**16117**

**3 Hours / 100 Marks**     Seat No.

*Instructions* :  (1)  All Questions are *compulsory*.

(2)  Answer each next main Question on a new page.

(3)  Illustrate your answers with neat sketches wherever necessary.

(4)  Figures to the right indicate full marks.

(5)  Assume suitable data, if necessary.

(6)  Use of Non-programmable Electronic Pocket Calculator is permissible.

(7)  Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

1.  **(A)  Solve any SIX of the following :**     **2 × 6 = 12**

(a)  Define (i) Geology (ii) Petrology.

(b)  State any two important engineering uses of igneous rock.

(c)  Define (i) Outcrop  (ii) Dip  (iii) Strike  (iv) Fault

(d)  State four different types of fold.

(e)  Give the IS definition of soil.

(f)  State any two objective of Geotechnical Engineering.

(g)  State any four field application of Geotechnical Engineering.

(h)  Define :

(i)  Void ratio(e)

(ii)  Degree of saturation (Sr)

**(B)  Solve any TWO of the following :**     **2 × 4 = 8**

(a)  State and explain classification of igneous rock.

(b)  State and explain various parts of fold with neat sketch.

(c)  Explain importance of soil in Civil Engineering.

2.  **Solve any FOUR of the following :** 4 × 4 = 16

    (a)  State causes and effects of Earthquake.

    (b)  Define weathering and explain its various types.

    (c)  Define Earthquake and state its significance.

    (d)  Give the classification of earthquake.

    (e)  State step-by-step procedure for determination of water content by oven drying method. Write down the formula for water content determination.

    (f)  Define Atterber's limit of consistency.

3.  **Solve any FOUR of the following :** 4 × 4 = 16

    (a)  Explain how soils are classified according to IS soil classification system.

    (b)  State various factors affecting permeability.

    (c)  State Darcy law and state its limitations.

    (d)  Describe Mohr-Coulomb failure theory with neat sketch.

    (e)  Explain direct shear test with neat sketch.

    (f)  State the effect of water table on bearing capacity. Explain.

4.  **Solve any FOUR of the following :** 4 × 4 = 16

    (a)  A retaining wall with a smooth vertical back retains sand backfill for a depth of 6 m. The backfill has a horizontal surface and has the following properties $C = 0$, $\phi = 28°$ $\gamma = 16 \text{ kN/m}^3$.

    Calculate total magnitude of active and passive earth pressure.

    (b)  State the assumptions made in Terzoghis bearing capacity analysis.

    (c)  In a Standard Proctor Test the following observations were made on a soil sample :

| Bulk density gm/CC | 1.7 | 2.0 | 2.15 | 2.105 | 2.074 |
|---|---|---|---|---|---|
| Water content in % | 7.7 | 11.5 | 15 | 17.5 | 19.7 |

    Determine OMC & MDD.

    (d)  State the necessity of site investigation and sub soil exploration.

    (e)  Differentiate between compaction and consolidation. (any four points)

    (f)  Give a field situation where stabilization is needed.

5. **Solve any TWO of the following :** **2 × 8 = 16**

   (a) Explain soil as a three phase system with neat sketch and derive a relation between e, Sr, $\omega$, G.

   (b) Explain laboratory method to determine plastic limit of soil sample as per IS 2720.

   (c) State the significance of particle size distribution curve and show typical curves for well graded, poorly graded and uniformly graded soils. Define $C_u$ and $C_c$.

6. **Solve any TWO of the following :** **2 × 8 = 16**

   (a) Draw a neat sketch of flow net. State properties of flow net and explain. State application of flow net.

   (b) Explain with neat sketch plate load test as per IS 1888 with two limitations of test.

   (c) State and explain various field identification tests on soil.

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