

Code No: RT32012

R13**SET - 1****III B. Tech II Semester Regular Examinations, April - 2016**
GEOTECHNICAL ENGINEERING – II
(Civil Engineering)

Time: 3 hours

Max. Marks: 70

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- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) What are the methods of soil exploration? [3M]
- b) Explain finite and infinite slopes. [4M]
- c) What are factors affecting Bearing Capacity? [4M]
- d) What are the different types of foundation settlements? [3M]
- e) How do you determine the group efficiency of piles? [4M]
- f) What is grip length with respect to well foundations? [4M]

PART -B

- 2 a) Explain with neat figure area ratio, inside and outside clearances of a cutting edge used for soil exploration borings. [4M]
- b) Explain in detail about preparation of soil investigation report including RECORD OF BORING [IS : 1892-1979] [8M]
- c) An SPT was conducted in a dense sand deposit at a depth of 20 m, and a value of 48 was observed for N . The density of the sand was 14 kN/m^3 . What is the value of N , corrected for overburden pressure? [4M]
- 3 a) Explain Taylor's stability number. [3M]
- b) Explain Culmann's graphical method and also its advantages. [8M]
- c) An embankment is inclined at an angle of 35° and its height is 15 m. The angle of shearing resistance is 15° and the cohesion intercept is 200 kN/m^2 . The unit weight of soil is 18 kN/m^3 . If Taylor's stability number is 0.06, find the factor of safety with respect to cohesion. [5M]
- 4 a) Explain the differences between local and general shear failures and factors considered for their identification. [4M]
- b) What are the assumptions in Terzaghi's theory for shallow foundations [4M]
- c) A loading test was conducted with a 300 mm square plate at depth of 1 m below the ground surface in pure clay deposit. The water table is located at a depth of 4 m below the ground level. Failure occurred at a load of 45 kN. What is the safe bearing capacity of a 1.5 m wide strip footing at 1.5 m depth in the same soil? Assume $\gamma = 18 \text{ kN/m}^3$ above the water table and a factor of safety of 2.5. The water table does not affect the bearing capacity in both cases. [8M]
For $\Phi = 0^\circ$, Terzaghi's factors are $N_c = 5.7$, $N_q = 1$, and $N_\gamma = 0$.

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SET - 1

- 5 a) Explain plate load test in detail and its limitations. [8M]
- b) Two load tests were conducted at a site - one with a 0.5 m square test plate and the other with a 1.0 m square test plate. For a settlement of 25 mm, the loads were found to be 60 kN and 180 kN, respectively in the two tests. Determine the allowable bearing pressure of the sand and the load which a square footing of 2 m × 2 m, can carry with the settlement not exceeding 25 mm. [8M]
- 6 a) Explain different classifications of piles with neat sketches. [8M]
- b) A square group of 9 piles was driven into soft clay extending to a large depth. The diameter and length of the piles were 30 cm and 9 m respectively. If the unconfined compression strength of the clay is 90 kN/m², and the pile spacing is 90 cm centre to centre, what is the capacity of the group? Assume a factor of safety of 2.5 and adhesion factor of 0.75. [8M]
- 7 a) Explain with neat sketches different tilts and shifts of wells and their rectifying measures. [8M]
- b) Explain with a neat sketch different forces acting on well foundations and construction and Sinking of wells. [8M]

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R13**SET - 2****III B. Tech II Semester Regular Examinations April - 2016**
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- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) What is the need of soil exploration? [3M]
- b) Explain finite and infinite slopes. [4M]
- c) What are the factors effecting Bearing Capacity? [4M]
- d) What are the different types of foundation settlements? [3M]
- e) How do you determine the group efficiency of piles? [4M]
- f) What are the different shapes of wells and draw neat figures? [4M]

