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Sixth Semester B.E. Degree Examination, June-July 2009

Geotechnical Engineering – II

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1
 - a. What are the objects of soil exploration? (06 Marks)
 - b. Distinguish between undisturbed, disturbed and representative sample of soil. What are the tests conducted on these samples in the laboratory? (08 Marks)
 - c. Determine the area ratios of the samplers of the following data and also comment on the values obtained in regard to sample disturbance. (06 Marks)
 - i) Split spoon sampler $D_0 = 50 \text{ mm}$ $D_i = 35 \text{ mm}$
 - ii) Drive tube $D_0 = 100 \text{ mm}$ $D_i = 90 \text{ mm}$
 - iii) Shelby tube $D_0 = 50 \text{ mm}$ $D_i = 47 \text{ mm}$

- 2
 - a. Explain with neat sketches different methods of dewatering in the construction site. (12 Marks)
 - b. What is bore hole log? List the information to be recorded in a bore hole log. (04 Marks)
 - c. Give the purpose of standard penetration test. (04 Marks)

- 3
 - a. Distinguish between Boussinesq's and Westergaard's theory of stress distribution. (05 Marks)
 - b. Explain construction and uses of Newmark's chart. (05 Marks)
 - c. A point load of 500 kN due to monument acts on the ground surface. Calculate the vertical pressures at a point 5 m directly below the load and at a distance of 4 m from axis of loading. Assume $\mu = 0$.
Using i) Boussinesq's analysis ii) Westergaard's analysis. (10 Marks)

- 4
 - a. What is a flownet? What are its characteristics and uses? (05 Marks)
 - b. Explain the method of locating phreatic line in a homogeneous earth dam with horizontal filter. (05 Marks)
 - c. A sheet pile structure is shown in Fig. 4(c). Draw the flownet, determine seepage loss per meter length of wall, if $k = 22 \times 10^{-6} \text{ m/sec}$. (10 Marks)

