Question Paper

Exam Date & Time: 20-Nov-2018 (02:00 PM - 05:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES
THIRD SEMESTER B.Sc APPLIED SCIENCE IN ENGG END SEMESTER NOV 2018
GEOTECHNICAL ENGG. [ICE 233 - S2]

Marks: 100 **Duration: 180 mins.**

Answer 5 out of 8 questions.

1) A) Obtain the relationship between angle of internal friction and direction of failure plane in the case of triaxial compression strength test. (10)

B) Explain primary consolidation and secondary consolidation. Explain spring analogy (10)

2) A) In the field, it is observed that water table is at a depth of 3m. The soil mass was taken in a sampling tube of internal diameter of 50mm. The length of extracted soil was 102mm and its weight was 3.797 N. If the specific gravity of the solid soil is 2.7 and the weight of the dried sample is 3.07 N; calculate porosity, void ratio, degree of saturation and dry unit weight of the in-situ soil. (10)

B) Classify the soils A, B and C, with properties as shown below (10)

Soil	w_L(%)	I_P (%)	% passing 4.75 mm sieve	% passing 0.075 mm sieve
A	38	20	100	59
B	62	18	100	84
C	45	12	65	42

3) A) In a falling head permeameter test, the initial head causing flow was 50 cm and it drops 5 cm in 10 minutes. How much time would be required for the head to fall to 25 cm. (12)

If the soil sample is 10 cm in height and 50 cm^2 in cross sectional area, calculate the coefficient of permeability, taking area of stand pipe = 0.5 cm^2.

B) Derive a relationship for the coef?cient of permeability for the soil with multiple layers and the flow is along the layers (8)

4) A) Explain i. Liquidity Index ii. Seepage velocity iii. Compression index iv. Isobars v. Uniformity Coefficient (10)

B) Undisturbed soil sample 30 mm thick got 50% consolidation in 20 minutes with drainage allowed at top and bottom in the laboratory. If the clay layer from which the sample was obtained is 3 m thick in field conditions, estimate the time it will take to consolidate 50 % With i. double surface drainage ii.Single surface drainage, if in both cases consolidation pressure is uniform. (10)

5) (8)

A) Classify the following soils as per Indian Standard Soil Classification

Soil Type	% passing 75 micron	% passing 4.75 mm	Cu	Cc	Liquid Limit (%)	Plastic Limit (%)
S1	16	60	7	2	45	33
S2	3	49	2	2	28	22
S3	78	12	6	1	80	30

B) A Granular soil deposit 7m deep over an impermeable layer. The ground water table is 4m below the ground surface. The deposit has a zone of capillary rise of 1.2m with a saturation of 50%. Plot the variation of stress, pore water and effective stress with the depth of deposit. Take e=0.6 G=2.65 (12)

6) Explain the corrections for hydrometer reading. (6)

A)

B) Explain with the help of neat sketch the silica and gibbsite sheets of clay minerals. (6)

C) Explain factors affecting permeability. (8)

7) Explain Single grained and flocculated structure of soil (6)

A)

B) Differentiate between compaction and consolidtion. Explain zero air void line (6)

C) Define each term and S.T $S = \frac{wG}{(1+w)G\frac{\gamma_w}{\gamma_b}-1}$ (8)

8) Define i. percentage air voids ii. air content. iii. Shrinkage ratio iv. Porosity v. Specific gravity vi. Submerged unit weight (12)

A)

B) Discuss how the compaction effort and type of soil affects the compaction (8)

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