Subject Code: KCE501

PAPER ID-310304

Roll No: | | | | | | | | | | | | | |

B.TECH
(SEM V) THEORY EXAMINATION 2020-21
GEOTECHNICAL ENGINEERING

Time: 3 Hours ***Total Marks: 100***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

Q no.	Question	Marks	CO
a.	Explain the process of soil formation. Differentiate between residual and transported soil.	2	CO1
b.	Derive the formula between soil moisture content (w), degree of saturation (S), specific gravity (G) and void ratio €.	2	CO1
c.	What are the factors affecting the permeability of soils?	2	CO2
d.	What do you understand by the term "flow net"?	2	CO2
e.	Define total stress, neutral stress and effective stress.	2	CO3
f.	Define consolidation. How it is differ from compaction?	2	CO3
g.	List the assumptions made in Boussinesq's theory.	2	CO4
h.	How do you define "failures" in soils?	2	CO4
i.	What are the different types of earth pressures?	2	CO5
j.	What are the assumptions in Rankine's theory?	2	CO5

SECTION B

2. Attempt any *three* of the following:

Q no.	Question	Marks	CO
a.	A natural deposit has bulk unit weight of 18.5 kN/m^3 and water content of 5%. Calculate the amount of water required to be added to 5 m^3 constant. Also, find the degree of saturation. Assume G= 2.65.	10	CO1
b.	Determine the neutral and effective stress at a depth of 15m below the ground surface for following conditions: Water table 3m below ground surface, for the soil with properties given by specific gravity = 2.65, e= 0.7, average moisture content above water table = 5%.	10	CO2
c.	Define the following terms: i. Coefficient of compressibility ii. Compression index iii. Coefficient of volume change iv. Expansion/ swelling index v. Recompression index	10	CO3
d.	Analyze the Skempton's Pore Pressure coefficients. Describe how are the Pore Pressure Parameters A and B determined?	10	CO4
e.	Differentiate critically the earth pressure theories of Rankine and Coulomb.	10	CO5

SECTION C

3. Attempt any *one* part of the following:

Q no.	Question	Marks	CO
a.	Differentiate between: i. Liquidity index and consistency index ii. Flow index and toughness index iii. Plasticity and consistency iv. Activity and sensitivity.	10	CO1
b.	Write the importance of the classification of soils? Discuss in brief with the help of a neat sketch classification of fine-grained soils as per Indian Standard Classification System of soils. Also, give the significance of D_{10}, D_{30} and D_{60}.	10	CO1

4. Attempt any *one* part of the following:

Q no.	Question	Marks	CO
a.	A falling head permeability test was performed on a sample of a clear uniform sand. One minute was required for the initial head of 100cm to fall to 50cm in the standpipe of cross-sectional area of 1.50cm^2. If the sample was 4cm dia and 30 cm long, calculate the coefficient of permeability of sand.	10	CO2
b.	Explain quick sand condition. Give the expression for critical hydraulic gradient along with its significance.	10	CO2

5. Attempt any *one* part of the following:

Q no.	Question	Marks	CO
a.	Illustrate the assumptions of the Terzaghi's theory for calculating the rate of 1-D consolidation and prove that: $\frac{\partial u}{\partial t} = c_v \cdot \frac{\partial^2 u}{\partial z^2}$.	10	CO3
b.	Compare standard Proctor test and modified Proctor test.	10	CO3

6. Attempt any *one* part of the following:

Q no.	Question	Marks	CO
a.	Discuss in detail the Mohr-Coulomb's theory of shear failure of soils.	10	CO4
b.	Describe tri-axial shear test. What are its advantages and disadvantages?	10	CO4

7. Attempt any *one* part of the following:

Q no.	Question	Marks	CO
a.	What are the basic mode of failure of an earth retaining structure? Briefly, outline the remedial measures that can be undertaken against such failures?	10	CO5
b.	A 5m high rigid retaining wall has to retain the soil having the following properties: G= 2.68, μ=0.36, e=0.74 and Φ= 30° i.Plot the distribution of lateral Earth pressure for the wall. i.Determine the magnitude and point of resultant thrust. i.Compute the percentage change in lateral thrust if the water table rises from a great depth to the top of the backfill.	10	CO5