

THE UNIVERSITY *of York*

**Degree Examination 2007**

**ENVIRONMENT DEPARTMENT**

**MSc Environmental Science & Management  
MSc Marine Environmental Management  
MSc Environmental Economics & Environmental Management**

**OCEAN & COASTAL PROCESSES**

Time allowed: **two hours**

Answer **ALL TEN** questions in **PART 1** (40 marks)

Answer **ONE** question in **PART 2** (40 marks)

*Pay adequate attention to spelling, punctuation and grammar, so that your answers can be readily understood*

## **PART 1**

### **ANSWER ALL OF THE FOLLOWING TEN QUESTIONS**

#### **Question 1**

- (a) Describe how the Coriolis Effect results in Ekman Pumping [4]
- (b) Give one specific example of a wind driven coastal upwelling systems [1]

#### **Question 2**

In one short paragraph, describe the thermohaline circulation of the oceans. Include in your answer: the principal driving force [1], areas and mechanisms of deepwater formation [2], and the thermohaline circulation flow path [2].

#### **Question 3**

- (a) Define the wave base in terms of wavelength? [2]
- (b) What is significant about the wave base in terms of coastal erosion? [2]

#### **Question 4**

Name three factors influencing tidal range [3]

#### **Question 5**

What is the typical range of temperature and salinity in the ocean? [2]

What equipment is typically used to measure these parameters? [1]

#### **Question 6**

Sketch a typical temperature, salinity and density profile with depth in the ocean, naming the principal features. [4]

#### **Question 7**

Briefly describe how an El Nino event affects the physical and chemical conditions in surface waters of the Peruvian margin, and the impact of these changes on Peruvian fish stocks. [5]

### **Question 8**

(a) Place the following substances in order from most to least resistant to erosion: Shale, granite, boulder clay, limestone [2]

(b) In the process of erosion, what is meant by the term attrition? [1]

### **Question 9**

Sven lives in Pålång, a small town on an island off the coast of Sweden in the Baltic Sea. His friend, Luciana, lives in Lisbon, a Portuguese port on the Atlantic coast. For the past 50 years, both Sven and Luciana have used tidal gauges to measure their Local Mean Sea Level (LMSL). Sven has measured an average decrease in LMSL of 5.8 mm/yr, while Luciana has measured an increase of 1.6 mm/yr.

(a) What are the two factors that contribute to changes in LMSL? [2]

(b) Why has Sven measured a decrease in LMSL, while Luciana has measured an increase in LMSL? [2]

### **Question 10**

(a) What is an inverse estuary? [2]

(b) Why are the Colorado River delta and northern Gulf of California less productive today than it was in 1900? [2]

## **PART 2**

### **ANSWER ONE OF THE FOLLOWING THREE QUESTIONS**

#### **Question 1**

Why are linkages between land and sea important to the structure, functioning or condition of some marine and coastal ecosystems? Illustrate your answer with examples.

#### **Question 2**

Describe the range of options available to coastal engineers to manage coastal erosion and discuss some of their costs and benefits.

#### **Question 3**

Describe, with examples, how physical and chemical processes generate oceans currents and circulation.