PART -B

- 2 a) Explain with neat figure area ratio, inside and outside clearances of a cutting edge of a sampler used for soil exploration borings. [4M]
- b) Write detailed notes on Standard Penetration Test procedure and corrections required. [8M]
- c) Write differences between undisturbed and disturbed soil samples. [4M]
- 3 a) What is meant by slope factor of safety? [3M]
- b) A cutting is made 10 m deep with sides sloping at 8 : 5 in a clay soil having a Mean undrained strength of 50 kN/m² and a mean bulk density of 19 kN/m³. Determine the factor of safety under immediate (undrained) conditions given the following details of the impending failure circular surface: The centre of rotation lies vertically above the middle of the slope. Radius of failure arc = 16.5 m. The deepest portion of the failure surface is 2.5 m below the bottom surface of the cut (*i.e.*, the centre of rotation is 4 m above the top surface of the cut). Allowance is to be made for tension cracks developing to a depth of 3.5 m from surface. Assume that there is no external pressure on the face of the slope. [8M]
- c) Explain Taylor's stability number and how it is modified for different stability conditions of canal slope. [5M]
- 4 a) What are the assumptions in Terzaghi's theory for shallow foundations? [4M]
- b) Explain the differences between local and general shear failures and factors considered for their identification. [4M]
- c) Explain IS code method for determining soil bearing capacity. [8M]

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SET - 2

- 5 a) Explain in detail the methods for determining safe bearing pressure based on N- value. [8M]
- b) Two load tests were conducted at a site one with a 0.5 m square test plate and the other with a 1.0 m square test plate. For a settlement of 25 mm, the loads were found to be 60 kN and 180 kN, respectively in the two tests. Determine the allowable bearing pressure of the sand and the load which a square footing of 2 m × 2 m, can carry with the settlement not exceeding 25 mm. [8M]
- 6 a) Explain at least two dynamic formulae of piles. [8M]
- b) A square group of 9 piles was driven into soft clay extending to a large depth. The diameter and length of the piles were 30 cm and 9 m respectively. If the unconfined compression strength of the clay is 90 kN/m², and the pile spacing is 90 cm centre to centre, what is the capacity of the group? Assume a factor of safety of 2.5 and adhesion factor of 0.75. [8M]
- 7 a) Explain with neat sketch different components of wells and their functions. [8M]
- b) Explain with neat sketches different types of caissons based on their method of construction [8M]

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R13**SET - 3****III B. Tech II Semester Regular Examinations, April - 2016**
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- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) What are the methods of soil exploration? [3M]
- b) Explain types of slope failures. [4M]
- c) What is the Criteria for the determination of bearing capacity of soils? [4M]
- d) What are the allowable settlements of structures? [3M]
- e) What is a negative skin friction? [4M]
- f) What is grip length with respect to well foundations? [4M]

PART -B

- 2 a) How do you decide depth and spacing of boring in soil investigation? [4M]
- b) Explain in detail about preparation of soil investigation report including. [8M]
RECORD OF BORING [IS : 1892-1979]
- c) An SPT was conducted in a dense sand deposit at a depth of 22 m, and a value [4M]
of 48 was observed for N . The density of the sand was 15 kN/m^2 . What is the
value of N , corrected for overburden pressure?
- 3 a) What is meant by slope factor of safety? [3M]
- b) A cutting is made 10 m deep with sides sloping at 8:5 in a clay soil having a [8M]
mean undrained strength of 50 kN/m^2 and a mean bulk density of 19 kN/m^3 .
Determine the factor of safety under immediate (undrained) conditions given the
following details of the impending failure circular surface: The centre of
rotation lies vertically above the middle of the slope. Radius of failure arc =
16.5 m. The deepest portion of the failure surface is 2.5 m below the bottom
surface of the cut (*i.e.*, the centre of rotation is 4 m above the top surface of the
cut). Allowance is to be made for tension cracks developing to a depth of 3.5 m
from surface. Assume that there is no external pressure on the face of the slope.
- c) Explain Taylor's stability number and how it is modified for different stability [5M]
conditions of canal slope.
- 4 a) Explain types of foundations and factors to be considered in their location. [4M]
- b) Explain the differences between local and general shear failures and factors [4M]
considered for their identification.