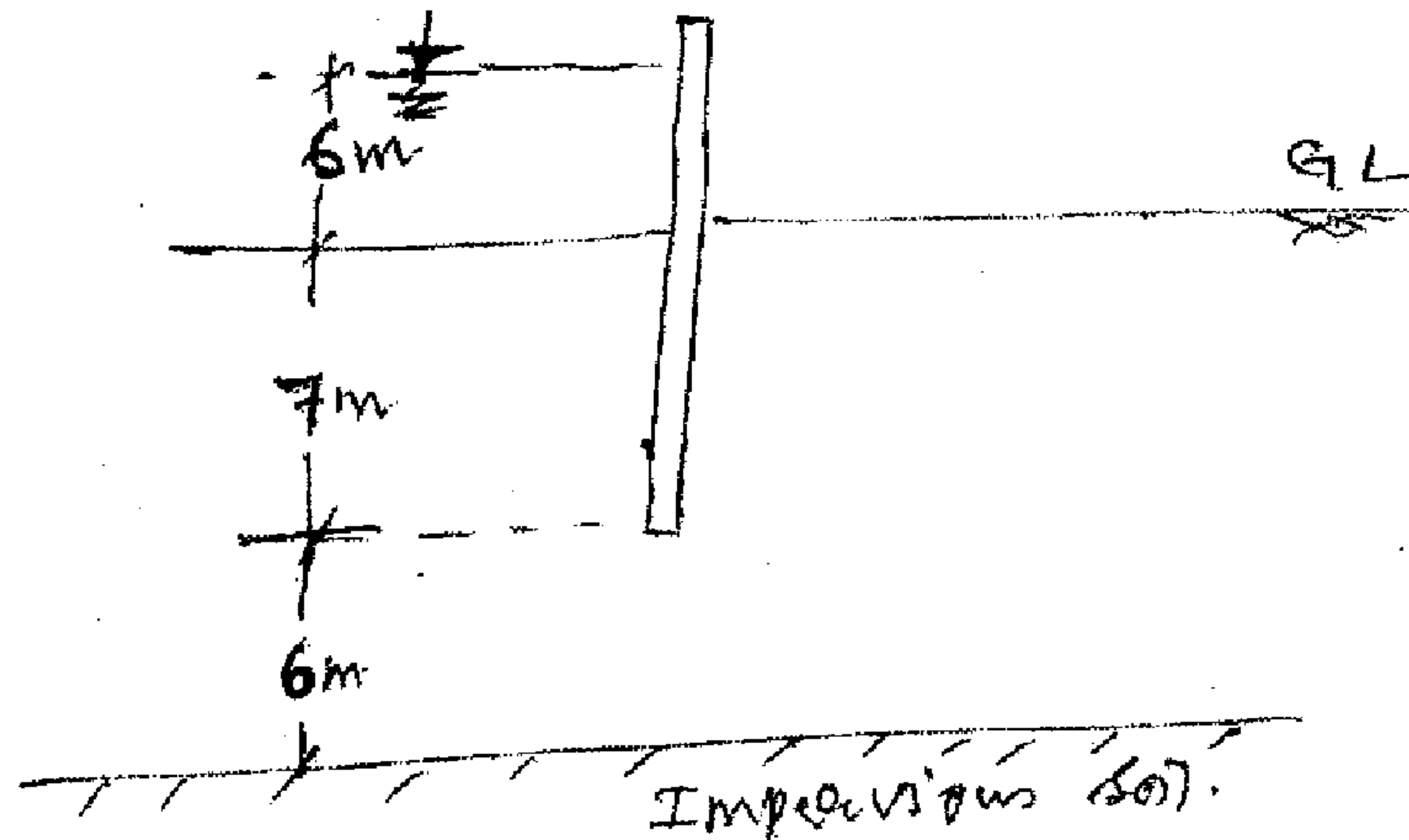


Fig. Q4(c)

PART - B

- 5 a. Describe Rehbann's graphical method of finding active earth pressure on a retaining wall. (05 Marks)
- b. Distinguish between active and passive earth pressure and also earth pressure at rest.
- c. For the retaining wall shown in the Fig. 5(c). Draw the earth pressure diagram for the active state and find total active earth pressure per unit length of wall, by Rankine's theory. Assume sand above water table is dry. (10 Marks)

