BACHELOR OF ENGINEERING (CIVIL ENGINEERING)
FOURTH YEAR FIRST SEMESTER EXAM 2025
SOIL MECHANICS-II
PART-I (50 Marks)

Use separate answer scripts for each Part

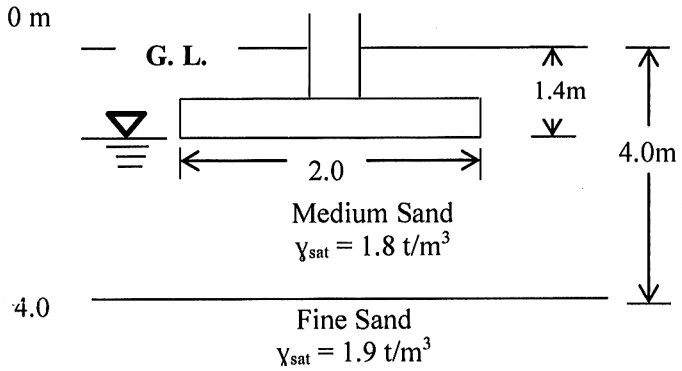
Full Marks 100
(50 marks for this part)

Q. No.	[Use code: IS: 6403, IS: 2131] **(Answer all the questions.)** **[Assume any data reasonably if necessary]**	**Marks**

1. (a) Determine the net safe bearing capacity for a square footing (2m x 2m) shown in Fig. 1 using IS recommendations.

[Take, $\gamma_w = 10$ kN/m^3]

[Correct the N values as per *IS* recommendations]



Depth (m)	N Value
0.75	4
1.5	5
2.25	7
3.0	10
3.75	15
4.5	17
5.25	21
6.0	26

Fig. 1

[12]

2. Following results are obtained from a plate load test performed on a square plate of 30cm x 30cm size at a depth of 1.2m below the ground level in a homogeneous bed of sand.

Applied Load (kg/cm^2)	0.25	0.5	1	2	3	4	5
Settlement (mm)	0.45	0.85	1.8	3.45	5.6	8.75	14.5

(i) Plot the load vs settlement curve and determine the ultimate bearing capacity of plate.

(ii) Determine the ultimate load which a footing of 1.5m x 1.5m, placed at 1.2m below ground level in the same soil, will carry if the allowable settlement is 2 cm.

[10]

Ex/CE/5/T/403/2025

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Q. No.	[Use code: IS: 6403, IS: 2131] **(Answer all the questions.)** **[Assume any data reasonably if necessary]**	**Marks**
3. (a)	Site investigation is to be made for 2300 kN load carried on (2.5m x 2.5m) a footing. The foundation will be built on layered soil as shown in Fig. 2. Estimate the minimum depth of boring.	[10+6]
(b)	Discuss wash boring in subsurface exploration with a neat sketch.	
4. (a)	Discuss (i) Area ratio, (ii) Inside clearance, (iii) Outside clearance of a sampler with a neat sketch.	[6+6]
(b)	Discuss the advantages and disadvantages of standard penetration test (SPT) and static cone penetration test (SCPT).	

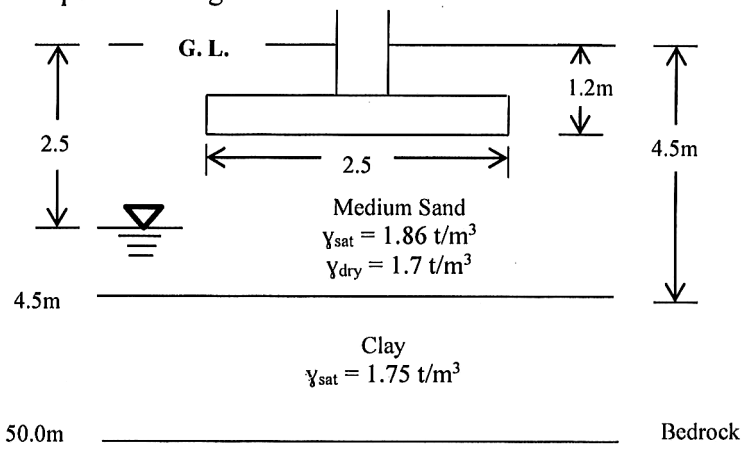

Fig. 2

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Bachelor of Engineering (Civil Engineering)

[4th Year; 1st Semester Examination - 2025]

Soil Mechanics II

Total Time: Three Hours | Full Marks 100 (Part I: 50 + Part II: 50)

Part II (50 Marks)

Use a separate Answer-Script for each part

Answer any two from the three questions. Answer all the parts of a question at a place.

1. (a) State the Boussinesq Analysis for stress distribution with the assumptions. (5+5)

With the help of Boussinesq theory derive (in detail) an expression to determine the vertical stress at depth 'z' below the center of a uniform circular load having the radius 'r' and intensity 'q' applied at ground surface.

(b) Define the 'Equivalent Point Load Method'. (3+12)

The Fig. 1 shows a uniformly loaded (100 kN/m^2) ground ABCDEFA. With the help of the Newark's Chart determine the distributed stress on a point 5 meter below (vertically) the corner point F. Compare the stress intensities obtained by 'Equivalent Point Load Method' and through the 'Newmarks' Chart'.

