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[5352]-503

**S.E. (Civil) (I Sem.) EXAMINATION, 2018**  
**GEOTECHNICAL ENGINEERING**  
**(2015 PATTERN)**

**Time : Two Hours**

**Maximum Marks : 50**

- N.B. :—** (i) Answer Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4,  
Q. No. 5 or Q. No. 6, Q. No. 7 or Q. No. 8.  
(ii) Neat diagrams must be drawn wherever necessary.  
(iii) Figures to the right indicate full marks.  
(iv) Use of calculator is allowed.  
(v) Assume suitable data, if necessary.

- Q1) a) Describe briefly the procedure for conducting liquid limit test as per I.S. 2720. [6]  
How the result of this test are plotted. Draw the typical sketch of the plot.  
b) What is flow net? Write down the characteristics and application of flow net. [6]

**OR**

- Q2) a) Derive the relation between  $\gamma_d$ ,  $G$  and  $e$ . [6]  
b) Explain with neat sketch variable head permeability test. Derive the expression [6]  
for coefficient of permeability of soil for the variable head method.

- Q3) a) Explain briefly the procedure of conducting unconfined compression test on [6]  
clayey soil sample. Draw Mohr's circle for the test.  
b) A concentrated load of 25 kN acts on the surface of homogeneous soil mass of [6]  
large extent. Find the stress intensity at a depth of 8.0 meters by using  
Boussinesq's theory at a horizontal distance of 2.5m

**OR**

- Q4) a) In case of Direct shear test ,the value of normal stress and corresponding shear [6]  
stress are given as;  
 $\sigma = 75 \text{ KPa}$ ,  $\tau = 61.3 \text{ KPa}$   
 $\sigma = 125 \text{ KPa}$ ,  $\tau = 90.168 \text{ KPa}$   
 $\sigma = 175 \text{ KPa}$ ,  $\tau = 119.036 \text{ KPa}$   
Determine cohesion and angle of internal friction of soil.

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- b) Differentiate between light compaction test and heavy compaction test. Draw typical compaction curve for both tests. [6]
- Q5) a) Explain Rankine's lateral stress distribution theory for active, passive and at rest state with the assumptions involved. [6]
- b) A wall with a smooth vertical back, 10m high, supports a purely cohesive soil with  $c = 9.81 \text{ kN/m}^2$  and  $\gamma = 17.66 \text{ kN/m}^3$ . Determine total Rankine's active pressure against the wall and the position of zero pressure [7]
- OR**
- Q6) a) Derive the relation for passive earth pressure using Rankine's theory for dry, cohesionless backfill. [7]
- b) Explain Rebhann's graphical method for determination of earth pressure on retaining wall [6]
- Q7) a) What is stability number ? Determine the critical height of excavation of a vertical cut in a cohesive soil, if  $c = 30 \text{ kN/m}^2$  and  $\gamma = 18 \text{ kN/m}^3$ . [6]
- b) Discuss sources and types of ground contamination [7]
- OR**
- Q8) a) State classification of slopes based on different criteria. Explain with neat sketch the different modes of slope failure. [7]
- b) Write down the effects of subsurface contamination [6]
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