Registration No. :

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B. Tech
PCCI 4401

Seventh Semester Back Examination – 2014
FOUNDATION ENGINEERING
BRANCH : CIVIL
QUESTION CODE : L 144
Full Marks – 70
Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*
The figures in the right-hand margin indicate marks.

1. Answer the following questions :   2 ×10
    (a) Differentiate between active and passive earth pressures.
    (b) Find the value of coefficient of earth pressure at rest for a soil having Poisson's ratio (μ) of 0.3.
    (c) Under what conditions the soil mass is called as semi-infinite ?
    (d) What are the criteria for deciding the depth of foundation ?
    (e) Sketch the load settlement curves from pile load tests for various soils on a single chart.
    (f) When and why a group of piles under a column is recommended ? Sketch it.
    (g) What should be the minimum depth of sub-soil exploration for a ten storied residential building using the model suggested by Sowers and Sowers (1970)?
    (h) What do you mean by RQD ?
    (i) What is the difference between a fault and a fissure ?
    (j) Differentiate between a Q-joint and S-joint.

2. (a) A circular footing is resting on stiff saturated clay with q_u = 300 kN/m². The depth of foundation is 3 m. Determine the diameter of the footing if the column load is 900 kN. Assume a factor of safety of 2.5. The bulk unit weight of soil is 22 kN/m³.   5
    (b) Discuss the Standard Penetration Test.   5

3. (a) A cohesive soil has unit weight of 18.7 kN/m³, unit cohesion as 12 kN/m² and angle of internal friction as 12°. Calculate the critical height of vertical excavation that can be made without any lateral support.   5

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(b) Describe Culmann's graphical solution for active earth pressure. Explain how surcharge will affect this pressure. 5

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

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

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

Show the active earth pressure distribution assuming that the water table is well below the base of the wall.

(b) Explain how a foundation may be designed when a dense stratum overlies a loose one. 5

5. (a) Enlist various shapes of well foundation with their advantages and disadvantages. How do you estimate the bearing capacity of well foundation ? 5

(b) How do you estimate the load carrying capacity of piles ? Discuss static formulae for various types of soil. 5

6. (a) Discuss the use of a split tube sampler in subsurface exploration. What is its area ratio ? Can you get an undisturbed specimen using piston sampler ? 5

(b) How would you fix the depth of boring for various civil engineering constructions ? Discuss the IS guidelines. 5

7. (a) What are various penetration tests useful for sub-soil exploration ? Discuss the dynamic cone penetration test in detail. 5

(b) Enumerate various geophysical methods of site investigation. Discuss the seismic refraction method in brief. 5

8. Write brief notes on any **five** of the following : 2×5

(a) strike and a dip

(b) Recovery ratio

(c) Defects in a rock mass

(d) Net ultimate bearing capacity

(e) Friction piles

(f) strike and a dip

(g) Raft foundation.