Dr. Saurabh Kumar

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2021

B.Tech. VII Semester

COURSE CODE: 10B13CE736 MAX. MARKS: 35

COURSE NAME: Underground Technology

COURSE CREDITS: 3 MAX. TIME: 2 Hours

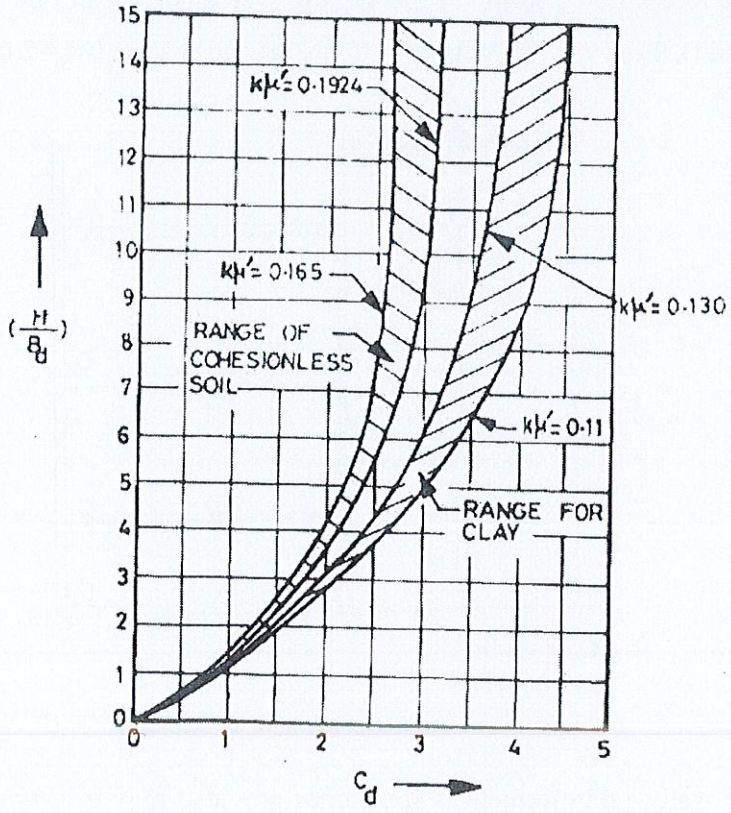
---

***Note:*** *All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.*

---

[1] Explain the phenomenon of 'Arching of soil'. State the assumptions of Cain's theory of soil arching and derive the solution for $q = 0$ and $c = 0$ condition. [5]

[2] A rigid sewer pipe with an outside diameter of 50 cm is to be laid in a ditch which is 1 m wide at the top of the pipe and is to be covered with 8.0 m of clayey soil backfill having unit weight of 19 kN/m$^3$. Determine the load on the sewer. Take $K\mu' = 0.12$. Use the chart given below. [5]




[3] List the factors that influence the choice of the side support system to be used for vertical excavation in soils. [4]

[4] Find the maximum grout pressure that can be applied for permeation grouting at point A in the loose sand layer shown in **Fig. 1.** [5]

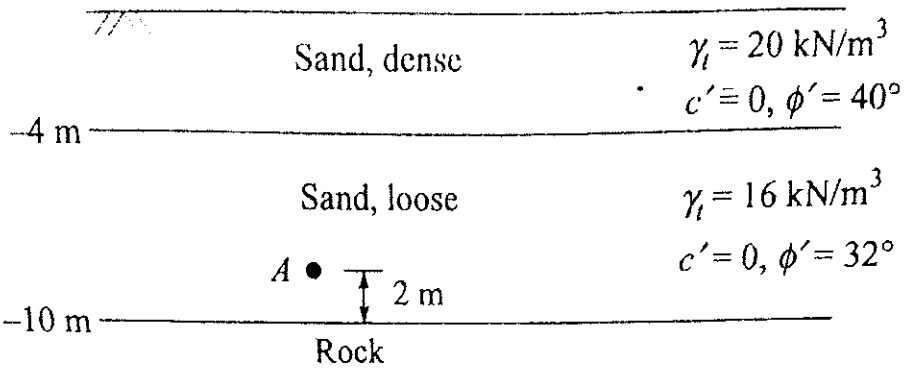



**Fig. 1**

[5] With the help of diagram, explain 'Imperfect Ditch conduit'. Also describe its construction methodology. [5]

[6] Determine the forces in the struts for the bracing system shown in Fig. 2. Assume hinges at levels B, C and D. Take $\gamma = 18$ kN/m$^3$; $c = 30$ kN/m$^2$ and spacing 's' = 2.0 m. [6]

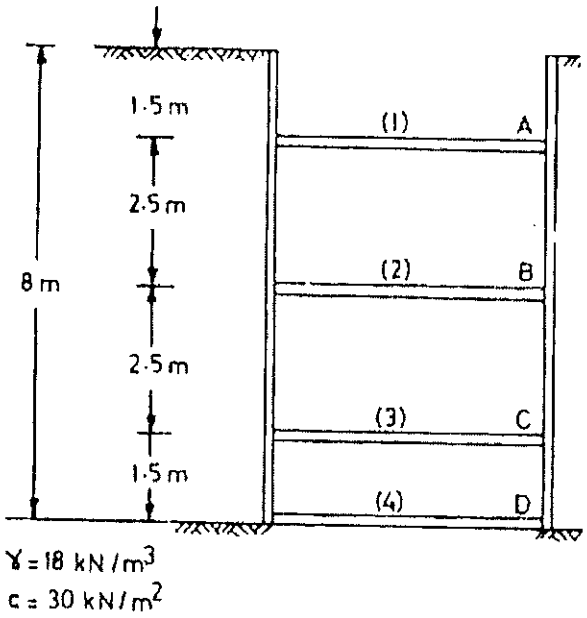



**Fig. 2**

[7] In secant pile walls, reinforcement is sometimes provided only in alternative piles. Why? In which piles is the reinforcement avoided; those installed in the first stage or those in the second stage. [5]