

Name \_\_\_\_\_

## Synoptic Lab, MET 421, Test 2

- 1) For a  $15 \text{ ms}^{-1}$  east wind blowing towards Milwaukee
  - a) Calculate the distance to the east shore of Lake Michigan. You can use a distance calculator website such as <http://www.daftlogic.com/projects-google-maps-distance-calculator.htm> . (1 pt)
  - b) Calculate the offshore significant wave height using the Breugem and Holthuijsen equation. Assume an average water depth of 70 meters (2 pts)
  - c) Calculate the wave period using the Breugem and Holthuijsen equation. Assume an average water depth of 70 meters (2 pts)
  - d) If the water depth were 15 m, what would the wave height be? (2 pts)
  - e) If the water depth were 15 m, what would the wave period be? ( 2 pts)
  - f) Circle - If the distance were 30 km, is the offshore wave height and period the same no matter what the water depth? ( 1 pt)    Yes    No

2) What three factors determine wave height in deep water? (3 pts)

3) True/false (7 pts)

- Swell waves are generated locally
- Swell waves tend to have irregular distance between wave crests
- Swell waves are the 1/3 highest waves
- Swell waves have propagated out of a generation region
- Longer waves move faster than shorter waves
- Wavelength tends to decrease as a wave moves into shallower water
- Waves “break” when the wave height to length ration is 1/20 in shallow water

4) Wave modeling (4 pts)

a) Write the wave energy balance equation and define the terms

b) List 4 products of the Wavewatch model. You may refer to [http://polar.ncep.noaa.gov/waves/viewer.shtml?-multi\\_1-](http://polar.ncep.noaa.gov/waves/viewer.shtml?-multi_1-)

5) List 4 considerations to optimize a ship route (4 pts)

6) List 5 qualities of a good streamline analysis (5 pts)

7) Streamlines which depict directional divergence of directional convergence are called: \_\_\_\_\_ (1 pt)

8) A transition area between two singular points is called \_\_\_\_\_ (1 pt)

9) Datum questions ( 6 pts)

- a) What is a geoid?
  
  
  
  
  
  
  
  
  
  
- b) List two orthometric datums
  
  
  
  
  
  
  
  
  
  
- c) List two tidal datums

10) Tide questions ( 7 pts)

- a) Circle one - Biloxi, MS has (    semidiurnal    mixed    diurnal    ) tides
- b) Circle one - Lake Charles, LA has (    semidiurnal    mixed    diurnal    ) tides
- c) Circle one - Cape Canaveral, FL has (    semidiurnal    mixed    diurnal    ) tides
- d) Draw a line that matches the following

Associated with the two-week cycle	Moon's orbit around earth
Associated with the monthly cycle	Earth's orbit around sun
Associated with the one-year cycle	Regression of the moon's nodes
Associated with the 18.6-year cycle	Full and new moon

11) List two atmospheric influences causes departures from the tide tables. Refer to storm surge notes. (2 pts)?

12) Other than land elevation changes, what are the two main mechanisms contributing to sea level rise? (2 pts)

13) Sea level rise has averaged 0.10 inches per year globally. But it varies locally due to land elevation changes, and may be accelerating. Using <http://tidesandcurrents.noaa.gov/sltrends/sltrends.html> , based on current trends, what is the equivalent sea level rise in feet over a 100-year period for:? (5 pts)

- a) Grand Isle, LA \_\_\_\_\_
- b) Waveland, MS \_\_\_\_\_
- c) San Francisco, CA \_\_\_\_\_
- d) Valdez, Alaska \_\_\_\_\_
- e) Ocean City, MD \_\_\_\_\_

14) Ocean terms. Define (10 pts)

a) Rip current

b) Ocean conveyor belt

c) Gyres

d) Eddies

e) Tsunami

15) Boundary currents (6 pts)

a) Name two western boundary currents

b) Name two eastern boundary currents

c) Circle one - Ekman transport moves water to the right of the wind. Therefore, a north wind along California results in ( upwelling      downloading).

16) What are the 4 optimum conditions for rip currents? Refer to the checklist in

<http://www.ripcurrents.noaa.gov/resources/Engle2002.pdf> for guidance (4 pts)

17) Circle - You are on a forecast shift at the Mobile National Weather Service. There is only one DART buoy, located in the central Gulf of Mexico. The wave period suddenly shifts for a buoy near Pensacola. Based on which wave period would you issue a tsunami warning for the Florida panhandle? (2 pts)

- ( 0.1-0.3 seconds    2-5 seconds    6-10 minutes )

18) Circle - Which diagram below might denote  $r=-0.8$  ? (2 pts)

