17420

15116

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) **Attempt any SIX of the following:** **12**

(i) Define petrology and mineralogy.

(ii) Define outcrop and skike.

(iii) What is a seismograph?

(iv) What do you understood by the term:

1) Epicenter and

2) Richter scale

(v) Give the IS definition of soil.

Marks

(vi) Define:

1) Ultimate bearing capacity

2) Safe bearing capacity.

(vii) Define co-efficient of earth pressure.

(viii) Define:

1) Degree of saturation and

2) Air content.

b) **Attempt any TWO of the following:** **8**

(i) State and briefly explain any four physical properties of minerals.

(ii) State any four causes of earthquakes.

(iii) What is meant by geologic cycle? State the types of weathering and explain in brief.

2. Attempt any FOUR of the following: **16**

a) Define a fault and state its classification.

b) What is a fold and state its types?

c) Name any four earthen dams of Maharashtra and state the name of the river across which they're constructed.

d) Explain the method of determination in-situ density with a core-cutter.

e) In a specific gravity test the following data is obtained at room temperature of 30°C.

(i) Mass of pycnometer = 680 gm

(ii) Mass of pycnometer + water = 720.26 gm

(iii) Mass of pycnometer + soil solids + water = 750.36 gm

(iv) Mass of pycnometer + soil solids = 727.25 gm

Determine the specific gravity of soil solids.

f) State the procedure for the determination of water content by oven-drying method.

Marks

3. Attempt any FOUR of the following: **16**

a) Define with formula D_{10}, D_{30} and D_{60} wrt grain size distribution.

b) Define permeability and co-efficient of permeability.

c) Describe direct shear test with a neat sketch.

d) At the bottom of a bore hole, a vane 120 mm long and 80 mm in diameter was pressed into soft clay. Torque was applied and gradually increased to 57 N-m, when failure took place estimate the shear strength of clay.

e) Define a flow net. State its properties.

f) State the assumptions made in Terzaghi's bearing capacity analysis.

4. Attempt any FOUR of the following: **16**

a) A strip footing 1.4 m wide is laid at a depth of 4.5 m in a purely cohesive soil having $\varrho = 144\ kN/m^2$ and bulk unit weight = $17.7\ kN/m^3$; calculate ultimate bearing capacity by Terzaghi's analysis (Nc and Nq are 5.7 and 1 respectively)

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

c) Draw the compaction curves for proctor's light and heavy compaction test. Also state the compactive energy applied in both the cases.

d) Define zero-avi voids line? How is it drawn? State its significance.

e) Mention the suitability of the following method of compaction:

(i) Ramming

(ii) Tamping

(iii) Rolling

f) Compute the intensities of p_a and p_p at a depth of 8 m in dry cohesionless sand with $\phi = 30°$ and $\gamma = 19\ kN/m^3$.

Marks

5. Attempt any FOUR of the following: **16**

a) State the field application of Geotechnical engineering. (any four)

b) The field density of sandy soil was found to be 1800 kg/m^3 at a water content of 10%. If the void ratio in the loosest and densest states were 0.75 and 0.47 respectively, determine the value of density index. Also comment about the degree of compaction based on the value of density index.

c) A liquid limit test by Casagrande apparatus gave the following results:

No. of blows	15	21	38	51
Moisture content in %	74.6	68.4	66.7	52.60

Plot the flow curve and find the liquid limit.

d) Derive the expression for shrinkage limit:

(i) When 'G' is known and

(ii) When 'G' is unknown

e) Define plasticity index and classify soil on its basis.

f) Describe unified soil classification system.

6. Attempt any FOUR of the following: **16**

a) State the factors affecting permeability and explain in brief.

b) A permeameter (A = 3000 mm^2, L = 200 mm) gave a discharge of 25 ml in 20 minutes under a constant head of 1 m. Determine the value of co-efficient of permeability.

c) Draw neat sketch of plate load test.

d) State the four assumptions of Rankine's theory.

e) State the criteria for deciding the location and number of test pits and bores.

f) Explain any two field identification tests for fine grained soils.