

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017**

**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

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|---|---|------|
| 1 | a) What are the assumptions in the Boussinesq's formula for stress distribution? (5)  | (5)  |
|   | b) A water tank is founded on a circular ring type foundation. The ring is of 10m external diameter and 6m internal diameter. Assuming a uniformly distributed load of 300kPa, determine the vertical pressure at a depth of 6m below the centre of the foundation. (5)   | (5)  |
|   | c) What is pressure bulb? Discuss its significance. (5)   | (5)  |
| 2 | a) Explain the use of Newmark's chart (5)   | (5)  |
|   | b) A wall of 8m height retains a non-cohesive backfill of dry unit weight 18kN/m <sup>3</sup> and $\phi = 30^\circ$ . Using Rankine's theory find the total active thrust on the wall and the point of application if it carries a uniform surcharge load of 10kPa. (10)  | (10) |
| 3 | Compute the total lateral earth thrust exerted by a layered backfill of height 10m if the wall has a tendency to move towards backfill. The upper layer of thickness 6m has angle of internal friction $32^\circ$ and saturated unit weight 18kN/m <sup>3</sup> . The lower layer has angle of internal friction $28^\circ$ , cohesion 20kPa, and saturated unit weight 19kN/m <sup>3</sup> . The backfill also supports a uniform surcharge of intensity 8kN/m <sup>2</sup> . Water table is at a depth of 5m below the surface of the backfill. Also find the point of application. Soil above water table is also saturated (15) | (15) |

**PART B**

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

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|---|--|------|
| 4 | a) What are the assumptions in Terzaghi's bearing capacity theory (5)  | (5)  |
|   | b) A square footing of 2mx2m is provided at a depth of 1m, in a sandy soil with an angle of internal friction of $30^\circ$ . Compute the net safe bearing capacity of the soil with a factor of safety of 3, when the water table is at a depth of 0.5m & 1.5m below the ground level. Given $G = 2.65$ , $e = 0.7$ , Degree of saturation above water table = 80%, $N_c=95$ , $N_q=80.4$ , $N_\gamma=100.2$ . (10) | (10) |
| 5 | a) Differentiate between general and local shear failure of soil. (5)  | (5)  |
|   | b) What remedial measures can be taken to control the differential settlement of foundations? (5)  | (5)  |
|   | c) Under what situations raft foundation is preferred? (5)   | (5)  |
| 6 | a) Explain with neat sketches, the various elements of a well foundation. (7)  | (7)  |
|   | b) Design the plan dimensions of a trapezoidal footing to support two adjacent columns at a centre to centre distance of 5m carrying loads of 1500kN and (8)   | (8)  |

3000kN. The smaller column is of size 400mmx400mm and is at a clear distance of 250mm from the property line. The bigger column is of size 750mmx750mm. The permissible soil pressure is 300kPa.

**PART C**

*Answer any two full questions, each carries 20 marks.*

- 7 a) What is negative skin friction? (5)  
b) What is dynamic pile capacity? (5)  
c) A group of 9 piles 12m long and 250mm in diameter is to be arranged in a square form in clay with an average unconfined compressive strength of 60kN/m<sup>2</sup>. Determine the centre to centre spacing of the pile for group efficiency of 1. Neglect bearing at the tip.  $\alpha=0.9$  (10)
- 8 a) Explain mass spring model for undamped free vibration (5)  
b) Explain with a neat sketch, the wash boring method. What are its advantages and disadvantages? (7)  
c) Using modified Hiley's formula, determine the safe load that can be carried by a pile. The gross weight of the pile is 1400kg, weight of hammer 2000kg, height of fall 91cm, hammer efficiency 70%, average penetration under the last 5 blows is 10mm, coefficient of restitution is 0.55 and the factor of safety is 2.5. assume  $C=2.5$  and  $e = 0.5$  (8)
- 9 a) Explain in detail the procedure for standard penetration test. What are the corrections to be applied to the N-Value? (15)  
b) What are the main objectives of the site investigation? (5)

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