in diameter is to be arranged in a square pattern in clayey soil with an average unconfined compressive strength of 60 kN/m^2. Work out the spacing of piles for a group efficiency factor 1.0. Neglect the bearing at the tip of the piles. [8+8]

8. The height of a cantilever sheet pile from the top of the dredge level is 9m. The water level in the backfill is at 2m from top. Find the depth of penetration required for a factor of safety equal to 1. Assume that above the water table, the soil is dry. The other properties of soil are: γ_{sat} = 20 kN/m^3, K_A =0.33, K_p = 3.0, G_s=2.6. [16]

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Code No: R05410107 **R05** **Set No. 4**

IV B.Tech I Semester Examinations,November 2010
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. The height of a cantilever sheet pile from the top of the dredge level is 9m. The water level in the backfill is at 2m from top. Find the depth of penetration required for a factor of safety equal to 1. Assume that above the water table, the soil is dry. The other properties of soil are: γ_{sat} = 20 kN/m^3, K_A =0.33, K_p = 3.0, G_s=2.6. [16]

2. (a) Classify the piles based on the material and use.
   (b) A group of 9 piles, 12 m long and 250 mm in diameter is to be arranged in a square pattern in clayey soil with an average unconfined compressive strength of 60 kN/m^2. Work out the spacing of piles for a group efficiency factor 1.0. Neglect the bearing at the tip of the piles. [8+8]

3. (a) How do you estimate the settlement of a footing on clay using Janbu's method?
   (b) A rectangular footing 2m × 3m carries a column load of 600 kN at a depth of 1 m. The footing rests on c-ϕ soil strata of 6 m thick having Poisson's ratio of 0.25 and modulus of elasticity as 20000 kN/m^2. Calculate the immediate elastic settlement of the footing. Influence factor = 1.06. [8+8]

4. (a) Explain the design of foundation when a dense stratum overlie a loose one.
   (b) A footing 2m × 2m has to carry an axial load of 600 kN with M_x = 180 kN.m and M_y = 60 kN.m. The soil has c = 15 kN/m^2, $\phi = 25^0$ and γ = 20 kN/m^3. The depth of foundation is 1.5 m. Find the safety of the footing, if the ground water level can be assumed to rise up to the foundation level. [6+10]

5. (a) Explain the Reese and Matlock's approach for laterally loaded piles analysis.
   (b) A 200 mm diameter, 5 m long piles are used as foundations for a column carrying 500 kN in a uniform deposit of normally consolidated clay having γ_{sat} = 19 kN/m^3, liquid limit 40%, void ratio 1.05. There are nine piles in the group arranged in a square pattern with centre to centre spacing 500 mm. Hard stratum exists at a depth of 7 m. Estimate the settlement of a pile group. [8+8]

6. A circular well of 5 m external diameter and steining thickness 1 m is used as 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, ϕ is 30^0. The well is subjected to a horizontal force of 50 tones and a total moment of 500 t - m at the scour level. The depth of well below scour level is 12 m. Assuming the well to be a heavy well, calculate the total horizontal equivalent resisting force the well can resist: Further,

what will be the change in value, if the maximum scour level is subjected to a surcharge equivalent to 2 m height of soil. [16]

7. (a) What are the various problems associated with expansive soils in Civil Engineering.

   (b) When are the uses of under-reamed piles? Analyse a typical under-reamed pile and give the various design implications. [16]

8. The pressure surface of a retaining wall slopes up and away from the backfill with a batter of 1 in 10. The backfill is a non-cohesive soil with a density of 19.2 kN/m^3 and angle of internal friction 35^0. The angle of surcharge is 4^0, the angle of wall friction is estimated to be 20^0, and the vertical height of the wall is 12 m. Compute the maximum active thrust on the wall. [16]

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Code No: R05410107 **R05** **Set No. 1**

IV B.Tech I Semester Examinations,November 2010
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 circular well of 5 m external diameter and steining thickness 1 m is used as 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, ϕ is 30^0. The well is subjected to a horizontal force of 50 tones and a total moment of 500 t - m at the scour level. The depth of well below scour level is 12 m. Assuming the well to be a heavy well, calculate the total horizontal equivalent resisting force the well can resist: Further, what will be the change in value, if the maximum scour level is subjected to a surcharge equivalent to 2 m height of soil. [16]

