Second Term Test
Spring 2010
B
ENCE 4723
Coastal Engineering

Duration 2 hours

Open-book including calculator, notes and texts.

Attempt all questions

Give your answers on the sheets provided.

Question # 1	11	/12
Question # 2	7½	/8
Question # 3	7½	/~~12~~ 8
Question # 4	10	/~~8~~ 12
TOTAL	36	/40

Name: DONALD JEROLLEMAN PLEASE PRINT!

Last Name

Student No.

2330000

FPS(0.3048) = mps   FPS(0.6818) = mph

1m = 3.281 ft
1ft = 0.3048 m

1. Given: A lake that is 45 miles long and 40 ft deep. The overwater wind speed at 7-m above the surface is 76 mph. Assume: The air and water temperatures are nearly the same. Td = 1.25 hours.

Circle the closest answer:

Determine:

a) Hs=: [≤8, 11, 12, 13, 15, ≥20] ft   2/3

b) Ts= : [≤2, 3, 4, 5, 7, ≥15] sec   3/3

c) Using a friction coefficient of 0.0025, the wind setup is: [≤1.5, 2, 3, 4, 5, 6, ≥7] ft   2/2

d) The waves are: [Fetch Limited, Duration Limited]   1/1

e) H_{rms} = [≤5, 7.5, 8.5, 10, 12, ≤13] ft   1

Show your calculations here!

F = 45 miles = 237600 ft = 72420 m   d = 40 ft U_{ow} = 76 mph = 111.47 fps = 33.98 mps T_d = 1.25 hr. = 4500 s

$R_L = 1$

$R_T = 1$

$U_A = 0.589(76\text{mph})^{1.23}$ = ~~44.764 mph~~ 121.2

$0.539(111.47)^{1.23} = 177.66$ fps

$\frac{gd}{U_A^2}$ = ~~0.6418~~ 0.0408 (g = 32.2)

$\frac{gF}{U_A^2}$ = ~~0.723~~ (feet) = 242.4

$\frac{gH}{U_A^2} = 0.011 \rightarrow$ H_s = 10.78 ft

$\frac{gT}{U_A} = 1.3 \rightarrow$ T_s = 7.17 s

$\frac{gT_m}{U_A} = \left\{\left(\frac{g\,t_d}{U_A}\right)\frac{1}{537}\right\}^{3/7}$ $T_m = 6.6$

$T_m < T_s$

3

$\frac{gT_m}{U_A} = 1.19$ $\frac{gd}{U_A^2} = .022 \rightarrow \frac{gH}{U_A^2} = 0.0085 \rightarrow H_m = 8.33$ ft

$Z_{sup} = \frac{1}{800}\frac{F(C_f)\,U_{ow}^2}{2gd} = 3.58$

2 Given: A hurricane in the northern Gulf of Mexico with:

- $\Delta p = 60$ mm = 2.36"
- R = 18 Nmiles
- $V_F = 11$ mph = 9.559 Knots
- $\alpha = 1.2$
- Reference depth 44 ft.
- Latitude 28 degrees

Circle the closest answer:

Determine:

a) H_{os} is: [<20, 30, 35, 38, >40] ft 2

b) T_{os} is: [<12, 13, 14.5, 15, >15] sec 2

.

c) If CR=2 and Cf=0.0026, the surge height is approximately:
[<1, 2, 4, 6, 8, >10] ft 1/2 / 1

Show your calculations here!

$U_{max} = 0.868 \text{ knots} \{73 \text{ miles} (2.36 \text{ in})^{1/2} - 0.57 \text{ inch} (18 \text{ Nmiles})(\frac{4\pi}{24}) \sin 28° \}$
$= 0.868 (112.145 - 2.52) = 95.15$ Knots

$U_R = 0.865 (95.15) + 0.5 (9.559) = 87.08$ knots 3.

$T_s = 8.6 \left(1 + \frac{0.104(1.2)(9.559)}{\sqrt{87.08}}\right) e^{\frac{18(2.36)}{200}} = 11.99$ s

$H_{os} = 16.5 \left(1 + \frac{0.208(1.2)(9.559)}{\sqrt{87.08}}\right) e^{\frac{18(2.36)}{100}} = 31.68$ ft

ft/sec.

$h_{ss} \approx K_s K_a \left(2.36 + \frac{2(0.0026)(87.08^2)}{2(32.2)(44)(800)}\right) \sim K_s K_a (2.36)$

1mm = 0.003281 ft   1 cm/s = 0.03281 ft/s

3. Given: A beach with a D50 = 0.45 mm. Assume water temperature approximately 20 degrees C.

Circle the closest answer:

a) The fall velocity is: [<0.03, 0.15, 0.2, 0.25, 0.3, >0.4] ft/sec   1/1

b) The stable beach slope is: [< 1%, 1.5%, 2%, 3%, >4%] "Exposed"   1/1

c) For a deep water wave Ho = 5 ft and T = 10 sec, the beach profile tends to: [Berm; Offshore bar(s), Neither] State method 1984 SPM & Fig 8.14   2/2

$F_o = \frac{H_o}{V_s T}$ >1 → offshore, <1 → onshore

d) The closure depth for the wave in (b) is: [<50, 80, 100, 120, 130, >150] ft   1½/1

Show your calculations here!