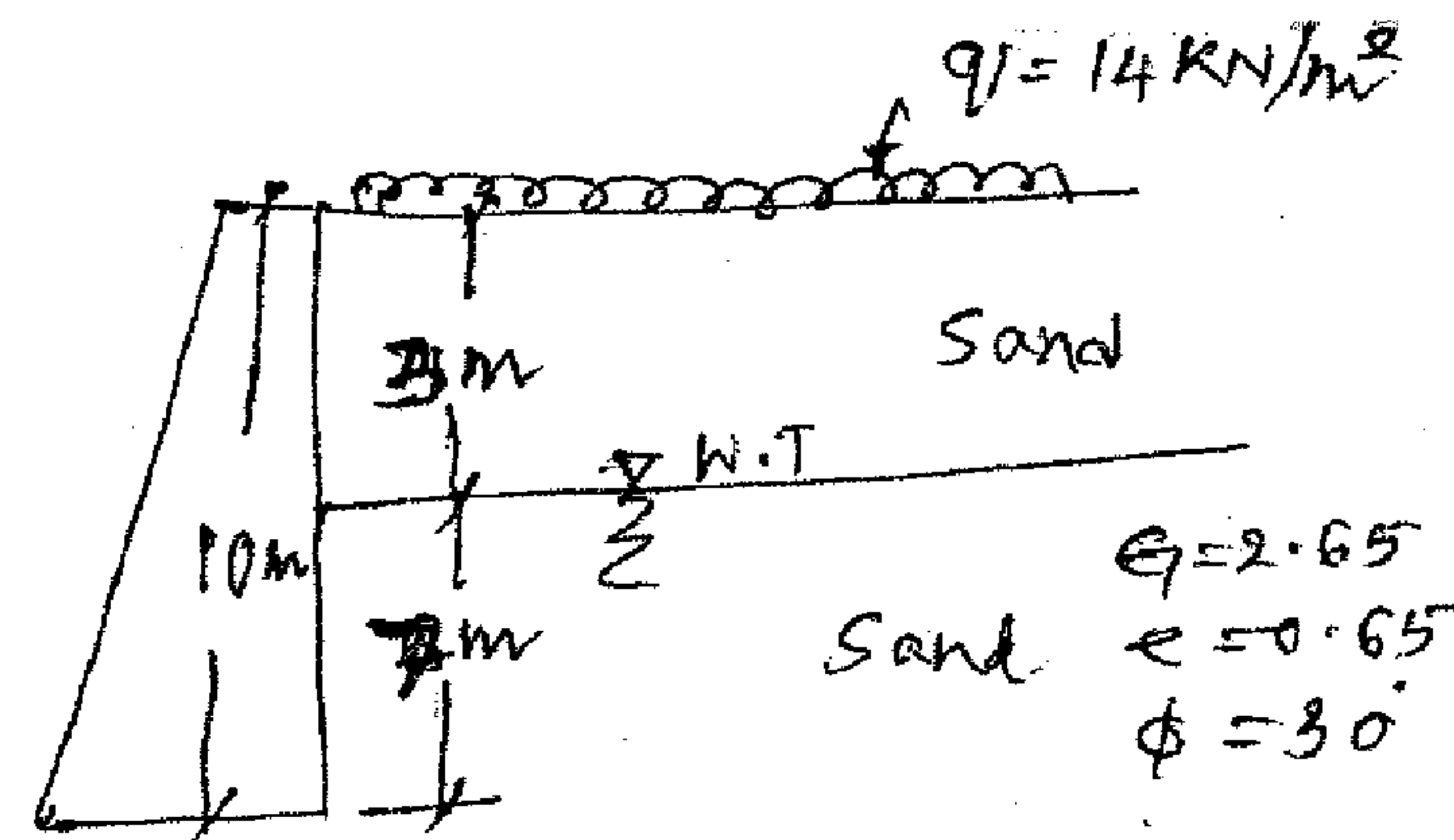


Fig. Q5(c)

- 6 a. Explain friction circle method of stability analysis of slopes. (06 Marks)
- b. List various causes of failure of slopes. (04 Marks)
- c. An embankment is made of a soil having $C = 25 \text{ kN/m}^2$ (cohesion) and $\phi = 20^\circ$ (angle of shearing resistance) and $\gamma = 19 \text{ kN/m}^3$ (unit weight). The slope is 1.5 Horizontal to 1 vertical and of 9m in height. Determine factor of safety along a slip circle passing through the toe. The centre of slip circle is located by directional angles $\alpha = 26^\circ$ and $\beta = 35^\circ$. Use method of slices the analysis. (10 Marks)
- 7 a. Distinguish between general shear failure and local shear failure. (05 Marks)
- b. List like factors affecting bearing capacity of soil. (05 Marks)
- c. A $2\text{m} \times 2\text{m}$ footing is located at a depth of 1.5m from ground surface in sand. The shear parameters are $C = 0$ and $\phi = 36^\circ$. Determine ultimate bearing capacity of soil if i) water table is well below the foundation level ii) water table is at base of footing iii) water table is at the ground surface. Unit wt of soil above water table = 18 kN/m^3 and saturated of soil is 20 kN/m^3 . Take $N_c = 50.5$, $N_q = 37.7$, $N_\gamma = 48.00$. (10 Marks)
- 8 a. Explain : (06 Marks)
- Immediate settlement
 - secondary settlement
 - Total settlement
 - Differential settlement.
- b. A soft clay layer is 5 m thick and lies under a newly constructed building. The effective pressure due to overlying strata is 300 kN/m^2 and new construction increase the over burden by 120 kN/m^2 . If liquid limit of soil is 80%. Natural water content of clay layer is 43% and $G = 2.70$. Dry density of clay is 18 kN/m^2 . Compute the settlement. (10 Marks)
- c. Estimate the immediate settlement of a concrete footing $1 \text{ m} \times 2 \text{ m}$ placed at a depth of 1 m in a soil with $E = 25000 \text{ kN/m}^2$ and $\mu = 0.30$. The footing is subjected to a load of 400 kN. Assume the footing to be rigid and take influence factor as 1.31. (04 Marks)
