

22404

22223

3 Hours / 70 Marks

Seat No.

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

Marks

- 1. Attempt any FIVE of the following: **10****
- a) State four branches of Geology.
 - b) Define soil as per IS 2809-1972.
 - c) Draw 3-phase diagram for partially saturated soil.
 - d) Define permeability of soil.
 - e) Define ultimate bearing capacity of soil.
 - f) Define active earth pressure and passive earth pressure.
 - g) State necessity of soil investigation.

P.T.O.

- 2. Attempt any THREE of the following:** **12**
- a) Give step-by-step procedure to determine specific gravity of soil by pycnometer in laboratory.
 - b) Find coefficient of uniformity C_u and coefficient of curvature C_c for a soil particle. If $D_{10} = 0.15$ mm, $D_{30} = 0.75$ mm and $D_{60} = 2$ mm.
 - c) Calculate void ratio and dry density of a soil sample having porosity 35% and specific gravity 2.67.
 - d) Explain field application of geotechnical engineering.
- 3. Attempt any THREE of the following:** **12**
- a) Explain determination coefficient of permeability by constant head method.
 - b) Draw shear strength envelope for purely cohesive and cohesionless soil with sketch.
 - c) State assumptions made in Terzaghi's analysis of bearing capacity of soil.
 - d) Draw a neat labelled sketch of plate load test set-up for gravity loading.
 - e) Explain the importance of geology in civil engineering constructions.
- 4. Attempt any THREE of the following:** **12**
- a) State and explain factors affecting bearing capacity.
 - b) A soil sample is tested in constant head permeability, diameter of sample is 4 cm. and length is 10 cm under constant head of 15 cm discharge was found to be 70 cc in 10 mins. Find coefficient of permeability.
 - c) Differentiate between compaction and consolidation with four points.
 - d) Explain the standard proctor test to determine OMC and MDD of soil.
 - e) Define soil stabilization. Explain one method of soil stabilization.

5. Attempt any TWO of the following:**12**

- a) Explain sieve analysis test for grading of soil with the help of particle size distribution curve.
- b) Explain Mohr-Coulomb's theory to determine the shear strength of soil.
- c) A soil sample of volume 160 cc, weight 310 gms when partially saturated. It weights 269.28 gms when fully dry. Sp. gravity of soil is 2.64. Determine porosity, void ratio, water content and degree of saturation.

6. Attempt any TWO of the following:**12**

- a) Following observations were made using standard proctor test on a soil sample.

Bulk density (gm/cc)	1.75	1.95	2.10	2.20	2.15	2.05
Water content (%)	5	10	15	20	25	30

Determine OMC and MDD by plotting compaction curve on graph.

- b) State field identification test on soil and explain any one.
- c) Following readings were taken in a direct shear test.

Normal load in N	50	100	150	200	250
Shear load in N	90	110	130	150	170

Size of shear box 60 mm × 60 mm. Plot the failure envelope for the soil and find the value of angle of shearing resistance and cohesion.
