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- (b) What do you mean by contact pressure ? Explain contact pressure for cohesive and cohesionless soil with diagram. 10
7. (a) Define consolidation and its types. Explain Terzaghi's theory of one dimensional primary consolidation with its assumptions. 10
- (b) Describe the following terms :
- (i) Expansion index
 - (ii) Coefficient of volume change
 - (iii) Coefficient of compressibility. 10

Section-D

8. (a) What is shear strength ? What are the different tests to determine shear strength of soil ? Explain under what conditions these tests are used. 10
- (b) Explain normally consolidated and over consolidated clay. Also draw pressure void ratio relationships for these. 10
9. (a) Explain active, passive and at rest conditions in earth pressure against a retaining wall. 10
- (b) What are the different theories to determine active and passive pressure ? Describe any one theory in detail. 10

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B.Tech. 5th Semester (Civil Engg.) Examination,

December-2015

SOIL MECHANICS

Paper-CE-307-F

Time allowed : 3 hours]

[Maximum marks : 100

Note : (i) Q. No. 1 is compulsory.

(ii) Attempt one question from each section.

(iii) All questions carry equal marks.

(iv) Attempt five questions in all.

(v) Assume missing data, if any, suitable.

1. Describe the following briefly :

(a) Black cotton soil

(b) Relative density of soil

(c) Discharge velocity and seepage velocity

(d) Difference between effective stress and natural stress

(e) Quick sand condition and critical hydraulic gradient

(f) Protective filter

(g) Use of Newmark's chart

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- (h) Types of consolidation
- (i) Earth pressure at rest
- (j) Engineering properties of soil $10 \times 2 = 20$

Section-A

2. (a) Describe the different consistency limits and consistency indices with diagram. 10
- (b) The total unit weight of a specific soil is 16 kN/m^3 . The specific gravity of soil particles of the soil is 2.67. The water content of the soil is 17%. Calculate dry unit weight, porosity, void ratio and degree of saturation. 10
3. (a) What is the purpose of soil classification ? Explain Indian Standard classification on the basis of plasticity. 10
- (b) What do you mean by permeability ? Explain the laboratory and field methods to determine coefficient of permeability. 10

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Section-B

4. (a) A sand deposit consists of 2 layers. The top layer is 2m thick ($\rho = 1705 \text{ kg/m}^3$) and bottom layer is 3.5 m thick ($\rho_{\text{sat}} = 2065 \text{ kg/m}^3$). The water table is at a depth of 3.5m from the surface and the zone of capillary saturation is 0.5 m above water table. Draw the diagram showing variation of stresses and determine effective stress at each section. 15
- (b) Describe the properties and utilities of flow nets. 5
5. (a) What is compaction curve ? Give its salient features. Also define zero air void line. 10
- (b) Describe the field methods of compaction. Also explain how compaction can be controlled in field. 10

Section-C

6. (a) Explain Westergaard's theory for the determination of the vertical stress at a point. How is it different from Boussinesq's equation ? 10

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