

KATIHAR ENGINEERING COLLEGE, KATIHAR
CIVIL ENGINEERING, 3rd Year (Semester-VI)

Subject: Soil and Rock Mechanics

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Assignment 1

Q.1 A retaining wall 6 m high, vertical back, supports a saturated clay soil with a horizontal surface. The properties of the backfill are:

$$\phi_u = 0, \quad c_u = 35 \text{ kN/m}^2, \quad \gamma = 17 \text{ kN/m}^3$$

Assuming the back of the wall to be smooth, determine:

- (a) the depth of tension cracks
- (b) the critical depth of a vertical cut
- (c) the total active thrust against the wall and its point of application, if cracks are formed in the tension zone.

Q.2 A retaining wall 6 m high, with a smooth vertical back is pushed against a soil mass having $c' = 40 \text{ kN/m}^2$ and $\phi' = 15^\circ$ and $\gamma = 19 \text{ kN/m}^3$. What is the total Rankine passive pressure, if the horizontal soil surface carries a uniform load of 50 kN/m^2 ? What is the point of application of the resultant thrust?

Q.3 A three layered backfill behind a 15 m high retaining wall with smooth vertical back. Calculate lateral active earth pressure, total lateral thrust at the base of the wall. Also draw the active earth pressure distribution. (Assume no effect of water table)

Layer	Height (m)	Unit weight(kN/m ³)	c (kN/m ²)	ϕ (in degree)
Top	5	20	0	35
Middle	5	18	20	25
Bottom	5	16	35	0

Q.4 Discuss the following:

- (a) Rowe's theory of moment reduction
- (b) Rebhann graphical method
- (c) Culman's graphical method