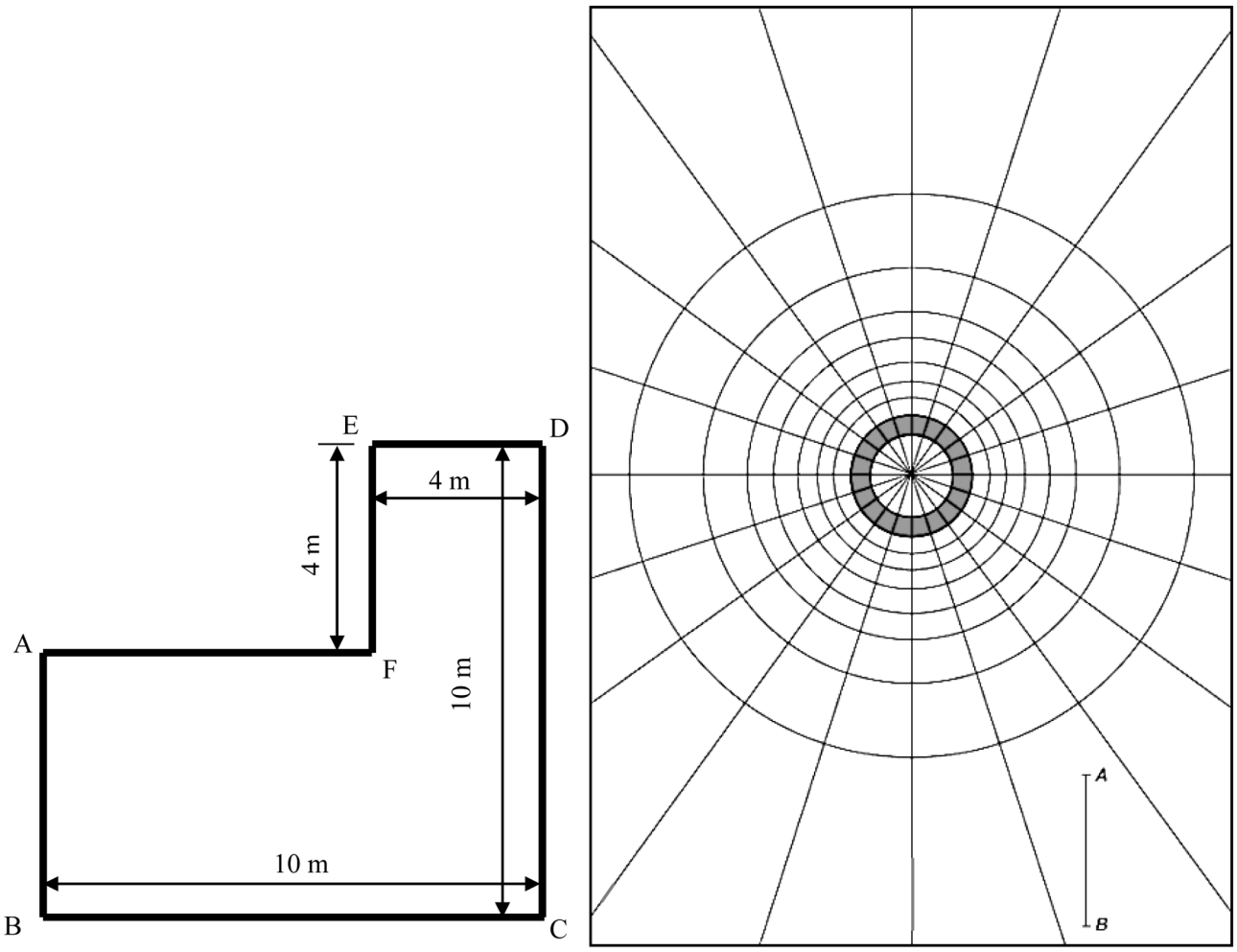

Fig. 1 Uniformly loaded area and Newmarks' Chart

Ref. No. **Ex/CE/5/T/403/2025**

Bachelor of Engineering (Civil Engineering)

[4th Year; 1st Semester Examination - 2025]

Soil Mechanics II

Total Time: Three Hours

Full Marks 100
(Part I: 50 + Part II: 50)

Part II (50 Marks)

Use a separate Answer-Script for each part

2. (a) How 'Finite' and 'Infinite' slope can be distinguished? Derive, with the help of a neat sketch, the expression for the factor of safety for an infinite slope of sandy soil without any seepage condition. Use common nomenclatures for your derivation. (4+6)

   (b) An infinite slope is made of clay with the following properties: γ_t = 18 kN/m^3; γ' = 9 kN/m^3; c′ = 25 kN/m^2, Ø′ = 28°. If the slope has an inclination of 35° and height equal to 12 m, determine the stability of the slope, when (i) the slope is submerged, and (ii) there is seepage parallel to the slope. (15)

3. (a) Differentiate the Rankine and Coulomb Earth Pressure Theories. (5+5)

   Explain in detail, with the help of Mohr circles, the occurring of minimum and maximum earth pressures. What would be the inclination of the failure planes developed in each case?

   (b) A smooth vertical wall. 4 m high, retains a soil with c′ = 25 kN/m^2 and γ = 18 kN/m^3. The horizontal backfill surface carries a uniform surcharge load of 50 kN/m^2. If the retaining wall is caused to move toward the soil sufficiently to mobilize the passive resistance, draw the pressure distribution diagram. Determine the magnitude and the point of application of the total passive pressure. (15)

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