



SE-8265

B. E. - III (Sem. V) (Civil) Examination

May / June - 2011

Geotechnical Engineering - I

(New Course)

Time : 3 Hours]

[Total Marks : 100

Instructions :

नीचे दशांशके निशानीवाणी विगतो उत्तरवही पर अवश्य लिखनी.
Fillup strictly the details of signs on your answer book.

Name of the Examination :
B. E. - 3 (SEM. 5) (CIVIL)

Name of the Subject :
Geotechnical Engineering - 1

Subject Code No. : 8 2 6 5 Section No. (1, 2,.....) : NIL

Seat No. :
[] [] [] [] [] []

Student's Signature

- (1) Use separate answer books for each section.
- (2) Assume suitable data, if necessary.
- (3) Figures to the right indicate full marks.
- (4) Explain with neat sketches, if needed.

Q-1(A) Attempt All Questions 10

- (1) When the cohesion less soil is in loosest state the density index is _____
(a) Between one and zero (b) zero (c) one
- (2) The ratio of _____ to _____ is known as void ratio
- (3) If sand is fully compacted the value of density index is _____
- (4) For fully saturated soil the phase diagram is _____ phase diagram
(two, three)
- (5) In casagrande's apparatus the moisture content at _____ no of blow is known as liquid limit
- (6) Upal's cone test is used for determination of _____ of soil
- (7) If percentage passing through 75 micron sieve is more than 50 % soil is classified as _____ grained soil
- (8) The kneading action to soil is given by
(a) Sheep foot roller (b) Pneumatic type roller (c) rammer (d) none of above
- (9) The M.D.D. obtained by modified proctor test is always _____ than the M.D.D. Obtained by standard proctor test.
(a) More (b) less
- (10) the number of layer of soil in heavy compaction test is _____

(B) A fully saturated clay has water content of 40 percentage. The bulk unit weight of soil is 18.5 KN/M³ find void ratio and specific gravity of soil. 6

OR

(B) Describe the fine grained classification of soil. 6

(C) Explain briefly effect of the compaction on various soil properties. 6

Q-2(A) A laboratory compaction test on a soil having specific gravity equal to 2.65 gave a maximum dry density of 1.72 g/cm^3 and a water content of 16 %. Determine the degree of saturation and air content at the maximum dry density. What would be the theoretical dry density corresponding to zero air voids at the optimum water content ? 6

(B) List different type of rollers used for compaction of soil, Explain them briefly. 6

Q-3(A) Discuss Effective and Neutral pressure for (a) Submerged soil mass (b) soil mass with surcharge 6

OR

(A) Explain proctor needle test for determination of water content of soil at site. 6

(B) Explain step by step determination in situ unit weight of soil by core cutter method with neat sketches 4

(C) Draw phase diagram of soil and indicate the volume and weights of phases on it. Also derive the relation between void ratio, degree of saturation, water content and specific gravity. 6

Q-4 (a) Attempt the following: (12)

- 1) Equipotential lines cross flow lines at _____ angle.
- 2) The coefficient of consolidation varies with the change in _____.
- 3) The Mohr's circle has centre co-ordinates _____ and radius _____.
- 4) Darcy's law for permeability is valid if the flow through soil is _____.
- 5) The shear strength of clayey soil is defined by _____.
- 6) The coefficient of consolidation varies with the change in _____.
- 7) The maximum depression of water table due to pumping is known as the _____.
- 8) The falling head permeability test is used for clayey soil. True or false ?
- 9) The shear strength of sandy soil is defined by _____.
- 10) The maximum shear stress occurs on a plane inclined at _____ to the principal plane.
- 11) The coefficient of consolidation varies with the change in _____.

(b) Attempt any one of the following. (6)

- 1) A sample of coarse sand is 20 cm long and 8cm diameter. On testing the specimen in constant head permeameter water permitted under hydraulic head of 70 cm for 30 seconds was 1000 cc. Find coefficient of permeability.
- 2) In a constant head permeability test the following observations were taken: Distance between peizometer tapings = 250 mm, Difference of water levels in peizometers = 80 mm, Diameter of test samples =100 mm, Quantity of water collected = 450 ml, Duration of the test = 9 min. Determine the coefficient of permeability of soil.

Q-5 (a) Describe triaxial test with neat sketch (6)

OR

(a) Write advantages and disadvantages of box shear test. (6)

(b) Explain Mohr- Coulomb Strength envelope for different types of soil. (4)

(c) The stresses at failure on the failure plane in a cohesionless soil mass were: Shear stress = 6 kN/m^2 ; normal stress = 12 kN/m^2 . Determine the resultant stress on failure plane, the angle of internal friction of the soil and the angle of inclination of the failure plane to the major principal plane. (6)

Q-6 (a) Define 'preconsolidation pressure.' Explain the procedure to determine preconsolidation pressure. (6)

OR

(a) How coefficient of consolidation can be determined by 'Log time fitting method? (6)
Write steps and draw typical sketch.

(b) Explain the following: (4)

1) Compression Index

2) Coefficient of volume change

(c) A 2.5 cm thick sample was tested in consolidometer with drainage at both sides. (6)
50% of consolidation is achieved under load in 18 minutes. For the same Consolidation of stress but only with single drainage estimate the amount of time in days for 6 meter thick layer of same soil in field to attain same degree of consolidation.
