(Set-L)

B. Tech - 7th
Geotechnical Engineering-II

Full Marks : 70

Time : 3 hours

Answer **Q. 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) Find the value of coefficient of earth
   pressure at rest for a soil having poisson's
   ratio(μ) of $0\cdot35$.

   (b) For an earthen slope with c-Φ soil, if $i = 15^{\circ}$
   and $\Phi = 30^{\circ}$, find the stability number (S_n).

   (c) Sketch the stress distribution on a vertical
   line at radial distance 'r' from a point
   load 'Q'.

   (d) Write the Brinch Hansen's general bearing
   capacity equation.

(2)

(e) What is the importance of 'influence factor' in drawing the Newmark' influence chart ?

(f) Which slope of an earth dam should be checked immediately after construction ? Justify your answer.

(g) What should be the spacing between bore holes for a multistoried building ?

(h) State the effect of water table on the bearing capacity of a soil.

(i) Discuss Feld's rule.

(j) What is a failure wedge ? Draw its free body diagram for a movement away from the backfill.

2. (a) Consider a circularly loaded flexible area on the ground surface. Given that the radius of the circular area is 4 m and the uniformly distributed load is 100 kN/m², calculate the vertical stress increase at a point located 5 m below the ground surface directly under the centre of the circular area.   5

(b) Discuss the construction and use of Newmark's Influence Chart. 5

3. (a) What do you mean by active and passive earth pressures and also the earth pressure at rest ? Discuss with examples. When does each type occur ? Discuss with sketches. Why are retaining walls usually designed for active earth pressures ? 5

(b) Fig.1 shows a 5 m high retaining wall (ABC). The wall is restrained from yielding. Calculate the lateral active earth pressure (P_a) per unit length of the wall. Also determine the location of the resultant force. 5

A

3 m   Sand : c' = 0, Φ' = 30°, γ = 19·5 kN/m³

B   ▽ Water Table

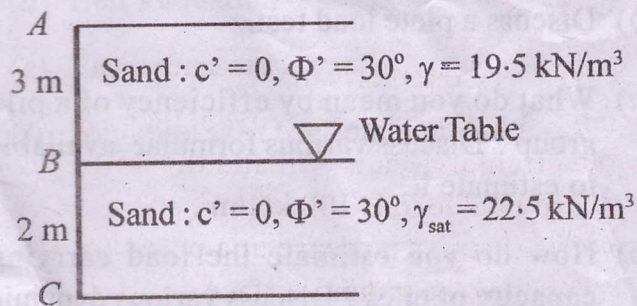2 m   Sand : c' = 0, Φ' = 30°, γ_{sat} = 22·5 kN/m³

C

Fig. 1

4. (a) What do you mean by stability number ? How do you determine it for a cohesive soil with infinite slope ? Derive the necessary equation for the same.   5

(b) Discuss Friction Circle method of analysis for stability of slopes for a c-Φ soil.   5

5. (a) Derive the Rankine's analysis for determination of minimum depth of foundation in a sand deposit. If the unit weight of the sand deposit is 20 kN/m³ and the minimum depth of foundation is known to be 5 m, find the angle of internal friction of the deposit for an ultimate bearing capacity of 1500 kN/m².   5

(b) Discuss a plate load test.   5

6. (a) What do you mean by efficiency of a pile group ? Discuss various formulae available to estimate it.   5

(b) How do you estimate the load carrying capacity of piles ? Discuss various dynamic formulae.   5

7. (a) Sketch and discuss a bore log.   3

   (b) Discuss the use of a piston sampler in subsurface exploration.   4

   (c) What do you mean by degree of disturbance as used during sample collection ? For a standard split spoon sampler, what is its value ?   3

8. Explain any *four* of the following in brief :   10

   (a) Active zone

   (b) Depth of bore holes

   (c) Safe bearing capacity

   (d) Bell's equation

   (e) Earth pressure at rest

   (f) Negative skin friction in piles.

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