Registration no: ☐☐☐☐☐☐☐☐☐☐

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B.Tech.
PCCI4401

7th Semester Regular/Back Examination 2017-18
Foundation Engineering
BRANCH : CIVIL
Time: 3 Hours
Max Marks: 70
Q.CODE : B220
Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 **Answer the following questions :** **(2x10)**
   a) Enumerate various types of retaining walls. What is the main thrust on a retaining wall?
   b) Differentiate between Rankine and Coulomb theories of earth pressure.
   c) Distinguish between local and punching shear failure.
   d) What are the criteria for deciding the depth of foundation?
   e) When and why a group of piles under a column is recommended? Sketch it.
   f) Sketch the load settlement curves from plate loadtests for various soils on a single chart.
   g) Write a critical note on 'negative skin friction' in piles.
   h) Which one is better in collecting undisturbed samples; (i) split-spoon sampler or (ii) thin-walled sampler?
   i) One sampler has an area ratio of 21% while another has 9%; which of these samplers would you prefer and why?
   j) Differentiate between cleavage and parting.

Q2 **a)** A retaining wall with a smooth vertical back is 10 m high and retains a two layer sand backfill with following properties: **(5)**

$$0 - 6 \text{ m depth: } c' = 0, \phi' = 31^0, \gamma = 19 \text{ kN/m}^3$$

$$\text{Below 6 m depth: } c' = 0, \phi' = 34^0, \gamma = 22 \text{ kN/m}^3$$

    Show the active earth pressure distribution assuming that the water table is well below the base of the wall.
   b) Discuss Rebhan's graphical solution for active earth pressure when β is not equal to Φ and β line and Φ line meet at a great distance. **(5)**

Q3 **a)** A strip footing, 1 m wide, rests on the surface of a dry cohesion less soil having angle of internal friction (Φ) = 28^0, and unit weight = 20 kN/m^3. What is the ultimate bearing capacity? What is the value, if there is complete flooding? Assume $N_\gamma = 11$. **(5)**
   b) Discuss a pile load test. **(5)**

Q4 **(a)** Discuss how you can obtain the bearing capacity of a soil from a cone penetration test. **(5)**
   (b) How is the settlement of footings estimated? **(5)**

Q5 **a)** Design a square pile group to carry 400 kN in clay with a unconfined compression strength of 60 kPa. The piles are 30 cm diameter and 6 m long. Adhesion factor may be taken as 0.6. **(5)**

b) A 40 cm diameter pile penetrates a deposit of soft clay 10 m deep and rests on sand. Compute the skin friction resistance. The clay has a unit cohesion of 6 N/cm^2. Assume an adhesion factor of 0.6 for the clay. **(5)**

Q6 **a)** Sketch a well foundation showing all its component parts. How do you estimate the depth and bearing capacity of a well foundation? **(5)**

b) Discuss the electrical resistivity method of geophysical exploration. **(5)**

Q7 **a)** What are various penetration tests useful for sub-soil exploration? Discuss the standard penetration test (SPT) in detail including the procedure for obtaining a sample. How can you relate relative density with the observed/corrected N value **(5)**

b) Why are undisturbed samples required? Discuss any one procedure for obtaining undisturbed samples for a multi-storeyed building project. **(5)**

Q8 **Write brief notes on any FIVE :** **(2 x 5)**
a) Dilatometer parameters
b) Earth pressure at rest.
c) Fender piles
d) Mat foundation
e) Strike and a dip
f) Degree of disturbance
g) Recovery ratio.
h) Cleavage in rocks
i) N_{60}