

Printed Pages-6

Roll No. ....

**320553(20)**

**B. E. (Fifth Semester) Examination, 2020**

APR-MAY/NOV-DEC

(New Scheme)

(Civil Engg. Br.)

**GEOTECH ENGINEERING-I**

*Time Allowed ; Three hours*

*Maximum Marks : 80*

*Minimum Pass Marks : 28*

*Note : Part (a) of each question is compulsory carrying (2) marks each. Solve any two parts from remaining (b) and (c), (d) carrying (7) marks each.*

**Unit-I**

1. (a) A soil sample has a void's ratio of 0.66 percent.  
Calculate porosity. 2

(b) Define liquid limit, liquidity index and consistency index. Determine the value of the liquid limit of a soil from the following test data : 7

[ 2 ]

No. of blows	:	38	34	25	20
Water content (%)	:	16	17	20	22

- (c) A soil sample whose water content is 20% has a bulk density of 2.16 gm/cc. The sample undergoes air drying with insignificant change in void ratio. What is the water content of this sample, when its bulk density is reduced to 2 gm/cc. 7
- (d) Prove that : 7

$$(i) Y = \frac{(G + es)Y_w}{1 + e}$$

$$(ii) Y_{sat} = \frac{(G + e)Y_w}{1 + e}$$

Where :

Y = unit weight of soil

e = void's ratio

s = Degree of saturation

$Y_w$  = Unit weight of water

G = Specific gravity

$Y_{sat}$  = Saturated weight of soil

Unit-II

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[ 3 ]

2. (a) What is the meaning of  $D_{60}$  and  $D_{30}$ ? 2
- (b) Explain textural classification. 7
- (c) Show the Indian Standard Classification for fine grained soils on plasticity chart. 7
- (d) Compute the total, effective and pore pressure at a depth of 12 m below the bottom of a lake 6 m deep. The bottom of the lake consists of soft clay with a thickness of max. than 15 m. The average water content for the clay is 40% and the specific gravity of soils may be assumed 2.6 S. Assume that the lake is filled up water upto the top 7

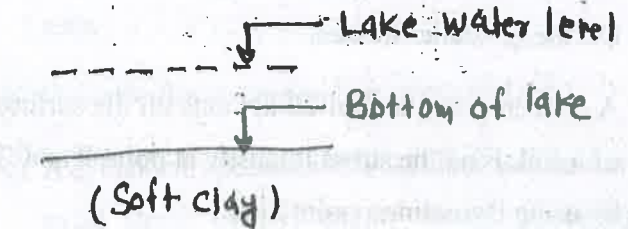


Fig. 2.1.

Unit-III

3. (a) What is zero air voids line? 2

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(b) Following data given in table : 7

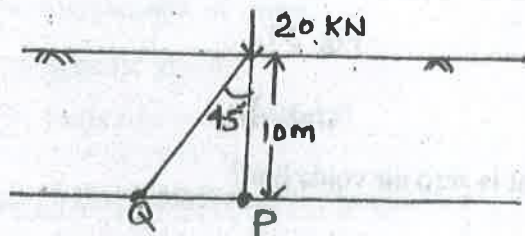
Soil	Specific gravity	Degree of saturation	OMC
Soil A	2.67	0.80	0.15
Soil B	2.70	0.83	0.18

Which soil is suitable for subgrade layer of soil with respect to dry density.

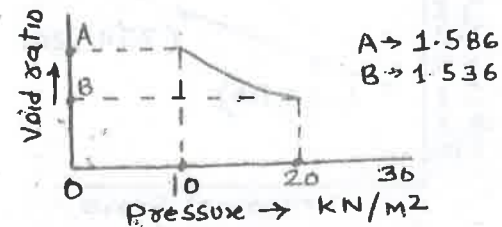
- (c) What are the factors that affect compaction? Discuss in brief. 7
- (d) Write the name of the permeability test for coarse soil? Derive the equation of this test. 7

**Unit-IV**

4. (a) Define geostatic stresses. 2
- (b) A concentrated load of 20 kN acts on the surface of a soil. Find the stress intensity at point P and Q by using Boussinesq point load. 7



- (c) Explain Newmark's influence chart. 7
- (d) The graph between pressure and void ratio represents the result of consolidation test : 7



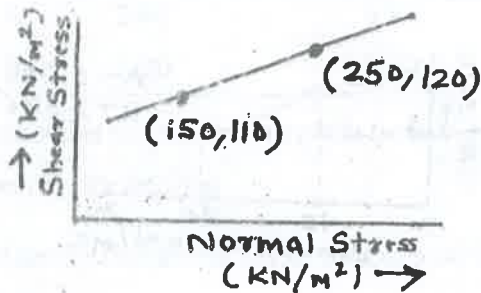
Calculate the value of coefficient of compression and compressibility.

**Unit-V**

5. (a) What is Coulomb's equation for shear strength of soils. 2
- (b) Describe the test procedure of triaxial test. 7
- (c) A cylindrical specimen of a saturated soil fails at an axial stress of 167 kN/m<sup>2</sup> in an unconfined compression test. The failure plane makes an angle of 54 with the horizontal. Calculate the shear strength parameters. 7
- (d) A direct shear test was carried out on a cohesive

soil sample. The graph below represents the relationship between normal and stress.

7



Calculate the value of cohesion and angle of internal friction.