CBCS SCHEME

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18MN731

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Open Pit Slope Analysis and Design

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Illustrate "Pit slope angle vis-à-vis Mine Economics" by increasing slope angle from 30° to 60° with an interval of 5°, and the pit depth from 100m to 400m with an interval of 100m. **(10 Marks)**

b. Derive an equation to determine factor of safety for wedge failure considering zero cohesion. **(10 Marks)**

OR

2 a. Explain the mechanism of common modes of slope failure. **(04 Marks)**

b. Identify and explain the factors/ parameters that influence the stability of slopes. **(16 Marks)**

Module-2

3 a. Identify the geotechnical data required for high wall slope stability studies. **(04 Marks)**

b. Explain the above geotechnical data in relation to high wall slope stability studies. **(16 Marks)**

OR

4 a. What are the geological data required for stability studies of high wall slopes? **(06 Marks)**

b. Interpret the above geological data in relation to stability studies of high wall slopes. **(14 Marks)**

Module-3

5 a. Explain in detail Barton's criterion for assessing the shear strength along discontinuity surfaces. **(10 Marks)**

b. Explain in detail the laboratory test to determine shear strength of rock with neat sketch. **(10 Marks)**

OR

6 a. For determining shear strength of rock mass, in situ shear test was done. If rock block failed at an inclined load of 100kN, estimate shear strength of the rock mass if applied normal load was 50kN and inclination of shear load was 20° with horizontal. Loading area for both normal and shear load may be taken as 0.2m × 0.2m. **(06 Marks)**

b. Explain in detail the filling features and conclusion made by Ladanyi and Archambault on filling discontinuities. **(14 Marks)**

Module-4

7 a. Describe different types of piezometers for measuring water pressure behind slope and mention their limitation. **(10 Marks)**

b. Define permeability and describe methods of measurement of permeability in field with neat sketch. **(10 Marks)**

OR

8 a. In order to determine the average permeability of a bed of soil of 12.5m thick overlying an impermeable stratum, a well was sunk through the soil and a pumping test was carried out. After some time the discharge was 5000kg/min and the drawdown in the observation wells of 15.2m and 30.4m from the pump were 1.625m and 1.360m respectively. If the original water table was at a depth of 1.95m below ground level, estimate permeability of soil in mm/sec. **(12 Marks)**

b. Draw a groundwater flow net of an open pit slope in rainy season and state the purpose of flow net. **(08 Marks)**

Module-5

9 a. A 60m high slope with a face angle 60° is found to have a bedding plane running through toe at dip of 30° and intersect the slope surface. The unit weight of rock is 2600kg/m^3. Cohesive strength of bedding is 4900kg/m^2 and angle of friction is 25°. Examine the stability of slope. **(10 Marks)**

b. Assume two slopes A and B Probability Density Function (PDF) of factor of safety for both the slopes are found to be normally distributed. Slope A is found to have mean factor of safety 1.35 and standard deviation 0.198, and same for slope B are 1.45 and 0.4. Compare slopes A and B in terms of safety. **(10 Marks)**

OR

10 Explain following slope stability assessment methods with their limitations.

a. Ordinary method of slices

b. Bishop's simplified method

c. Sarma's method. **(20 Marks)**

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