

DEPARTMENT OF CIVIL ENGINEERING
CVL712 : Slopes and Foundations
Minor Test II

23rd August, 2020

- 1 a) A slope is to be excavated in weathered and altered rock with $c'=30\text{kPa}$, $\phi'=30^\circ$ at slope face angle of 45° . Compute height H of the slope for $FS=1.5$ and location of slip circle using Hoek & Bray Charts for
- i) drained condition
 - ii) heavy rain condition

Take $\gamma=18\text{ kN/m}^3$. (4)

- b) Derive expression for inclination θ (angle between anchor force T and sliding plane) for a factor of safety F to have a minimum anchor force T for the slope shown in Fig. 1. (2)

- 2 a) A rock slope of height 25 m is shown in Fig. 2. It is subjected to self weight W and vertical live load of 200 kN. The site is located in an earthquake zone with maximum horizontal acceleration of $0.2g$. Calculate factor of safety against sliding for a prolonged rainfall using Barton's strength criterion

$$\tau = \sigma'_n \tan \left(\phi_b + JRC \log_{10} \frac{JCS}{\sigma'_n} \right)$$

The properties are: $JRC=10$, $JCS=5\text{MPa}$, $\phi_b=30^\circ$, $\gamma=25\text{ kN/m}^3$, $\gamma_w=10\text{ kN/m}^3$. (8)

- b) Sketch the force diagram for Problem 2a) showing all the force vectors and strength vector. (2)
- c) Explain Hocking's test for wedge failure with sketches. (1)
- d) The dips and dip directions of planes A and B are $40^\circ/105^\circ$ and $60^\circ/235^\circ$, respectively. The plunge and trend of the line of intersection are $25^\circ/161^\circ$. The dip and dip direction of the slope face are given as:
- (i) $65^\circ/160^\circ$
 - (ii) $20^\circ/150^\circ$
 - (iii) $50^\circ/150^\circ$
 - (iv) $40^\circ/085^\circ$
- Will a wedge failure occur for the above cases? If yes, will it occur along line of intersection, or on plane A or B? Explain the reasons for each case. (3)

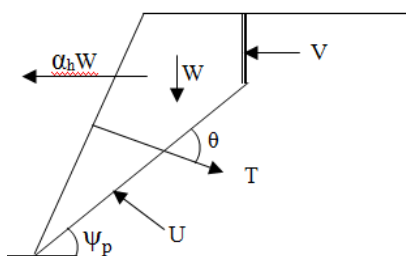


Figure 1

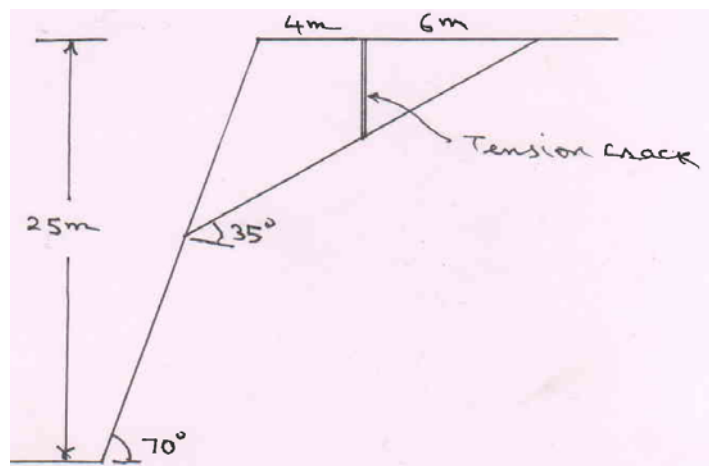


Figure 2