Code : 011615

B.Tech 6th Semester Exam., 2018

SOIL AND ROCK MECHANICS

Time : 3 hours *Full Marks* : 70

Instructions :

(i) The marks are indicated in the right-hand margin.

*(ii) There are **NINE** questions in this paper.*

*(iii) Attempt **FIVE** questions in all.*

*(iv) Question No. **1** is compulsory.*

1. Choose the correct option (any *seven*) : 2×7=14

(a) Taylor's stability number N is given by

(i) $c / \gamma H$

(ii) $\gamma H / c$

(iii) $\gamma c / H$

(iv) cH / γ

(b) When a retaining wall moves away from the backfill, the pressure exerted on the wall is termed as

(i) passive earth pressure

(ii) swelling pressure

(iii) pore pressure

(iv) active earth pressure

(c) The maximum value of Taylor's stability number is

(i) 1

(ii) 0·5

(iii) 0·26

(iv) 0·25

(d) For a base failure, the depth factor D_r is

(i) 0

(ii) 1

(iii) $0 < D_r < 1$

(iv) $D_r > 1$

(e) Rankine's theory of earth pressure assumes that the back of the wall is

(i) plane and smooth

(ii) plane and rough

(iii) vertical and smooth

(iv) vertical and rough

(f) Generally standard size of rock core is preferred as

(i) 27 cm

(ii) 40 cm

(iii) 54 cm

(iv) 60 cm

(g) Stokes's law given the equation for settling velocity (v_s) of small particles and viscous flow is

(i) depth of soil

(ii) square of depth of soil

(iii) angle of internal friction of soil

(iv) None of the above

(h) Which of the following earth pressure theories is directly applicable to bulk heads?

(i) Rankine's theory

(ii) Coulomb's theory

(iii) Both of the above

(iv) None of the above

(i) Which of the following methods is used for tensile strength of rock?

(i) UCS

(ii) Brazilian test

(iii) Point load test

(iv) Slake durability test

(j) Specific gravity of rock is of range

(i) 1·2–1·5

(ii) 2·0–2·2

(iii) 1·8–2·0

(iv) 2·5–2·8

2. (a) Define shear strength of soil. What is Mohr-Coulomb failure criterion? 7

(b) Define shear strength in terms of effective stress on a plane within a saturated soil mass at a point, where the total normal stress is 200 kN/m^2 and pore water pressure is 80 kN/m^2. The effective shear stress parameter is $c' = 16$ kN/m^2 and $\phi' = 30°$. 7

3. (a) In a triaxial test, cell pressure is 100 kN/m^2 and $\phi = 30°$, cohesion is 50 kN/m^2. Calculate the failure state of soil. 7

(b) What is vane shear test? How to calculate the shear strength using this test? 7

4. (a) What is the earth pressure? Explain the types of earth pressure with their coefficients. 7

(b) Differentiate between the Coulomb earth pressure theory and Rankine earth pressure theory. 7

5. (a) Describe rock mass classification. Write different types of rock mass classification. 6

(b) What are the types of failure of slope? Explain with neat sketch. 8

6. (a) What is TBM? List the application of TBM. 7

(b) Define rock bolts. Explain the types and application of rock bolt with neat sketch. 7

7. (a) Explain different types of physical properties of rock. 8

(b) Define Brazilian test for tensile strength with diagram. 6

8. (a) Why are rock bolts necessary? Enumerate different types of rock bolts. Explain it with neat sketches. 7

(b) Explain different types of explosives used in blasting techniques. 7

9. Write short notes on any *four* of the following : 3½×4=14

(a) Skempton's pore water parameter

(b) Liquefaction

(c) Critical depth in cohesive soil

(d) Slake durability test of rock

(e) Different types of rock

(f) RQD

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