INTRODUCTION TO COASTAL HYDRAULICS

HOMEWORK 1

In assignments, X is the last digit of the student number and Y is the penultimate digit. In the assignments, the student number must be written and X =? and Y =? must be indicated in every solution.

Question 1

The depth of water at a wave channel varies between 8X cm and 2Y cm. What should be the period ranges that generate deep water, shallow water or intermediate water conditions in the channel?

Question 2

If the wave profile is given by; η=0.X sin (0.0866x-0.785t)

a) Draw the wave profile (for Δt=T/8, x=0 m)
b) Calculate the water depth of the recorded wave profile and find the deep water wave length.

Question 3

A wave with a period of T=7.X sec and a height of H = 3.X m is propagating over a water depth of d=10.Y m. Determine the maximum horizontal and vertical components of particle velocity at z=-4.X m below the surface.

Question 4

A wave with a period of T=10.X sec and a height of H = 2.Y m is propagating from deep water into shallow water.

a) At a depth of d=100 m, determine the maximum horizontal and vertical components of particle velocity and the maximum horizontal and vertical water particle displacements for z= -80 m and z=-d. (u_{max}, w_{max}, A and B).

b) At a depth of d = 39 m, determine the maximum horizontal and vertical components of particle velocity and the maximum horizontal and vertical water particle displacements for z= -30 m and z=-d. (u_{max}, w_{max}, A and B).

c) At a depth of d = 2.4 m, determine the maximum horizontal and vertical components of particle velocity and the maximum horizontal and vertical water particle displacements for z= 0 and z=-d. (u_{max}, w_{max}, A and B).

Question 5

A wave with a period of T=8.Y sec is propagating over a water depth of d=19.X m. The equation of the elliptical orbit is as follows at z=0;

$$\frac{\alpha^2}{7.87}+\frac{\beta^2}{4}=1$$

a) Determine the wave profile.
b) If the movement of the water particle starts at T=0 from the top of the orbit, find the particle velocity at ¾ of the orbital length.