INTRODUCTION TO COASTAL HYDRAULICS

HOMEWORK 1

Question 1
The depth of water at a wave channel varies between 20 cm and 80 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=0.5 sin (0.0866x-0.785t)

a) Draw the wave profile (for $\Delta t = T/8$, 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 sec and a height of H = 3 m is propagating over a water depth of d=10 m. Determine the maximum horizontal and vertical components of particle velocity at z=-4 m below the surface.

Question 4
A wave with a period of T=10 sec and a height of H = 2m 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 sec is propagating over a water depth of d=19 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.