

B.Tech Sem – V (2007 Course) (Civil Engg.) : WINTER - 2018

SUBJECT : GEOTECHNICAL ENGINEERING

Day : Thursday
Date : 22/11/2018

W-2018-2792

Time : 02.30 PM TO 05.30 PM
Max. Marks : 80

N.B.

- 1) Q.1 and Q.5 are **COMPULSORY**. Out of the remaining attempt any **TWO** questions from Section - I and Section – II.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in **SEPARATE** answer book.
- 4) Use of non-programmable calculator is allowed.

SECTION – I

Q.1 a) Describe the process of soil formation and state factors that affect weathering. **(05)**

b) Define liquid limit, sensitivity and activity of clay. **(05)**

c) Explain geostatic stresses in soil. **(04)**

Q.2 a) Discuss about five major soils in India. **(06)**

b) Derive the expression with usual notation **(07)**

$$\gamma_d = \frac{(1 - n_a) G \gamma_w}{1 + Gw}$$

Where γ_d = dry unit weight

n_a = percentage air voids.

G = Specific gravity

w = Water content

γ_w = Unit weight of water

Q.3 a) A sample of soil with a liquid limit of 73.7% was found to have a liquidity index of 1.12% and water content of 79.5%. What are its plastic limit and plasticity index? **(07)**

b) Define C_c and C_u and explain how they are used to classify the sand in the IS classification. **(06)**

Q.4 a) A 25 kN point load acts on the surface of horizontal ground. Find the intensity of vertical pressure at 6 m directly below the load and 6 m below and 3 m away from load. Use any formula. **(07)**

b) Draw a typical plasticity chart used in IS classification system. Show the different soil groups on chart. **(06)**

P.T.O.

SECTION – II

- Q.5** a) State Darcy's law. Discuss assumptions and limitations. (05)
- b) Distinguish between active and passive earth pressure. (05)
- c) What are shear parameters? How these parameters are determined for various types of soil? (04)
- Q.6** a) What is quick sand condition? Derive the expression for critical hydraulic gradient. (07)
- b) Discuss the factors affecting permeability of soils. (06)
- Q.7** a) For a dry cohesionless back fill sloping at 20° with horizontal and $\phi = 30^\circ$. Calculate active and passive earth pressure as per Rankine's theory. The height of backfill is 5m and unit weight of soil 20 kN/m^3 . (07)
- b) What is a compaction curve? Give its salient features. What is zero air void line? (06)
- Q.8** a) Explain vane shear test with neat sketch. (07)
- b) Write advantages and disadvantages of direct shear test. (06)

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