Code No: **R164101G**　　　　**R16**　　　　Set No. 1

IV B.Tech I Semester Regular/Supplementary Examinations, Jan/Feb - 2022
ADVANCED FOUNDATION ENGINEERING
(Civil Engineering)
Time: 3 hours　　　　　　　　　　　　　　　　　　　　　　**Max. Marks: 70**

Question paper consists of Part-A and Part-B
*Answer ALL sub questions from Part-A*
Answer any FOUR questions from Part-B
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PART–A *(14 Marks)*

1.　a)　Differentiate between safe bearing capacity and allowable bearing capacity.　[2]
　　b)　Differentiate immediate and primary consolidation settlements.　[2]
　　c)　What are the conditions which recommend mat foundations?　[3]
　　d)　Write the purpose of retaining structures.　[2]
　　e)　Why negative skin friction is predominant in soft fills?　[2]
　　f)　How do you identify expansive clays using liquid limit and plasticity index?　[3]

PART–B *(4x14 = 56 Marks)*

2.　a)　What are the merits of Brinch Hansen's and Vesic's methods of bearing capacity? Discuss.　[7]
　　b)　Discuss about Bearing capacity of Layered Soils.　[7]

3.　A square footing of size 6m x 6m is founded at a depth of 1.8 m below the ground surface in loose to medium dense sand with q_n = 110 kN/m². Standard penetration tests conducted at the site gave the following corrected N_{60} values. Upto 4m depth N_{60} is 6. From 4m to 10m N_{60} is 12. From 10m to 16m N_{60} is 18. The water table is　far below from the footing surface. Above the water table, the unit weight of soil is 16 kN/m³. Compute the elastic settlement which can occur after 5 years by using Schmertmann's method. Use the equation E_s = 250 $(N_{cor}$ + 15) for computing the modulus of elasticity of sand. Assume μ = 0.32 and the depth of the compressible layer = $2B$= 12 m (= H).　[14]

4.　a)　Write the advantages and disadvantages of mat foundations.　[7]
　　b)　Explain how allowable bearing capacity of mats is estimated in clay.　[7]

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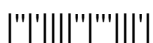
5. a) What are the ccross-sections of typical bracing used in deep excavation? Show them with neat sketches and discuss their practical relevance.   [7]

    b) What are sheet piles? Discuss the importance of them.   [7]

6. a) What is negative skin friction (NSF)? Discuss the remedies to control NSF on piles.   [7]

    b) A steel pipe pile of 0.61m outer diameter with 25mm wall thickness is driven into saturated cohesive soil to a depth of 20 m. The undrained cohesive strength of the soil is 85kPa. Calculate the ultimate lateral resistance of the pile by Broms' method with the load applied at ground level. Assume yield strength of pile material as 280 MPa. Use the following chart.   [7]
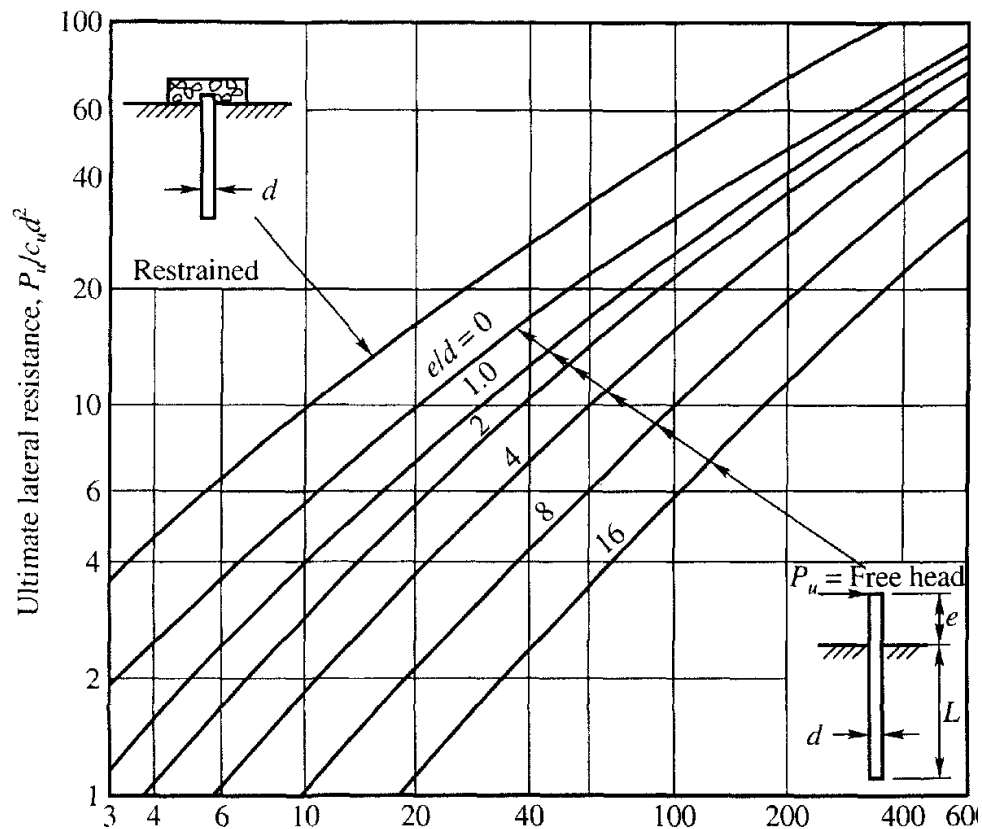
7. a) Discuss typical structural distress patterns and preventive construction measures in expansive soils.   [7]

    b) Write a note on importance of Plasticity Index and Swell Potential in identifying the expansive soil.   [7]