22404

23124

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

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

(3) Illustrate your answer 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. Attempt any FIVE of the following: **10**

a) State any two engineering uses of Igneous rocks.

b) Write IS defination of soil.

c) Define void ratio and porosity.

d) Define water content and degree of saturation.

e) Give the meaning of CBR value.

f) Write the formula for density index.

g) Enlist the methods of soil stabilization.

Marks

2. Attempt any THREE of the following: **12**

a) Explain the experimental procedure to determination of specific gravity of soil by Pycnometer method.

b) The porosity of soil sample is 27% and specific gravity of solids is 2.7. Calculate –

i) Void ratio

ii) Dry density.

c) Find coefficient of uniformity (Cu) and coefficient of curvature (Cc) for a soil particles of D_{10} = 0.2 mm, D_{30} = 0.8 mm, D_{60} = 2 mm. Also classify and grade of soil.

d) Define Geology and enlist the different branches of Geology.

3. Attempt any THREE of the following: **12**

a) State and explain Darcy's law of permeability and define coefficient of permeability.

b) Write any four methods of improving bearing capacity of soil.

c) State assumptions made in the theory of Terzaghi's analysis of bearing capacity failure of soil.

d) Explain the plate load test for determination of bearing capacity of soil.

4. Attempt any THREE of the following: **12**

a) Differentiate between active earth pressure and passive earth pressure with sketch.

b) Explain standard proctor test to determine MDD and OMC of soil.

c) State field identification test on soil and explain any one.

d) Explain vane shear test to determine shear strength of soil specimen in laboratory with neat sketch.

e) A constant head permeameter gives discharge of 305 ml in 270 seconds under a constant head of 870 mm. Determine the permeability if the soil sample was 120 mm long and 78.5 cm^2 in area.

Marks

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

a) Give any six reasons why the knowledge of Geotechnical Engineering is important for Civil Engineering field.

b) Describe Mohr's theory of shear failure of soil with sketch.

c) 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.

Assume G = 2.7, Dw = 10 kN/m^3.

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

a) In direct shear test the following observations were made

Normal load (N)	50	100	150	200	250
Shear load (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.

b) The following observations were made using standard proctor test on soil sample.

Bulk density gm/cc	1.65	1.95	2.1	2.2	2.15	2.05
Water Content	5	10	16	22	25	30

Determine OMC and MDD.

c) Differentiate between compaction and consolidation of soil.