III-SEM/CIVIL//2019(W)/(New)

TH-2-GEOTECHNICAL ENGINEERING

Full Marks: 80 Time : 3 Hours

Answer any Five Questions including Q No. 1 & 2

Figures in the right hand margin indicates marks

1.	Answer ALL the questions: a) What do you mean by zero air void line? b) What is coefficient of curvature? c) Define safe bearing capacity. d) What is passive earth pressure? e) Define quick sand condition. f) Define OMC & MDD. g) What do you mean by index property of soil? h) What is density index? i) Write the expression for shear strength as per coulomb's theory. j) What is group index?	(2x10)
2.	Answer any SIX questions: a) Describe about textural classification of soil. b) Explain Mohr-Coulomb's failure theory. c) Derive the relation between e, G, W & S. d) Write down the difference between compaction & consolidation. e) Define Darcy's law. What are the factors affecting permeability? f) Discuss about passive earth pressure. g) What is flow net? State the properties of flow net.	(5x6)
3.	Calculate the coefficient of permeability of a soil sample 6cm in height and 50cm^2 in sectional area, if a quantity of water equal to 430 cc passed down in 10minutes under a constant head of 40cm. On oven drying, the specimen weighed 4.98N. Taking G= 2.65, calculate the seepage velocity.	10
4.	What do you mean by wet mechanical analysis? Give a brief description about pipette method.	10
5.	A clay layer, whose total settlement under a given load is expected to be 250mm, settles by 50mm in 15 days after the application of a load increment. How many days will be required for it to reach a settlement of 125mm? How much settlement will occur in 300 days? The layer has double drainage.	10
6.	What will be the net safe bearing capacity and gross safe bearing capacity of sand having $\phi = 36^0$ and effective unit weight 1.8 tonnes/m^3 under following cases: (i) 1m wide strip footing (ii) 1m × 1m square footing Consider the footings are placed at a depth of 1m from ground surface and water table is at greater depth. Assume a factor of safety of 3.0. Use Terzaghi's theory and take N_q= 47 and N_γ= 43.	10
7.	What are the types of shear failures? Describe with neat sketches.	10

III-SEM./CIVIL ENGG./ 2021(W)

TH-II Geo Tech. Engg

Full Marks: 80 Time- 3 Hrs

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10
   a. What is block diagram? What is its use?
   b. What is Density Index?
   c. Define Uniformity Coefficient.
   d. State Darcy's Law.
   e. Differentiate between compaction and consolidation of soil.
   f. State Mohr- Coulomb's equation of shear failure.
   g. Differentiate between active and passive earth pressure.
   h. Define MDD and OMC.
   i. What is Zero air void line?
   j. What is bearing capacity of soil?

2. Answer **Any Six** Questions 6 x 5
   a. Explain the origin and formation of Soil.
   b. Derive the relation between Void ratio and porosity.
   c. What is Consistency of Soil? Explain different types of Atterberg indices.
   d. Discuss about Plasticity Chart.
   e. Write short note on Quick sand condition.
   f. Compute the active and passive earth pressure force at a depth of 8m in a dry cohesionless sand with angle of internal friction 30 degree and unit weight 18 KN/m^3.
   g How many cubic meter of earth fill can be constructed at a void ratio of 0.67 from 190000 m^3 of borrow material that has a void ratio of 1.1?

3 What do you mean by sedimentation analysis? Give a brief description about pipette method. 10

4 In a consolidation test void ratio decreased from 0.70 to 0.65 when the load was changed from 50 KN/m^2 to 100 KN/m^2. Compute compression index and coefficient of volume change. 10

5 The mass and volume of a saturated clay specimen were 29.8 gm and 17.7 cm^3 respectively. On oven drying the mass got reduced to 19 gm and volume to 8.9 cm^3. Calculate shrinkage limit, shrinkage ratio and volumetric shrinkage. Also compute G of soil. 10

6 A cylindrical mould of diameter 7.5 cm contains 15 cm long sample of sand. When water flows through the soil under constant head at a rate of 55 cc/minute, the loss of head between two point 8 cm apart is found to be 12.5 cm. Determine the coefficient of permeability of soil. 10

