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:2023
Name of Course: Geotechnical Engineering	Course Code:2304301
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 two page(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)	Classify the properties and applications of a flow net.	(6)	CO2
Question No. 3			
3a)	Differentiate between standard proctor test and modified proctor test.	(5)	CO3
	OR		
3b)	State and explain the terms involved in Boussinesq's circular load equation for vertical stress determination.	(5)	CO3
3c)	Explain the factors affecting Compaction of soil.	(5)	CO3
	OR		
3d)	Discuss the concept of pressure bulb and its significance.	(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)	Illustrate the concept of direct shear test with sketch. Also state the merits and demerits of test.	(5)	CO4

4c)	Explain the procedure for unconfined compression test with neat sketches.	(5)	CO4
	OR		
4d)	State the meaning of total stress and effective stress acting within a soil mass.	(5)	CO4
4e)	A soil has an angle of shearing of 15^0 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 axial 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 50^0 with horizontal.	(6)	CO4
Question No. 5			
5a)	Define the term "Earth Pressure" and explain its significance in geotechnical engineering.	(5)	CO5
	OR		
5b)	Define the various types of earth pressures w.r.t. wall movement with sketches.	(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 coulomb's wedge theory for determination of earth pressure.	(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 $\varphi = 16^0$. 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 30^0 when water rises to the ground level. Saturated unit weight of sand is 21 kN/m^3, $\gamma w = 9.81$ kN/m^3	(6)	CO5

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