CAIRO UNIVERSITY
FACULTY OF ENGINEERING
Soil Mechanics and Foundation Engineering Division

FOUNDATIONS

4th Year Civil — EXERCISE (5) — 2016-2017

EARTH PRESSURE

1) a- Using neat sketches and giving examples from practice, explain the lateral earth pressure in at rest, active and passive states.

b- For the retaining walls shown in Figure (1), draw the active lateral earth pressure diagrams.

i) Neglecting the wall roughness.

ii) Considering the wall roughness assuming $\delta = 2/3\ \phi$

Soil conditions:

$\phi = 33°$
γ (above G.W.T.) = 1.7 t/m^3
γ_{sat} = 2.0 t/m^3.

2) a- State the assumptions of Rankine's theory of earth pressure, then derive Rankine's formula for earth pressure in case of cohesionless soil mass.

b- Calculate and plot the lateral earth pressure distribution on the wall shown in Figure (2) for the following backfill conditions

Layer	c (kg/cm^2)	$\phi°$	γ (t/m^3)
I	0.2	20	1.85
II	0.0	30	1.82
III	0.0	40	1.90

3) For the smooth retaining wall shown in Figure (3), determine the earth pressure force acting on the wall. If during a rain storm the tension cracks are considered to be filled with water, compute the percentage increase in the horizontal load acting on the wall due to the development of hydrostatic pressure.

4) Determine the resultant active earth pressure force acting on the wall shown in Figure (4).

