

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End-Term Examination
B. Tech. in Civil Engineering, Semester-V

CE1108: Geotechnical Engineering

Time: 1.5 hours

Max. Marks: 30

Instructions to students:

1. Do not write anything other than your roll number on question paper.
 2. Assume suitable data wherever required and mention it clearly.
 3. *Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.*
 4. In order to solve complex mathematical forms, Casio fx-991 MS or fx-991 ES or fx-991 ES Plus shall be permitted, however **programmable calculators** are strictly not entertained.
-

1(a). In a proposed project, a building of 15 storey building needs be constructed. As a geotechnical engineer, state the tests in detail that you are going to perform to characterize the soil type and design the foundation. Assume the soil to have both clayey and sandy components and ground water table is located at a depth of 1 m below the ground surface. (7 marks)

1(b). In a construction site, determine the effective average permeability of the deposit in horizontal and vertical directions for soil layer having thicknesses of 5 m, 9 m and 12 m, respectively. The permeability of the layers are 12×10^{-4} , 20×10^{-4} and 18×10^{-4} cm/sec. (3 marks)

2(a). A specimen of cohesionless sand collected from a construction site was tested in triaxial compression test. Determine the deviator stress at which the sample fails when the cell pressure was 100 kN/m^2 under drained conditions. The soil specimen has the effective angle of shearing resistance of 32° . What would be the cell pressure for another identical specimen of sand if it fails under a deviator stress of 1150 kN/m^2 . (5 marks)

- 2(b). Calculate the settlement in cm due to primary consolidation for the clay layer due to surcharge, shown in figure below. (5 marks)

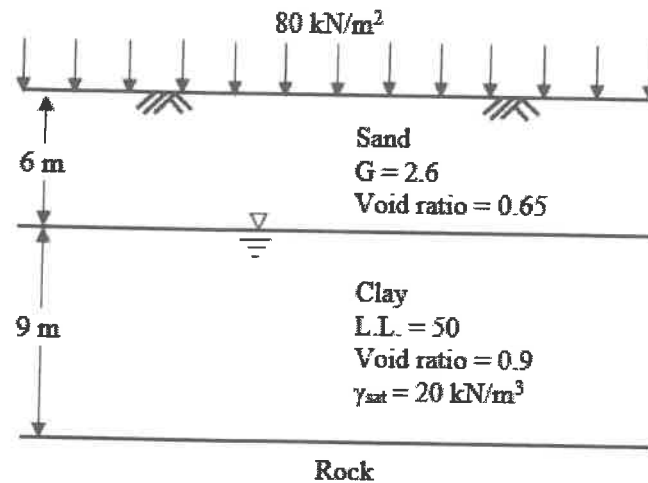


Fig. Soil profile for settlement calculation

3. A foundation ABCD of $6 \text{ m} \times 6 \text{ m}$ carries a load of 325 kN/m^2 . Determine the vertical stress at point 'P' located outside at a depth of 9.5 m . (10 marks)

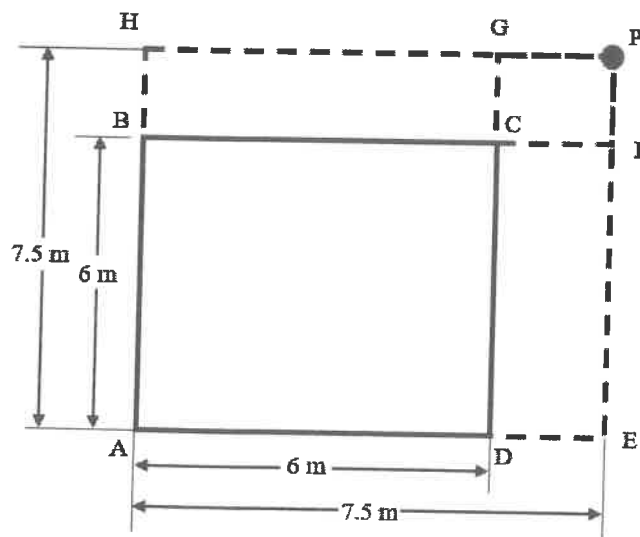


Fig. Foundation under load