2. (a) Explain the design of foundation when a dense stratum overlie a loose one.
   (b) A footing 2m × 2m has to carry an axial load of 600 kN with M_x = 180 kN.m and M_y = 60 kN.m. The soil has c = 15 kN/m^2, $\phi = 25^0$ and γ = 20 kN/m^3. The depth of foundation is 1.5 m. Find the safety of the footing, if the ground water level can be assumed to rise up to the foundation level. [6+10]

3. The pressure surface of a retaining wall slopes up and away from the backfill with a batter of 1 in 10. The backfill is a non-cohesive soil with a density of 19.2 kN/m^3 and angle of internal friction 35^0. The angle of surcharge is 4^0, the angle of wall friction is estimated to be 20^0, and the vertical height of the wall is 12 m. Compute the maximum active thrust on the wall. [16]

4. (a) What are the various problems associated with expansive soils in Civil Engineering.
   (b) When are the uses of under-reamed piles? Analyse a typical under-reamed pile and give the various design implications. [16]

5. (a) How do you estimate the settlement of a footing on clay using Janbu's method?
   (b) A rectangular footing 2m × 3m carries a column load of 600 kN at a depth of 1 m. The footing rests on c-ϕ soil strata of 6 m thick having Poisson's ratio of 0.25 and modulus of elasticity as 20000 kN/m^2. Calculate the immediate elastic settlement of the footing. Influence factor = 1.06. [8+8]

6. The height of a cantilever sheet pile from the top of the dredge level is 9m. The water level in the backfill is at 2m from top. Find the depth of penetration required for a factor of safety equal to 1. Assume that above the water table, the soil is dry. The other properties of soil are: γ_{sat} = 20 kN/m^3, K_A =0.33, K_p = 3.0, G_s=2.6. [16]

7. (a) Classify the piles based on the material and use.

(b) A group of 9 piles, 12 m long and 250 mm in diameter is to be arranged in a square pattern in clayey soil with an average unconfined compressive strength of 60 kN/m^2. Work out the spacing of piles for a group efficiency factor 1.0. Neglect the bearing at the tip of the piles. [8+8]

8. (a) Explain the Reese and Matlock's approach for laterally loaded piles analysis.

(b) A 200 mm diameter, 5 m long piles are used as foundations for a column carrying 500 kN in a uniform deposit of normally consolidated clay having γ_{sat} = 19 kN/m^3, liquid limit 40%, void ratio 1.05. There are nine piles in the group arranged in a square pattern with centre to centre spacing 500 mm. Hard stratum exists at a depth of 7 m. Estimate the settlement of a pile group. [8+8]

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Code No: R05410107 **R05** **Set No. 3**

IV B.Tech I Semester Examinations,November 2010
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. The height of a cantilever sheet pile from the top of the dredge level is 9m. The water level in the backfill is at 2m from top. Find the depth of penetration required for a factor of safety equal to 1. Assume that above the water table, the soil is dry. The other properties of soil are: γ_{sat} = 20 kN/m^3, K_A =0.33, K_p = 3.0, G_s=2.6. [16]

2. (a) Explain the Reese and Matlock's approach for laterally loaded piles analysis.
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3. (a) What are the various problems associated with expansive soils in Civil Engineering.
   (b) When are the uses of under-reamed piles? Analyse a typical under-reamed pile and give the various design implications. [16]

4. (a) Explain the design of foundation when a dense stratum overlie a loose one.
   (b) A footing 2m × 2m has to carry an axial load of 600 kN with M_x = 180 kN.m and M_y = 60 kN.m. The soil has c = 15 kN/m^2, $\phi = 25^0$ and γ = 20 kN/m^3. The depth of foundation is 1.5 m. Find the safety of the footing, if the ground water level can be assumed to rise up to the foundation level. [6+10]

5. (a) How do you estimate the settlement of a footing on clay using Janbu's method?
   (b) A rectangular footing 2m × 3m carries a column load of 600 kN at a depth of 1 m. The footing rests on c-ϕ soil strata of 6 m thick having Poisson's ratio of 0.25 and modulus of elasticity as 20000 kN/m^2. Calculate the immediate elastic settlement of the footing. Influence factor = 1.06. [8+8]

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