22404

23242

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 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. Attempt any FIVE of the following: **10**

a) Write four branches of geology.

b) Write two uses of soil in civil engineering as a construction material.

c) Draw three phase diagram of partially saturated soil.

d) Enlist the two methods to determine bulk unit weight and dry unit of soil in field.

e) Enlist the methods of soil classification.

f) State two types of soil exploration.

g) Define California Bearing Ratio (C.B.R.).

Marks

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

a) Explain the importance of geology in civil engineering structures.

b) Explain the experimental procedure to determine water content of soil sample by oven drying method.

c) Define the terms

i) Uniformity coefficient of soil (Cu)

ii) Coefficient of curvature (Cc)

d) Calculate voids ratio and dry density of soil if porosity is 38% and specific gravity is 2.6. Take density of distilled water = 1 gm/cm^3.

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

a) Define the following terms :

i) Permeability of soil

ii) Coefficient of permeability

iii) Phreatic line

iv) Flow net

b) Write the meaning of following

i) Safe Bearing Capacity

ii) Ultimate Bearing Capacity

iii) Active earth pressure

iv) Passive earth pressure

c) Enlist the assumptions made in Terzaghi's analysis of soil failure due to poor bearing capacity.

d) Draw a neat labelled sketch of the experimental set-up of plate load test using gravity loading.

Marks

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

a) Calculate coefficient of permeability of soil sample having 10 cm diameter, 15 cm length. It was tested under variable head permeameter with initial and final water head 45 cm and 30 cm respectively. The diameter of burette pipe was 1.9 cm.

b) Draw shear strength envelope (Stating its equation) for

i) Purely cohesive soil

ii) Cohesionless soil

c) Write the effect of water table on bearing capacity of soil if :

i) Ground water table (GWT) is at a depth equal to breadth of footing.

ii) GWT is exactly upto the base of footing.

d) Give the suitability of the following.

i) Flat footed rammer

ii) Smooth wheel roller

iii) Sheep foot roller

iv) Pneumatic tyred roller

e) Differentiate between standard proctor test and modified proctor test with respective to

i) Nature / type of test

ii) Instrument / accessories use

iii) Sampling

iv) Suitability

Marks

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

a) Justify the use of geotechnical engineering knowledge for the following

i) Design of foundation

ii) Design of earth retaining structure

iii) Design of earthen dam

b) Explain with neat sketch the experimental procedure to determine the bulk density and dry density of soil in field by core cutter method.

c) Explain the experimental procedure to determine the coefficient of permeability by constant head method with neat sketch.

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

a) Explain the direct shear test to be carried out on soil to determine its shear strength using neat labelled sketches.

b) Describe stabilisation of soil in terms of following.

i) Definition of soil stabilisation

ii) Necessity of stabilisation (any two points)

iii) Methods of stabilisation (any four)

c) Explain in brief the procedure of following field identification tests on soil

i) Dilatancy test

ii) Toughness test