INTRODUCTION TO COASTAL HYDRAULICS

HOMEWORK 4

Question 1

Rubble mound breakwater will be constructed at a depth of 5 m and will be designed for breaking wave condition. Number of units in cover layer is 2. The bottom slope is m=1/20 and the wave period is T=9 sec. By using Hudson method;

a) Find the weight of the armor units in the cover layer at the trunk section (slope angle is 1/2).

b) Calculate the deep water wave height of design wave. The angle between wave crests and the shoreline is 45° at deep water (α_0=45°).

In this question, regular wave conditions will be taken into account.

Number of units in cover layer	Placement	K_D (Trunk)		K_D (Head)	
		Breaking wave	Non-breaking wave	Breaking wave	Non-breaking wave
2	Random	2	4	1.6	2.8

Question 2

A breakwater will be constructed at a 14 m water depth. The armour face slope of the breakwater is 1/1.5. The design wave height and mean period are H_s=3.0m and T_m=8.0s., respectively. The stability calculations of the breakwater will be made using Van der Meer method. Design the breakwater without permitting overtopping and draw the cross-section in scale.

Question 3

Calculate the stability of the caisson structure to be built in the project area where the specific gravity of the sea water is 10.20 kN/m^3. The deep water significant wave height and significant wave period are H_{s0}=5.0m and T_s=6.0s., respectively. Bottom slope will be considered as 1/50. Friction factor between caisson concrete structure and rubble mound foundation is $\mu = 0.5$. Safety factor against sliding will be considered as 1.1 whereas safety factor against overturning as 1.2.