

(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 180418

Roll No.

B. TECH.

Theory Examination (Semester-IV) 2015-16

SOIL MECHANICS

*Time : 3 Hours*

*Max. Marks : 100*

Note: Attempt each section.

Section-A

UPTU NOTES

Q1. Attempt each short answer type questions. (2×10=20)

- (a) What do you understand by a bulk density of soil?
- (b) Give a general classification of soil based on particle size.
- (c) Define stress. What is a neutral stress of soil?
- (d) For what purpose the new mark influence chart is used?

(1)

P.T.O.

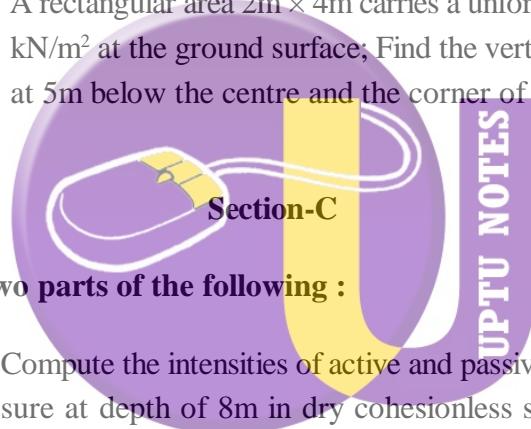
- (e) List any four field compaction method along with their applicability.
- (f) Why the field germination is affected by the compaction of tractor wheels?
- (g) Differentiate between compaction and consolidation.
- (h) What is a “void ratio”? Give the properties of soil on which it depends.
- (i) What do you mean by earth pressure?
- (j) What do you understand by “Taylor’s stability number”?

**Q2. Attempt any five parts of the following : (10×5=50)**

- (a) Derive the “Active earth pressure” of soil.
- (b) Discuss the “Terzaghi’s theory” of consolidation.
- (c) Explain the “Jodhpur mini compaction test”. Is it superior then Abbot Compaction?
- (d) Sketch and explain the Mohr’s stress circle to find shear strength of soil.

(2)

- (e) What do you mean by index properties of soils? Is it differing from the physical properties of soil?
- (f) A soil has bulk unit weight of  $20.11 \text{ kN/m}^3$  and water content of 15%. Calculate the water content if the soil partially dries to a unit weight of  $1942 \text{ kN/m}^3$  and the void ratio remains unchanged.
- (g) Discuss the Bousinesque's analysis for concentrated force.
- (h) A rectangular area  $2\text{m} \times 4\text{m}$  carries a uniform load of  $80 \text{ kN/m}^2$  at the ground surface; Find the vertical pressure at 5m below the centre and the corner of loaded area.



**Attempt two parts of the following :**

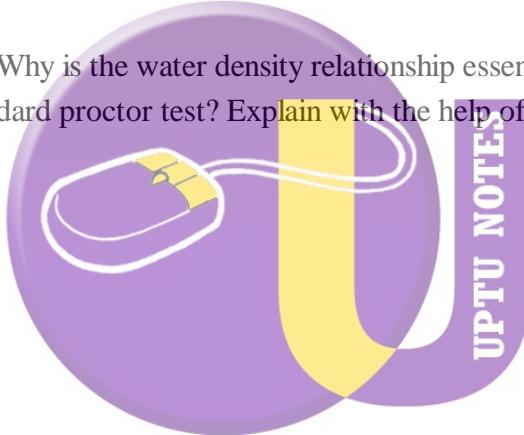
**( $15 \times 2 = 30$ )**

- Q3. (i) Compute the intensities of active and passive earth pressure at depth of 8m in dry cohesionless sand with an angle of internal friction of  $30^\circ$  and unit weight of  $18 \text{ kN/m}^3$ . What will be the intensities of active and passive earth pressure if the water level rises to the ground level? Take saturated unit weight of sand as  $22 \text{ KN/m}^3$ ?
- (ii) Discuss the stability analysis of infinite slopes?

(3)

P.T.O.

- Q4. (i) An unsaturated sample of clay stratum, 2m thick was tested in the laboratory and the average value of coefficient of consolidation was found to be  $2 \times 10^{-4} \text{ cm}^2/\text{sec}$ ? If the structure is built on the clay stratum, how long will it take to attain half the ultimate settlement under the load of structure? Assume double drainage.
- (ii) Discuss the Taylor's method of consolidation.
- Q5. (i) Describe the factors affecting on consolidation.
- (ii) Why is the water density relationship essential for standard proctor test? Explain with the help of neat sketch.



(4)