

Code No: 156BA

**R18**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**

**B. Tech III Year II Semester Examinations, August - 2022**

**FOUNDATION ENGINEERING**  
(Civil Engineering)

Time: 3 Hours

Max.Marks:75

**Answer any five questions**  
**All questions carry equal marks**

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- 1.a) Describe open excavation methods of exploration. What are their advantages and disadvantages?  
b) What is a bore log? Give a typical example. [10+5]
- 2.a) What is standard penetration test? In what type of soils is the test preferred? What are its important specifications? Discuss why overburden correction is applied for measured SPT N.  
b) Distinguish between disturbed and undisturbed samples. [9+6]
- 3.a) Explain different modes of slope failures with suitable reasons.  
b) Find the critical height of a slope of infinite extent having a slope of  $30^\circ$ . The slope is made of stiff clay having cohesion of 20kPa, angle of internal friction of  $20^\circ$ , void ratio of 0.7 and specific gravity of 2.7. Consider the following cases for the analysis.  
i) The soil is dry  
ii) The slope is submerged. [7+8]
- 4.a) What is stability number? What is its utility in the analysis of slopes?  
b) An embankment 10m high is inclined at  $35^\circ$  to the horizontal. A stability analysis by the method of slices gave the following forces. Total normal force = 900 kN, Tangential force = 420 kN, Pore water pressure force = 200 kN. If the length of failure is 25m, find the factor of safety. The soil has cohesion of 30 kN/m<sup>2</sup> and angle of internal friction  $15^\circ$ . [7+8]
- 5.a) Discuss the stability of cantilever retaining wall against overturning and sliding failures.  
b) A 10m high retaining wall with smooth vertical back supports a horizontal backfill ( $\phi = 33^\circ$ ,  $c = 25$  kPa, Density above water table 15kN/m<sup>3</sup> and below water table 18kN/m<sup>3</sup>). The water table is at a depth of 3m below the surface of the backfill. The backfill supports a surcharge of 10kPa. Determine the magnitude and line of action of passive earth pressure. [7+8]
- 6.a) A 5m high rigid retaining wall has to retain a backfill of dry, cohesionless soil having the following properties: Angle of internal friction =  $30^\circ$ , void ratio = 0.74, specific gravity = 2.68. Plot the distribution of Rankine active earth pressure on the wall and determine the magnitude and point of application of the resultant thrust.  
b) What are the merits in Coulomb's earth pressure theory as compared to Rankine's theory? Discuss. [9+6]

7.a) Explain what is meant by 'safe bearing capacity' of soil. Indicate how the bearing capacity of shallow footing in a given soil can be calculated from the strength characteristics of the soil such as cohesion and angle of internal friction.

b) Determine net ultimate bearing capacity of the circular footing of size 2.5m located at 1.5m depth below ground level in pure clay soil and for the following cases: When water table is at (i) far below from foundation base and (ii) Ground level. Consider the following soil characteristics: cohesion = 50 kPa and unit weight of soil is 18 kN/m<sup>3</sup>. Use Terzaghi's theory. [6+9]

8.a) In a pile group, what are the geometrical properties that are to be considered in bringing out a proper spacing of piles? Explain.

b) What are the various approaches available to estimate the load carrying capacity of a single pile? Discuss the static formulae for pile capacity. [7+8]

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