

Mid-West University
Examinations Management Office
 Semester End Examinations 2081

Bachelor level/ B.E. Civil/ 5th Semester

Time: 3 hours

Subject: Foundation Engineering (CE454/CE317)

Full Marks: 50

Pass Marks: 25

- Attempt all the questions
- Figures in the margin indicate full marks.
- Assume suitable values, with a stipulation, if necessary.
- Candidates are required to answer the questions in their own words as far as possible.

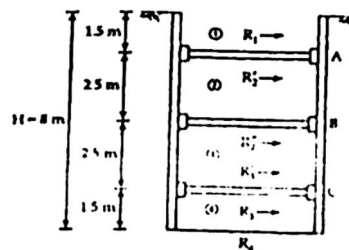
1. a) Explain the various factors for choice of particular foundations. Write down its procedure. For what purpose can the result of this test be used? How can the standard penetration values are corrected for dilatancy and over burden pressure. [2+3]

b) Differentiate between representative and non-representative soil samples. Explain the Various phases of foundation site investigation? [2+2]

2. a) Different assumptions are made while considering Rankine's theory and Coulomb's theory for finding lateral earth pressure force per unit length of the wall. Point out four basic differences made during assumptions. [5]

b) A retaining wall of 8.5 m high has a smooth vertical back It supports a horizontal backfill with $\phi = 40^\circ$, $c = 15$ kPa. The water table is at a depth of 3.5 m below the surface of the backfill. The density of the backfill is 17.5 kN/m³ above the water table and 19.5 kN/m³ below the water table. The backfill supports a surcharge of 30 kPa. Determine the magnitude and point of application of active earth pressure. [4]

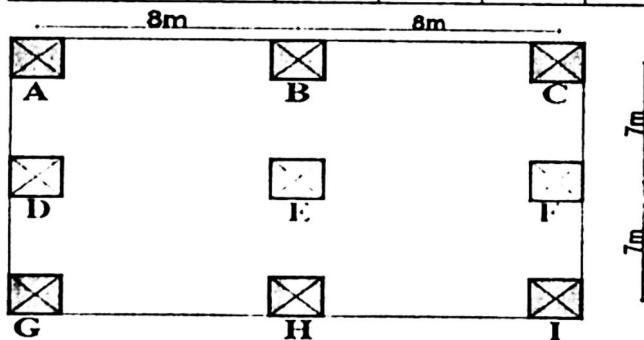
3. a) Explain Various types of coffer dam used in construction and why it is required. Determine the forces in the strut for the bracing system is shown below take $\gamma = 18$ kN/m³, $C = 30$ kN/m², and $s = 2$ m assume hinges at level B, C and D. [2+4]



b) Define negative skin friction. A cantilever sheet pile wall is driven into sand deposit having friction angle 35° and bulk unit weight of 21 kN/m³. One side of the sheet pile was backfilled to 3.5 m height. The backfill material is cohesion less sand having $\phi = 32^\circ$ and bulk unit weight of 18 kN/m³. Using the simplified method determine the depth of penetration needed for the sheet pile to retain the backfill. [1+3]

4. a) What is pile foundation and classify it? A piles group consists of 16 piles, diameter of 30 cm, are arranged in square pattern and 18 m length driven in clay. If cohesion at ground surface is 110 kN/m^2 and at the base is 160 kN/m^2 . Find the load carrying capacity of group pile. Take $\alpha = 0.6$, spacing = 0.75 m C/C and FOS = 3. [1+4]
- b) What do you know about the well foundation? How it can be differentiated with pile foundation? Describe the components of well/caisson foundation with neat sketch. [1+1+2]
5. a) Derive the Terzaghi's bearing capacity equation for strip footing in general shear failure condition. Also enlist the assumptions made for it. [3]
- b) The total column load of a footing at ground level is 1839 kN . The sub-soil is cohesionless soil with $\phi = 34^\circ$, $\gamma = 21.2 \text{ kN/m}^3$. The footing is to be located at a depth of 2 m below ground level. For a footing of size $3 \text{ m} \times 5 \text{ m}$. Determine the factor of safety by Terzaghi's general shear theory if water table is [3]
- At the 1 m below from the ground surface.
 - At the ground level.
 - At footing level
- (Take $N_c = 38.3$, $N_q = 23.4$ and $N_\gamma = 19.9$).
6. a) Explain various methods for foundation soil strengthening. [2]
- b) The plan of the Raft Foundation with 9 columns shown figure below. Assuming mat it rigid determine soil pressure distribution at column A, B, D, E and draw the force diagram of critical strip beam of mat foundation. The columns size $650 \text{ mm} \times 650 \text{ mm}$. [5]

Column	A	B	C	D	E	F	G	H	I
Load (KN)	950	1239	945	1199	1503	1220	884	1175	950



The End