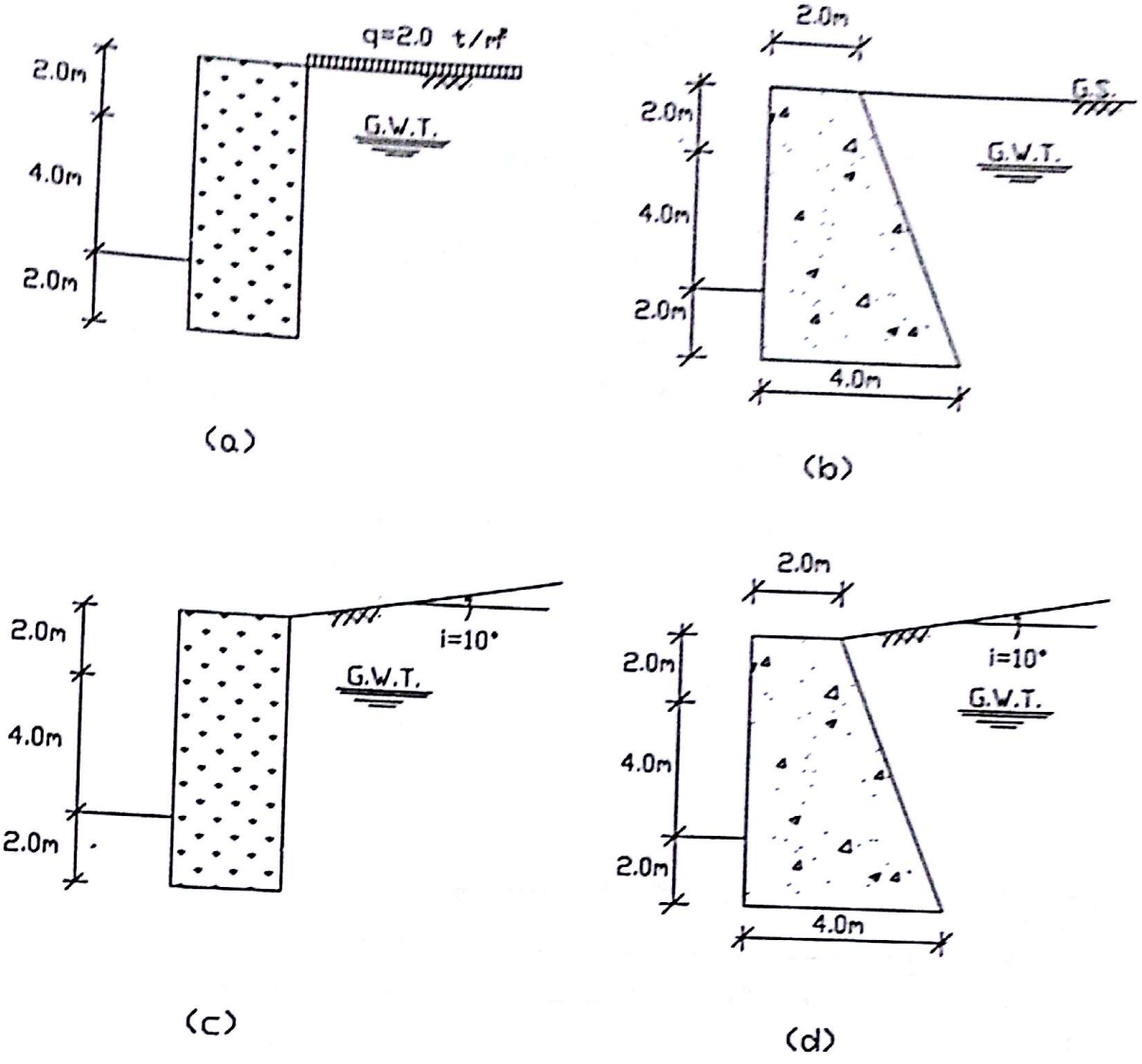

Figure (1)

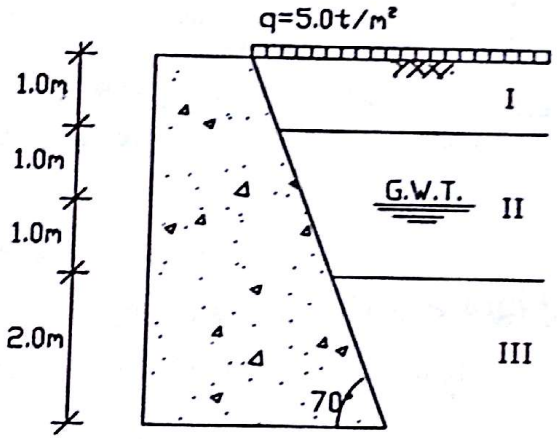

Figure (2)

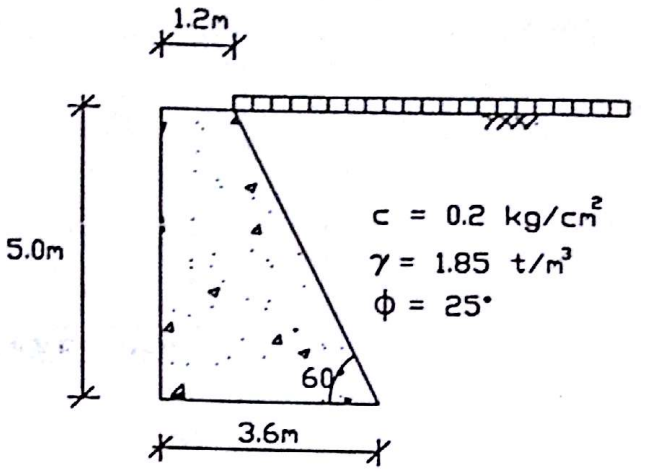

Figure (3)

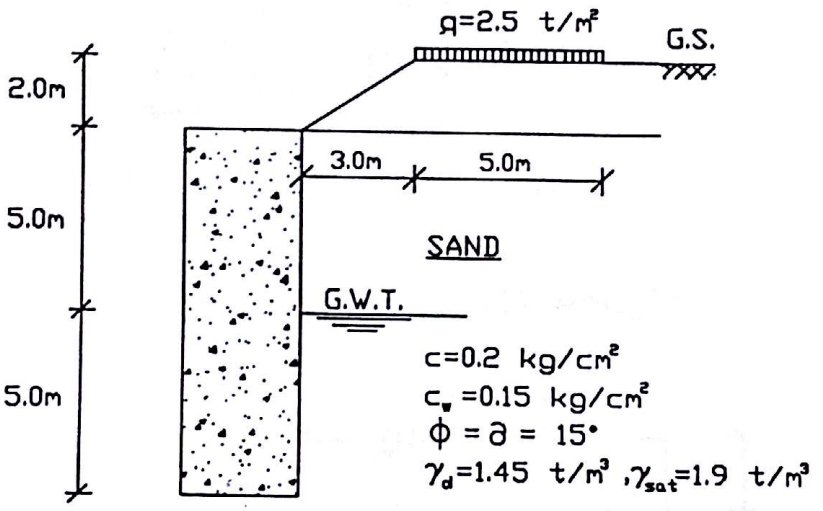

Figure (4)