



# Sanjay Ghodawat University, Kolhapur

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2018-19

EXM/P/09/01

Year and Program: 2018-19

School of Technology

Department of S. Y. B. Tech

Course Code: CET217

Course Title: Soil Mechanics

Semester – II

Day and Date Saturday  
01/06/2019

End Semester Examination  
(ESE)

Time: Max Marks: 100  
10.30 am to 1.30 pm.

## Instructions:

- 1) All questions are compulsory.
- 2) Assume suitable data wherever necessary.
- 3) Figures to the right indicate full marks.

## Q.1 Solve any Two

- a) Discuss a note on classification of soil.

OR

- a) A soil sample is partially saturated. Its natural water content was found to be 22% and bulk unit weight  $20 \text{ kN/m}^3$ . If specific gravity of soil solids is 2.65, estimate degree of saturation and void ratio.

- b) State and explain Darcy's law of permeability. Write validity.

OR

- b) In falling head permeameter test, falling results were obtained:  
Sample length = 12 cm, sample diameter = 80 mm, initial head = 1200 mm, final head = 400 mm, time for fall of head = 6 minutes, stand pipe diameter = 4 mm. Find coefficient of permeability of soil in mm/sec.

## Q.2 Solve any Two

- a) Differentiate between standard Proctor test and Modified Proctor test.

OR

- a) An undisturbed sample of clay, 24 mm thick consolidated 50% in 20 minutes, when tested in laboratory under drainage allowed at top and bottom. The clay layer from which sample was obtained is 4 meter thick in field.

- i) How much time will it take to consolidate 50%, with double drainage?

- ii) If the clay stratum has only single drainage, calculate the time

Marks Bloom's CO

Level

07

L<sub>2</sub>

CO1

07

L<sub>2</sub>

CO1

08

L<sub>3</sub>

CO2

08

L<sub>3</sub>

CO2

07

L<sub>4</sub>

CO3

07

L<sub>4</sub>

CO3

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required to consolidate 50%. Assume uniform distribution of consolidation pressure.

- b) A concentrated load of intensity 20 kN acts at a point in soil. Find intensity of normal and shear stress at depth of 4 m directly below the load. Also find the intensity of pressure at a point which is 2 m horizontally away from the load and at a depth of 4 m? Use Boussinesq's theory. 08 L<sub>3</sub> CO4

OR

- Q.3 b) Write approximate methods for calculation of stresses in soils. 08 L<sub>3</sub> CO4  
Solve any Two
- a) Write a note on following terms 08 L<sub>1</sub> CO1  
1. Unit weight of soil 2. Specific gravity of soil solids 3. Water content 4. Void Ratio
- b) Describe flow net in detail. 08 L<sub>1</sub> CO2
- c) Define following terms 08 L<sub>1</sub> CO3  
1. Coefficient of consolidation 2. Coefficient of compression  
3. Coefficient of volume change 4. Coefficient of compressibility
- d) Write assumptions in Boussinesq's theory for point load. 08 L<sub>2</sub> CO4

Q.4 Solve any Two

- a) What do you understand by shear strength of soil. List methods to determine the same. Explain direct shear strength in detail. 09 L<sub>3</sub> CO5
- b) Following results were obtained from a series of a consolidated undrained tests on a soil. 09 L<sub>1</sub>, L<sub>3</sub> CO5

Sample No.	Confining pressure ( $\sigma_3$ ) kN/m <sup>2</sup>	Deviator stress ( $\sigma_d$ ) kN/m <sup>2</sup>
1	100	600
2	200	750
3	300	870

Plot failure envelope and find out value of shear strength parameters of soil

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- c) A soil mass is retained by a smooth backed vertical retaining wall of 6 m height. The soil has a bulk unit weight of  $20 \text{ kN/m}^3$  and  $\phi = 16^\circ$ ,  $c = 0$ . The backfill carries a surcharge of  $4.5 \text{ kN/m}^2$ . Determine the total active earth thrust in  $\text{kN/m}$  and its point of application

09 L<sub>3</sub> CO5

Q.5

Solve any Two

- a) Explain how different types of rocks are formed. 09 L<sub>2</sub> CO6
- b) Explain following terms with respect to rocks with neat sketches:  
i) Joints ii) faults iii) folds 09 L<sub>2</sub> CO6
- c) Explain in detail how a site is selected for a tunnel based on the geology of the site. 09 L<sub>2</sub> CO6

Q.6

Solve any Three

- a) Explain in detail: Active, passive and at rest earth pressure 06 L<sub>2</sub> CO5
- b) Write a note on UU, CU and CD types of shear tests. 06 L<sub>2</sub> CO5
- c) Explain stresses and strains in rocks. 06 L<sub>2</sub> CO6
- d) Explain importance of geology in site selection. 06 L<sub>2</sub> CO6

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