

22404

11920

3 Hours / 70 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Attempt **all** questions including Question No. 1 which is compulsory.
 - (3) Answer each next main Question on a new page.
 - (4) Illustrate your answers with neat sketches wherever necessary.
 - (5) Figures to the right indicate full marks.
 - (6) Assume suitable data, if necessary.
 - (7) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (8) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.
 - (9) Preferable solve in sequential order.

Marks

1. Attempt any FIVE of the following :

10

- (a) Define a soil as per I.S.
- (b) Define a Rock and state one type of it.
- (c) Define voids ratio and porosity.
- (d) Define : (i) Water content (ii) Plasticity index
- (e) Enlist any two the methods of soil stabilization.
- (f) State relation between e , S and W , G .
- (g) Define soil exploration.

- 2. Attempt any THREE of the following :** **12**
- (a) Write step by step procedure for determination of specific gravity by pycnometer bottle.
 - (b) The density of soil sample is 2000 kg/m^3 and its water content is 16%. Determine its dry density, void ratio, porosity and degree of saturation.
 - (c) Explain soil as three phase system with labelled sketch.
 - (d) Explain the importance of geology in civil Engineering Construction.
- 3. Attempt any THREE of the following :** **12**
- (a) Define flow net and state its characteristics with neat sketch.
 - (b) State any four assumptions made in Terzaghi's analysis of bearing capacity of soil.
 - (c) Differentiate between active and passive earth pressure.
 - (d) Draw a neat labelled sketch of plate load test set up for determination of field bearing capacity.
- 4. Attempt any THREE of the following :** **12**
- (a) Calculate active earth pressure and passive earth pressure at depth of 9 m in dry cohesionless soil with an angle of internal friction of 30° and unit weight of 17 KN/m^3 .
 - (b) Differentiate between compaction and consolidation with four points.
 - (c) Explain standard proctor test to determine MDD and OMC of soil.
 - (d) Explain determination of coefficient of permeability by constant head method.
 - (e) A sample of soil 10 cm height and 50 cm^2 in c/s area water flows through the soil under a constant head of 80 cm. Water collected in 9 minutes is 450 C.C. find the coefficient of permeability.

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

- (a) (i) Explain field applications of geotechnical engineering.
 (ii) State two civil engineering situations where knowledge of geotechnical engineering is used.
- (b) In a shear box test, following observations were recorded at the failure of soil specimen :

Normal stress kg/cm ²	1.0	1.50	2.50	3.50
Shear stress kg/cm ²	0.80	1.15	1.42	1.70

Find the value of cohesion C and internal friction ϕ by graphical method.

- (c) A soil sample of volume 160 CC, weights 304 gms, when partially saturated. It weights 269.28 gms, when fully dry specific 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) Explain with figure laboratory determination of shear strength of soil with direct shear test.
- (b) The following are the results of standard compaction test performed on a sample of soil :

Water content %	5	10	15	20	25	30
Bulk density (gm/cc)	1.77	1.98	2.10	2.18	2.16	2.12

Plot the water content dry density curve and obtain the optimum water content (OMC) and its maximum dry density (OMD).

- (c) State field methods of compactions. Explain suitability of various compaction equipments.