7 What are the types of shear failures? Describe with neat sketches. 10

3RD SEM./ CIVIL/ 2022(W)

Th2 Geotechnical Engineering

Full Marks: 80 Time- 3 Hrs

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

a. What is density index?
b. State stokes law.
c. What is active earth pressure?
d. Define air content and percentage air voids?
e. What do you mean by dispersing agent correction?
f. What do you mean by flow index?
g. Write the name of tests for finding shear strength of soil?
h. Differentiate between compaction and consolidation?
i. What do you mean by ultimate bearing capacity?
j. What do you mean by correction due to dilatancy and overburden?

2. Answer **Any Six** Questions 6 x 5

a. What is scope of soil mechanics?
b. Explain the phenomenon of quick sand.
c. Describe gravity loading method of plate load test ?
d. A constant head permeability test was conducted on a soil specimen has specific gravity of 2.65 and saturated water content of 20% . If the coefficient of permeability is 0.1 m/sec the seepage velocity is
e. Explain about standard penetration test.
f. What are the factors affecting compaction?
g. Explain pycnometer method for determination of water content.

3 Write about IS classification of soil. 10

4 For a soil sample the specific gravity of soil mass is 1.7 and specific gravity of soil particle is 2.65 determine its void ratio 10
a) Assuming sample is dry
b) Sample has water content of 15%

5 A rectangular footing 2mx3m rests on c-Φ soil with its base at 1.5m below ground surface. Calculate safe bearing capacity , using factor of safety as 3 on 10
1) net ultimate bearing capacity
2) ultimate bearing capacity
The soil has bulk unit weight =18kn/m^3,C=10 kn/m^3,Φ=30° use Terzaghi analysis.

6 A clay layer 4m thick is sand witched between layer of sand calculate the time the clay layer take to reach 70% consolidation. Coefficient of consolidation $=3x10^{-4}$ 10

7 Describe briefly procedure of sedimentation analysis and hydrometer method . 10

3RD SEM./CIVIL/ 2023(W)NEW

Th-2 Geotechnical Engineering

Full Marks: 80 **Time- 3 Hrs**

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

a. What is quick sand condition
b. State Darcy's law.
c. What do you mean by active and passive earth pressure.
d. Define Air content & Degree of saturation.
e. Differentiate between compaction & consolidation.
f. What are the Index properties of soil.
g. What do you mean by zero air void line.
h. Differentiate between shallow foundation & deep foundation.
i. Write down the relationships between γ_d, γ_w, e, and G.
j. What is zero air void line.

6 x 5

2. Answer **Any Six** Questions

a. Describe the phenomenon of quick sand with neat sketch.
b. Discuss Mohr-Coulomb failure theory.
c. Discuss the various factors affecting permebility of soil.
d. What is plasticity chart. Describe in brief the I.S classification of soil.
e. What do you mean by flow net. What are the properties of flow net.
f. A soil sample has a porosity of 40 %.The specific gravity of solids is 2.70. Calculate (a) voids ratio (b) dry density (c) unit weight if the soil is 50% saturated(d) unit weight if the soil is completely saturated.
g Describe the Assumptions of Rankine's Earth pressure theory. 10

3 Describe in detail Terzaghi's spring analogy for primary consolidation with neat sketches. 10

4 Explain in detail triaxial shear test of soil with neat sketch. 10

5 What are the types of shear failures? Describe with neat sketches. 10

6 A square footing 2.5m X 2.5m is built in a homogeneous bed of sand of unit weight 20 KN/m^3 and having an angle of shearing resistance of 36°. The depth of the base of footing is 1.5m below the ground surface, Calculate the safe load that can be carried by a footing with factor of safety of 3 against complete shear failure.Use Terzaghi's Analysis. 10

7 For a soil sample the specific Gravity of soil mass is 1.7 and specific gravity of soil particles is 2.7. Determine the void ratio(i) Assuming the soil sample is dry and (ii) The soil sample has a water content of 12 percent.