

**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) What is Mohr's circle ? Derive a relationship between the principal stresses at failure using Mohr- Coulomb criterion. 10
9. (a) Explain Culmann's graphical method for active earth pressure with diagram. 10
- (b) What are the assumptions in Coulomb's theory? Explain Coulomb wedge theory for determining in cohesionless soil. 10

Roll No. ....

**24290**

**B. Tech. 5th Semester (Civil)  
Examination – February, 2022**

**SOIL MECHANICS**

**Paper : CE-307-F**

*Time : Three Hours ]*

*[ Maximum Marks : 100*

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

**Note :** Attempt *five* questions in all by selecting *one* question from each Section. Question No. 1 is *compulsory*. All questions carry equal marks. Assume missing data, if any, suitably.

1. Describe the following briefly : 2 × 10 = 20
- (a) Weathering of soil
  - (b) Relative density of soil
  - (c) Different test for determining permeability of soil
  - (d) Hydraulic gradient
  - (e) Isobar diagram
  - (f) Uses of protective filter

- (g) Types of consolidation
- (h) Types of rollers
- (i) Shear characteristics of partially saturated soil
- (j) Active earth pressure

#### SECTION - A

2. (a) A natural soil deposit has a bulk unit weight of  $18.44 \text{ kN/m}^3$  and water content of 5%. Calculate the amount of water required to be added to 1 cubic metre of soil to raise the water content to 15%. Also, determine the degree of saturation if the void ratio remain constant. Assume  $G = 2.67$ . 10
- (b) What do you mean by consistency of soil? Describe different consistency limits with neat diagram. 10
3. (a) What is the use of plasticity chart? Explain Indian Standard classification on the basis of plasticity. 10
- (b) Define discharge velocity and seepage velocity. Briefly describe the factors affecting permeability. 10

#### SECTION - B

4. (a) The water table in uniform sand deposit is 2 m below ground surface. Determine the effective stress at a depth of 6 m below ground surface if the void ratio is 0.65 and specific gravity of solids is 2.62. Assume soil above water table is dry. 10

- (b) What is capillary rise in soil? Describe the effective stresses in saturated soil by capillary action. 10

5. (a) Explain standard proctor test to determine compaction of soil. 10
- (b) What is field control of compaction? Describe to determine compaction in field. 10

#### SECTION - C

6. (a) Explain Westergaard's theory for the determination of the vertical stress at a point. Compare it with Boussinesq's equation. 10
- (b) What do you mean contact pressure? Explain contact pressure for cohesive and cohesionless soil with diagram. 10
7. (a) Describe with assumptions Terzaghi's one dimensional consolidation theory. 10
- (b) Describe the following terms : 10
- (i) Coefficient of compressibility
  - (ii) Construction period settlement
  - (iii) Coefficient of volume change