Lab Practical (Answer Sheet) - Limit Equilibrium Analysis of Engineered Slopes

Below, enter the answers you obtain when prompted to do so during the different exercises (note: round your Factor of Safety values to two decimal places):

Part 1A – Deterministic Planar Analysis

1. What is the safety factor obtained for the:

   a) dry slope with a slope angle of 55 ° (as prompted in step 6) ? _____

   b) same slope with a cohesion of 5 tonne/m^2 (as prompted in step 7) ? _____

   c) sliding surface 100% filled with water (as prompted in step 8-4) ? _____

   d) sliding surface 50% filled with water (as prompted in step 8-5) ? _____

   e) same slope but with a seismic coefficient of 0.2 (as prompted in step 9) ? _____

   f) same slope but now with a tension crack (as prompted in step 10) ? _____

Part 1B – Sensitivity Analysis

1. Approximately list the input data parameters in order of most sensitive to least sensitive (as prompted in step 2):

2. At what distance from the crest does a tension crack produce the minimum Factor of Safety (as prompted in step 3): _____

Part 2A – Method of Slices: The Basics

1. What is the minimum safety factor obtained using the Bishop Simplified method to the given problem (as prompted in step 10) ? _____

2. Report the values obtained for the other analysis methods:

   Ordinary/Fellenius _____

   Janbu Simplified _____

   Janbu Corrected _____

   GLE/Morgenstern-Price _____

3. Sketch the free body diagrams for one of the slices, comparing the different forces and values (rounded to one decimal place), used by the different analysis methods (as prompted in step 13).

   SLICE # _____

ORDINARY	BISHOP SIMPLIFIED	JANBU SIMPLIFIED

JANBU CORRECTED	GLE/MORGENSTERN-PRICE

Part 2B – Materials & Loading

1. What are the minimum safety factors obtained (as prompted in steps 12 and 14)?

Analysis Method	Factor of Safety	
	with external load	*without external load*
Bishop Simplified		
Ordinary/Fellenius		
Janbu Simplified		
Janbu Corrected		
GLE/Morgenstern-Price		

BONUS: What is the maximum load that can be applied to the top of the slope, for which the safety factor (GLE/Morgenstern-Price) is greater than 1.0? _____

Part 2C – Non-Circular Surfaces

1. Compare the minimum safety factors obtained for the circular analysis (taken from Part B above) relative to those obtained for the same loading conditions but using a non-circular analysis (as prompted in step 5)?

Analysis Method	Factor of Safety	
	circular analysis	*non-circular analysis*
Bishop Simplified		
Ordinary/Fellenius		
Janbu Simplified		
Janbu Corrected		
GLE/Morgenstern-Price		