20°C D_{50} = 0.45 mm Exposed $H_o = 5'$ T = 10 s

= 0.0014765 ft

$\frac{H_o}{D_{50} \text{ in ft}} = 3386.5$ 2/2

1:16 = 0.0625 = 6.25%

Fig 4-30

Dimensionless fall time = $\frac{H_o}{V_f T}$ = 1.7?

$\frac{150}{51} = 2.9$ u 0.471

$\frac{d}{L} = 0.3058$ Fig 4-31

L = 490

$L_o = \frac{gT^2}{2\pi} = 51.25$ ft

w = 6.5 cm/s = 0.213 ft/s

$\frac{80}{51.25}$ 1.56   u = 1.05

$\frac{d}{L} = .1883$

L = 424

$F_o = \frac{5}{(.213)(10)} = 2.35$

$\frac{\pi(0.213)}{32.2(10)} = 0.0213$

$\frac{130}{51.25}$ = 2.54   u = 0.59

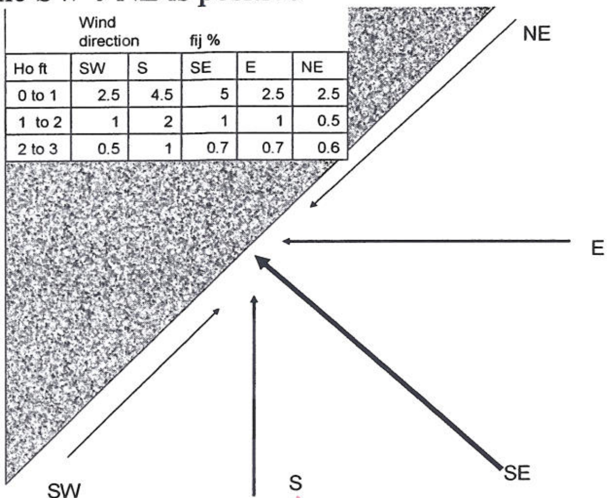
$\frac{H_o}{L_o} = \frac{5}{51.25} = 0.976$

D_{50} = 450 micron

$u = 0.5$ ft/s $= \frac{5}{2}\left(\frac{32.2(10)}{L}\right)\frac{1}{\cosh(2\pi d/L)}$

4. Given: Given: the wave frequency table below. The beach slope is 1.25%. Assume SW→NE is positive

Ho ft	SW	S	SE	E	NE
	Wind direction		fij %		
0 to 1	2.5	4.5	5	2.5	2.5
1 to 2	1	2	1	1	0.5
2 to 3	0.5	1	0.7	0.7	0.6



Circle the closest answer:

Estimate:

a) the net longshore transport is:
[≤6500, 7500, 10000, 15000, 30000, ≥360000] yd3/yr

b) the gross longshore transport is:
[≤7000, 7500, 14000, 22000, 36000, ≥50000] yd3/yr

c) the maximum breaker induced current is (use 3 ft wave):
[≤ 0.5, 1, 1.25, 1.5, 1.75, 2, ≥4] ft/sec

Show your calculations here and in table above!

	Wind direction		fij %		
Ho ft	SW	S	SE	E	NE
0 to 1	1.25 2.5	4.5	5	2.5	1.25 2.5
1 to 2	0.5 1	2	1	1	0.25 0.5
2 to 3	0.25 0.5	1	0.7	0.7	0.3 0.6
H_{oi} rad	1.37445	0.7854	0	-0.7854	-1.3744
0.5	774.52	29.9 1000	0	-16.855	-14.574
1.5	48090.5	2076924	0	-10 53462	-45240
2.5	162.3 861	12415	0	-2 608690	-194.8 -1033
	267.3	608	0	-380.1	-254.6
	1418	20339		-12707	-1350

$137000 (H_{oi}^{5/2}) (\cos \alpha_{oj})^{1/4} \sin(2(\alpha_{oj})) (\frac{\%}{100})$

α_{oj}

SW − NE = ~~475.7~~ 21757 yd³/yr

NE − SW = ~~634.7~~ 14057 yd³/yr

Net Q_{ls} = ~~240.6~~ 7700 SW−NE yd³/yr

Gross = 1510 yd³/yr 35814

2
2
1/2
5/2
6