



**KD-6447**

**B. E. II (Sem. IV) (Civil) Examination**

**December - 2012**

**Geotechnical Engineering - I**  
*(Old Course)*

Time : 3 Hours]

[Total Marks : 100

**Instructions :**

(1)

नीचे दशांशों में निशानीवाणी विंगतों उत्तरवही पर अवश्य लखनी.  
Fillup strictly the details of signs on your answer book.

Name of the Examination :  
B. E. 2 (Sem. 4) (Civil)

Name of the Subject :  
Geotechnical Engineering - 1 (Old)

Subject Code No. : 6 4 4 7 Section No. (1, 2,.....): Nil

Seat No. :  
[ ] [ ] [ ] [ ] [ ] [ ]

Student's Signature

- (2) Assume suitable data if necessary.  
(3) Figures to the right indicate full marks.  
(4) Explain with neat sketches, if needed.

- 1 (a) Explain following terms : (any five) 10
- (1) Water content  
(2) Co-efficient of curvature  
(3) Void ratio (e)  
(4) Permeability  
(5) Saturated density  
(6) Compection  
(7) Unit weight.
- (b) Need for soil-mechanics, studies in civil engg. 6
- (c) Relation between void ratio (e), sp. gravity (G),  
Water content (W) and degree of saturation (S),  
with neat sketches of soil phases. 6

**OR**

- (c) Calculate the unit wt. and sp. gravity of solids of 6
- (a) porosity of soil sample 40%.  
(b)  $r_d = 15.89 \text{ kW/m}^3$ .

- 2 (a) Defined the terms : (any three) 6  
 (1) Liquidity limit  
 (2) Consistency index  
 (3) Activity number  
 (4) Plasticity index.
- (b) Explain step by step determination of water content of soil mass by oven-dry method. 6

OR

- (b) A soil has liquid limit 48%. Natural water content 40% and consistency index 0.72, find liquid index and plastic index. 6
- 3 (a) Explain in brief field compaction method. 6  
 (b) Distinguish between compaction and consolidation of soil. 4  
 (c) A laboratory compaction test of soil having specific gravity, 2.67, gave MDD of  $1.9 \text{ gm/cm}^3$ , at a water content of 15%. Determine degree of saturation, air content and percentage air voids at maximum dry density. Find MDD corresponding to zero air voids at OMC. 6

OR

- (c) Discuss factors affecting compaction of soil. 6
- 4 (a) Explain various factors affecting coefficient of permeability. 7  
 (b) Give advantages and disadvantages of permeability. 4  
 (c) Calculate the coefficient of permeability of a soil sample 6 cm in height and  $50 \text{ cm}^2$  in cross sectional area. If a quantity of water equal to 430 ml passed down in 10 minutes, under an effective constant head of 40 cm. 7
- 5 (a) What is consolidation ? Explain mechanics of mechanics of consolidation of spring and piston analogy method. 8

OR

- (a) Differentiate between compression and consolidation. 8
- (b) A normally consolidated clay settled by 2 cm. 8  
When the effective stress was increased from 100 kPa to 200 kPa. Calculate the settlement when the effective stress is increased to 400 kPa and 800 kPa.
- 6 (a) List out various test for shear strength of soil. 2
- (b) Explain direct shear test with sketch. 6

**OR**

- (b) Explain Vane shear test with sketch. 6
- (c) Observation for normal load and maximum Shear force for specimen of Sandy clay tested in the shear box 36 cm<sup>2</sup> in area under untrained condition. Plot the failure envelope for the soil and determine :
- (1) Value of apparent cohesion
- (2) Value of angle of shearing resistance.

<i>Normal Load (N)</i>	100	200	300	400
<i>Shear force (τ)</i>	110	152	193	235