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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fifth Semester B.Tech Degree (S,FE) Examination January 2022 (2015 Scheme)

Course Code: CE305

Course Name: GEOTECHNICAL ENGINEERING - II

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks. Marks

1 a) State the assumptions of Boussinesq theory (4)

b) Explain the procedure to find vertical stress beneath a loaded area using Newmark's chart (5)

c) A retaining wall 5 m high with smooth vertical back is pushed against a soil mass with cohesion = 35 kN/m^2 φ=30°,γ= 18 kN/m^3. A surcharge of 40 kN/m^2 acts at Ground level. Determine the total earth pressure per metre length of wall and its point of application (6)

2 a) Differentiate active and passive earth pressure with examples (4)

b) The total weight of a tower is 750 kN. The base consists of an equilateral frame of side 4m on the corners of which three legs are supported. The weight of the tower is equally carried by three legs . Compute the increase in vertical stress caused at 6m below one of the legs (5)

c) A retaining wall 6 m high retains a backfill with following properties (6)

I layer : H1 = 3 m ,φ=30°,γ= 17 kN/m^3

II layer : H2 = 3 m ,φ=36°,γ= 18 kN/m^3

Determine the total active pressure per metre run and its point of application

3 a) What is an Isobar? State its significance. (4)

b) A strip footing 4.5 m wide is loaded on ground surface with a pressure of 150 kN/m^2. Determine the increase in vertical stress at 9 m i) below the edge of footing ii) Under the centre line of footing (5)

c) A vertical excavation was made in a purely cohesive deposit having unit weight 19 kN/m^3. It caved in when the digging reached 5 m. i) Calculate the value of cohesion ii) If same soil is used as a backfill against a retaining wall upto a (6)

height of 7m ,calculate the total active thrust developed per metre length of the wall

PART B

Answer any two full questions, each carries 15 marks.

4 a) What is a Floating raft foundation ? (4)

b) What are the remedial measures to be adopted to reduce differential settlement? (5)

c) i) What are the situations under which a combined footing is preferred? (6)

ii) Explain the procedure to proportion a trapezoidal combined footing .

5 a) Explain the sand drain method of soil improvement . (4)

b) What is the effect of water table on bearing capacity ? (5)

c) A square footing is located at a depth of 1.2 m below GL and carries a safe load of 1700 kN . Find the size of footing if $\varphi=35°$, $\gamma= 17$ kN/m^3 , $c= 10$ kN/m^2. Bearing capacity factors are $N_c = 57.8$, $N_q= 41.4$, $N_\gamma = 42.4$.Factor of safety =3 (6)

6 a) A raft 20 m x 10 m rests on cohesive soil with $c= 40$ kN/m^2 and $\gamma= 17$ kN/m^3 . The foundation carries a load of 25MN and is to be used as a basement . Find factor of safety if depth of foundation is 2.8 m (4)

b) A strip footing 2 m wide is located at a depth of 0.8 m below GL. Determine the net safe bearing capacity if $\varphi=20°$, $\gamma= 19$ kN/m^3 , $c= 20$ kN/m^2. Bearing capacity factors are $N'_c = 11.8$, $N'_q= 3.9$, $N'_\gamma = 1.7$ and factor of safety =3 (5)

c) Explain the functions of components of well foundation with a neat sketch (6)

PART C

Answer any two full questions, each carries 20 marks.

7 a) What is Negative skin friction ? How is it caused ? (5)

b) Explain the methods of vibration isolation (6)

c) i)Explain Standard Penetration Test (9)

ii) Field N value in a deposit of fully saturated fine silt was 45 at a depth of 7m. Saturated unit weight of soil is 19 kN/m^3. Calculate the corrected SPT value as per IS code

8 a) Determine the coefficient of uniform elastic compression , if resonance occurred at a frequency of 20cycles/second in a test block 1.5 x0.74 x0.7 m size . Weight of oscillator is 3 kN. Unit weight of concrete = 24kN/m^3 (5)

b) What are the IS guidelines for choosing depth and spacing of boreholes ? (6)

c) Explain Pile load test . How allowable load is calculated from pile load test? (9)

9 a) What are the objectives of subsoil exploration programme? (5)

b) A group of 16 piles 10 m long and 300mm diameter is to be arranged in square pattern in clay soil with undrained cohesion 35 kN/m^2. Determine the c/c spacing of piles , if group efficiency is 100 %. Adhesion factor = 0.7 Neglect end bearing (6)

c) Explain Wash boring technique of soil exploration (9)

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