

# Chapter-12

## Water (Oceans)

### 1. Multiple choice questions.

#### Question 1(i).

Identify the element which is not a part of the hydrological cycle:

- (a) Evaporation
- (b) Hydration
- (c) Precipitation
- (d) Condensation.

**Answer:**

- (b) Hydration

#### Question 1(ii).

The average depth of continental slope varies between:

- (a) 2-20 m
- (b) 200-2,000 m
- (c) 20-200 m
- (d) 2,000-20,000 m.

**Answer:**

- (b) 200-2000 m

#### Question 1(iii).

Which one of the following is not a minor relief feature in the oceans:

- (a) Seamount
- (b) Atoll
- (c) Oceanic Deep
- (d) Guyot.

**Answer:**

(b) Atoll

**Question 1(iv).**

**Salinity is expressed as the amount of salt in grams dissolved in sea water per:**

- (a) 10 gm
- (b) 1,000 gm
- (c) 100 gm
- (d) 10,000 gm.

**Answer:**

(b) 1,000 gm

**Question 1(v).**

**Which one of the following is the smallest ocean:**

- (a) Indian Ocean
- (b) Arctic Ocean
- (c) Atlantic Ocean
- (d) Pacific Ocean.

**Answer:**

(b) Arctic Ocean.

2. Answer the following questions in about 30 words.

**Question 2(i).**

**Why do we call the earth a Blue Planet?**

**Answer:**

Water is an essential component of all life forms that exist over the surface of the earth. The creatures on the earth are lucky that it is a water planet, otherwise we all would have no existence. Water is a rare commodity in our solar system. There is no water on the sun or anywhere else in the solar system. The earth, fortunately has an abundant supply of water on its surface. Hence, our planet is called the 'Blue Planet'.

**Question 2(ii).**

**What is a continental margin?**

**Answer:**

The continental margin is the extended portion of each continent occupied by relatively shallow seas and gulfs. It is the shallowest part of the ocean showing an average gradient of  $1^\circ$  or even less. The shelf typically ends at a very steep slope, called the shelf break. The width of the continental shelves vary from one ocean to another. The average width of continental shelves is about 80 km. The shelves are almost absent or very narrow along some of the margins like the coasts of Chile, the west coast of Sumatra, etc.

**Question 2(iii).**

**List out the deepest trenches of various oceans.**

**Answer:**

As many as 57 deeps have been explored so far; of which 32 are in the Pacific Ocean; 19 in the Atlantic Ocean and 6 in the Indian Ocean. Some important trenches of the world are as follows:

1. Mariana Trench: It is the world's deepest trench. It lies in Pacific Ocean. It is 11034 km below the ocean.
2. Puritonko Trench: It is deepest trench in Atlantic Ocean.
3. Sunda Trench: It is deepest trench in Indian Ocean.

**Question 2(iv).**

**What is a thermocline?**

**Answer:**

The temperature-depth profile for the ocean water shows how the temperature decreases with the increasing depth. The profile shows a boundary region between the surface waters of the ocean and the deeper layers. The boundary usually begins around 100 – 400 m below the sea surface and extends several hundred of metres downward. This boundary region, from where there is a rapid decrease of temperature, is called the thermocline.

**Question 2(v).**

**When you move into the ocean what thermal layers would you encounter? Why the temperature varies with depth?**

**Answer:**

The temperature structure of oceans over middle and low latitudes can be described as a three-layer system from surface to the bottom.

1. The first layer represents the top layer of warm oceanic water and it is about 500m thick with temperatures ranging between  $20^\circ\text{C}$  and  $25^\circ\text{C}$ .

This layer, within the tropical region, is present throughout the year but in mid-latitudes it develops only during summer.

2. The second layer called the thermocline layer lies below the first layer and is characterised by rapid decrease in temperature with increasing depth. The thermocline is 500 -1,000 m thick.
3. The third layer is very cold and extends upto the deep ocean floor. In the Arctic and Antarctic circles, the surface water temperatures are close to 0° C and so the temperature variation with the depth is very slight.

### **Question 2(vi).**

**What is salinity of sea water?**

**Answer:**

Salinity is the term used to define the total content of dissolved salts in sea water. It is calculated as the amount of salt (in gm) dissolved in 1,000 gm (1 kg) of seawater. It is usually expressed as parts per thousand (%) or ppt. Salinity is an important property of sea water. Salinity of 24.7% has been considered as the upper limit to demarcate 'brackish water'. Salinity changes with depth, but the way it changes depends upon the location of the sea. Salinity at the surface increases by the loss of water to ice or evaporation, or decreases by the input of fresh water, such as from the rivers. Salinity at depth is very much fixed, because there is no way that water is 'lost', or the salt is 'added.'

### **3. Answer the following questions in about 150 words.**

#### **Question 3(i).**

**How are various elements of the hydrological cycle interrelated?**

**Answer:**

Water is a cyclic resource. It can be used and re-used. Water also undergoes a cycle from atmosphere, land surface and sub surface and the organisms. About 71 per cent of the planetary water is found in the oceans. The remaining is held as freshwater in glaciers and icecaps, groundwater sources, lakes, soil moisture, atmosphere, streams and within life. Nearly 59 per cent of the water that falls on land returns to the atmosphere through evaporation from over the oceans as well as from other places. The remainder runs-off on the surface, infiltrates into the ground or a part of it becomes glacier. The renewable water on the earth is constant while the demand is increasing tremendously. This leads to water crisis in different parts of the world :— spatially and temporally. The pollution of river waters has further aggravated the crisis.

#### **Question 3(ii).**

**Examine the factors that influence the temperature distribution of the oceans.**

**Answer:**

**The factors which affect the distribution of temperature of ocean water are explained below:**

1. Latitude: The temperature of surface water decreases from the equator towards the poles because the amount of insolation decreases poleward. The enclosed seas in the low latitudes record relatively higher temperature than the open seas; whereas the enclosed seas in the high latitudes have lower temperature than the open seas.

2. Unequal distribution of land and water: The oceans in the northern hemisphere receive more heat due to their contact with larger extent of land than the oceans in the southern hemisphere.

3. Prevailing wind: The winds blowing from the land towards the oceans drive warm surface water away from the coast resulting in the upwelling of cold water from below. As a result, there is longitudinal variation in the temperature. On the contrary, the onshore winds pile up warm water near the coast and this raises the temperature.

4. Ocean currents: Warm ocean currents raise the temperature in cold areas while the cold currents decrease the temperature in warm ocean areas. Gulf stream raises the temperature near the eastern coast of North America and the West Coast of Europe while the Labrador current (cold current) lowers the temperature near the north-east coast of North America.

5. Salinity: Saline water absorbs more heat and its temperature rises much higher than fresh water.

All these factors influence the temperature of the ocean currents locally.