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- c) [8M]
A loading test was conducted with a 300 mm square plate at depth of 1 m below the ground surface in pure clay deposit. The water table is located at a depth of 4 m below the ground level. Failure occurred at a load of 45 kN. What is the safe bearing capacity of a 1.5 m wide strip footing at 1.5 m depth in the same soil? Assume $\gamma = 18 \text{ kN/m}^3$ above the water table and a factor of safety of 2.5. The water table does not affect the bearing capacity in both cases. For $\Phi = 0^\circ$, Terzaghi's factors are $N_c = 5.7$, $N_q = 1$, and $N_\gamma = 0$.
- 5 a) Explain in detail the methods for determining safe bearing pressure based on N -value. [8M]
b) A footing, 2 m square, is founded at a depth of 1.5 m in a sand deposit, for which the corrected value of N is 27. The water table is at a depth of 2 m from the surface. Determine the net allowable bearing pressure, if the permissible settlement is 40 mm and a factor of safety of 3 is desired against shear failure. [8M]
- 6 a) Explain different classifications of piles with neat sketches. [8M]
b) A group of 16 piles of 50 cm diameter is arranged with a centre to centre spacing of 1.0 m. The piles are 9 m long and are embedded in soft clay with cohesion 30 kN/m^2 . Bearing resistance may be neglected for the piles. Negative Adhesion factor is 0.6. Determine the ultimate load capacity of the pile group. [8M]
- 7 a) Explain with neat sketch different components of wells and their functions. [8M]
b) Explain with a neat sketch different forces acting on well foundations and the construction and Sinking of wells. [8M]

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R13**SET - 4****III B. Tech II Semester Regular Examinations, April - 2016**
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(Civil Engineering)

Time: 3 hours

Max. Marks: 70

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- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) What is the need of soil exploration? [3M]
- b) Explain types of slope failures [4M]
- c) What is the Criteria for the determination of bearing capacity [4M]
- d) What are the allowable settlements of structures? [3M]
- e) What is a negative skin friction? [4M]
- f) What are the different shapes of wells and draw neat figures? [4M]

PART -B

- 2 a) How do you decide depth and spacing of boring in soil investigation? [4M]
- b) Write a detail notes on Standard Penetration Test procedure and corrections required. [8M]
- c) Write differences between undisturbed and disturbed soil samples. [4M]
- 3 a) Explain Location of the Most Critical Circle in the method of slices. [3M]
- b) Explain Culmann's graphical method and also it's advantages. [8M]
- c) An embankment is inclined at an angle of 35° and its height is 15 m. The angle of shearing resistance is 15° and the cohesion intercept is 200 kN/m^2 . The unit weight of soil is 18.0 kN/m^3 . If Taylor's stability number is 0.06, find the factor of safety with respect to cohesion. [5M]
- 4 a) Explain the differences between local and general shear failures and factors considered for their identification. [4M]
- b) Explain types of foundations and factors to be considered in their location [4M]
- c) Explain IS code method for determining soil bearing capacity. [8M]
- 5 a) Explain plate load test in detail and its limitations [8M]
- b) A footing, 2 m square, is founded at a depth of 1.5 m in a sand deposit, for which the corrected value of N is 27. The water table is at a depth of 2 m from the surface. Determine the net allowable bearing pressure, if the permissible settlement is 40 mm and a factor of safety of 3 is desired against shear failure. [8M]



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- 6 a) Explain at least two dynamic formulae of piles. [8M]
b) A group of 16 piles of 50 cm diameter is arranged with a centre to centre spacing of 1.0 m. The piles are 9 m long and are embedded in soft clay with cohesion 30 kN/m^2 . Bearing resistance may be neglected for the piles. Negative adhesion factor is 0.6. Determine the ultimate load capacity of the pile group. [8M]
- 7 a) Explain with neat sketches different tilts and shifts of wells and their rectifying measures. [8M]
b) Explain with neat sketches different types of caissons based on their method of construction. [8M]

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