seconds. Calculate the time required for a layer 10m thick to reach the same degree of consolidation while having one side drainage. 10

(b) Explain Terzaghi's Theory of one dimensional consolidation. 10

Section–D

8. (a) Explain Mohr-Coulomb failure criterion with neat sketch. 10

(b) Describe direct shear test. What are its merits and demerits ? 10

9. (a) Derive expression for active and passive earth pressure using Rankine's theory. 10

(b) What do you mean by the critical depth of vertical depth for a clay soil.

B. Tech. 5th Semester (F) Scheme (Civil) Examination,

December–2018

SOIL MECHANICS

Paper–CE-307-F

Time allowed : 3 hours] *[Maximum marks : 100*

Note : *Attempt any **five** questions in total. **Question No. 1** **is compulsory**. All questions carry equal marks.*

1. (a) What are the major soil deposits in India ?

(b) Define Consistency index.

(c) Write the various methods for determination of water content in laboratory.

(d) Write effective stress equation for downward flow condition.

(e) Derive relationship between void ratio, water content, specific gravity and degree of saturation.

(f) What are the factors that affect the contact pressure distribution ?

(g) What do you mean by earth pressure at rest ?

(h) Define shear strength of soil.

(i) Draw void ratio-stress relationship curve for sand.

(j) Differentiate between primary and secondary consolidation. 2×10=20

Section–A

2. (a) A soil has porosity of 40%, moisture content = 20% and $G_s = 2.72$. Determine the amount of water to be added to 100m^3 of this soil to make it saturated Use $\gamma_w = 9.81 KN/m^3$ 10

(b) Discuss Indian standard classification system. 10

3. (a) For field pumping test, a well was sunk through a horizontal stratum of sand 14.5 m thick, underlain by clay sratum. Two observation wells were sunk at horizontal distances of 16 m and 34 m respectively from the pumping well. The initial position of the water table was 2.2m below ground level. At a steady-state pumping rate of 1850 litres/min, the draw down found to be 2.45 m and 1.20 m respectively. Calculate the coefficient of permeability. 12

(b) What is Darcy's law ? What are its limitations ? 8

Section–B

4. (a) What is quick sand condition ? Calculate hydraulic gradient for this case. 10

(b) In a soil deposit layer is 10m thick having water table at 5m below the ground surface. There is a capillary zone of 1.5m with degree of saturation 80%. Void ratio is 0.6 and specific gravity is 2.65. Assume soil above the capillary zone to be dry. Draw total, effective and pore pressure distribution diagram. 10

5. (a) Explain the factors affecting rate of compaction of a soil mass. 10

(b) Differentiate between standard and modified compaction test method. 10

Section–C

6. (a) Derive expression for the vertical stress distribution at a point due to load using Boussinesq's theory. 10

(b) Explain Newmark's influence chart. How it is used ? 10

7. (a) The time required to reach 60% consolidation for a sample 1 cm thick tested in consolidometer under double drainage condition was found to be 34