



K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

WINTER-2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester:V
Class:TY	Program:B.Tech
Branch Code:CIV	Pattern:2022
Name of Course:Geotechnical Engineering	Course Code:CIV223001
Max. Marks:60	Duration:2.30 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 2page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

Marks CO

Question No. 1

- 1a) Explain the purpose and significance of soil classification in geotechnical engineering. (6) CO1

Question No. 2

- 2a) Outline the concept of flow net and its properties. (6) CO2

Question No. 3

- 3a) Differentiate between light compaction test and heavy compaction test. (5) CO3

OR

- 3b) Give a brief account of pressure bulb and its significance. (5) CO3

- 3c) Explain the factors affecting Compaction of soil. (5) CO3

OR

- 3d) Draw a curve showing the relation between dry density and moisture content for Standard Proctor test and indicate the salient features of the curve. (5) CO3

- 3e) A water tower is supported only on three pillars forming an equilateral triangle with 10 m side, The total weight of tower is 1200 kN. Calculate vertical stress 10 m below the ground level under any one of the pillar. (6) CO3

OR

- 3f) A concentrated load 10 kN acts on the surface of soil mass. Using Boussinesq analysis find the vertical stress at points 3 m below the surface on axis of loading and radial distance of 2 m from axis of loading but at same depth of 3 m (6) CO3

Question No. 4

- 4a) Write a short note on Vane Shear Test with neat sketch and the formulae involved. (5) CO4

OR

- 4b) Write in detail different factors affecting shear strength of soil. (5) CO4

- 4c) Explain the procedure for unconfined compression test with neat sketches. (5) CO4

OR

- 4d) Illustrate the concept of direct shear test with sketch. Also state the merits and demerits of test (5) CO4
- 4e) A soil has an angle of shearing of 15° and cohesion of 35 kN/m^2 . If the specimen of soil is subjected to a triaxial compression test, find the value of the lateral pressure in the cell for failure to occur at total stress of 300 kN/m^2 . (6) CO4

OR

- 4f) An unconfined compression test was conducted on an undisturbed sample of clay. The sample had a diameter of 38 mm and 76 mm length. The load at failure was 30 N and the axial deformation of the sample 11 mm. Determine the undrained shear strength parameters. If the failure plane made an angle of 50° with horizontal (6) CO4

Question No. 5

- 5a) Define the term "Earth Pressure" and explain its significance in geotechnical engineering. (5) CO5

OR

- 5b) Elaborate Rebhans graphical method for determination of earth pressure on retaining wall. (5) CO5
- 5c) Explain Rankine's lateral stress distribution theory for active, passive and at rest state with the assumptions involved. (5) CO5

OR

- 5d) Discuss how to calculate earth pressure of soil for Backfill with uniform surcharge. (5) CO5
- 5e) A soil mass is retained by a smooth backed vertical wall of 6 m height. The soil has a bulk unit weight of 20 kN/m^3 and $\phi = 16^{\circ}$. The top of the soil is level with the top of the wall and is horizontal. If the soil surface carries a uniformly distributed load of 4.5 kN/m^2 , determine the total active thrust on the wall per linear metre of the wall and its point of application. (6) CO5

OR

- 5f) Compute the intensity of passive earth pressure at a depth of 8m in cohesion less sand with an angle of internal friction of 30° when water rises to the ground level. Saturated unit weight of sand is 21 KN/m^3 , $\gamma_w = 9.81 \text{ KN/m}^3$. (6) CO5

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