

Chapter-14

Movements of Ocean Water

1. Multiple choice questions.

Question 1(i).

Upward and downward movement of ocean water is known as the:

- (a) Tide**
- (b) Current**
- (c) Wave**
- (d) None of the above.**

Answer:

- (a) Tide**

Question 1(ii).

Spring tides are caused:

- (a) As result of the moon and the sun pulling the earth gravitationally in the same direction.**
- (b) As result of the moon and the sun pulling the earth gravitationally in the opposite direction.**
- (c) Indention in the coast line.**
- (d) None of the above.**

Answer:

- (a) As result of the moon and the sun pulling the earth gravitationally in the same direction.**

Question 1(iii).

The distance between the earth and the moon is minimum when the moon is in:

- (a) Aphelion**
- (b) Perigee**
- (c) Perihelion**
- (d) Apogee.**

Answer:

(b) Perigee

Question 1(iv).

The earth reaches its perihelion in:

(a) October

(b) September

(c) July

(d) January.

Answer:

(d) January

2. Answer the following questions in about 30 words.

Question 2(i).

What are waves?

Answer:

Waves are oscillatory movements in water, manifested by an alternate rise and fall of the sea surface. In other words, waves are actually the energy, not the water as such, which moves across the ocean surface. Water particles only travel in a small circle as a wave passes. The maximum wave height is determined by the strength of the wind, i.e. how long it blows and the area over which it blows in a single direction. Waves travel because wind pushes the water body in its course while gravity pulls the crests of the waves downward. The falling water pushes the former troughs upward, and the wave moves to a new position. The actual motion of the water beneath the waves is circular. It indicates that things are earned up and forward as the wave approaches, and down and back as it passes.

Question 2(ii).

Where do waves in the ocean get their energy from?

Answer:

Wind provides energy to the waves. Wind causes waves to travel in the ocean and the energy is released on shorelines. The motion of the surface water seldom affects the stagnant deep bottom water of the oceans. As a wave approaches the beach, it slows down. This is due to the friction occurring between the dynamic water and the seafloor. Waves continue to grow larger as they move and absorb energy from the

wind. Most of the waves are caused by the wind driving against water. When a breeze of two knots or less blows over calm water, small ripples form and grow as the wind speed increases until white caps appear in the breaking waves.

Question 2(iii).

What are tides?

Answer:

The periodical rise and fall of the sea level, once or twice a day, mainly due to the attraction of the sun and the moon, is called a tide. Tides vary in their frequency, direction and movement from place to place and also from time to time.

Question 2(iv).

How are tides caused?

Answer:

Tides are caused by:

1. The moon's gravitational pull to a great extent
2. The sun's gravitational pull to some extent are the major causes for the occurrence of tides.
3. Another factor is centrifugal force, which is the force that acts to counter balance the gravity.

Together, the gravitational pull and the centrifugal force are responsible for creating the two major tidal bulges on the earth. On the side of the earth facing the moon, a tidal bulge occurs while on the opposite side though the gravitational attraction of the moon is less as it is farther away, the centrifugal force causes tidal bulge on the other side. The 'tide-generating' force is the difference between these two forces; i.e. the gravitational attraction of the moon and the centrifugal force.

Question 2(v).

How are tides related to navigation?

Answer:

Since tides are caused by the earth- moon-sun positions which are known accurately, the tides can be predicted well in advance. This helps the navigators and fishermen plan their activities. Tidal flows are of great importance in navigation. Tidal heights are very important, especially harbours near rivers and within estuaries having

shallow 'bars' at the entrance, which prevent ships and boats from entering into the harbour. Kolkata port on Hugli river is an example for it.

3. Answer the following questions in about 150 words.

Question 3(i).

How do currents affect the temperature? How does it affect the temperature of coastal areas in the N. W. Europe?

Answer:

Impact of currents on temperature varies depending on whether currents are warm or cold.

1. Cold currents: Cold currents bring cold water into warm water areas. These currents are usually found on the west coast of the continents in the low and middle latitudes (true in both hemispheres) and on the east coast in the higher latitudes in the Northern Hemisphere.

2. Warm currents: Warm currents bring warm water into cold water areas and are usually observed on the east coast of continents in the low and middle latitudes (true in both hemispheres). In the northern hemisphere they are found on the west coasts of continents in high latitudes.

In North West Europe, warm currents exist. They increase the temperature in coastal areas of N. W. Europe.

Question 2(ii).

What are the causes of currents?

Answer:

Ocean currents are like river flow in oceans. They are caused by two types of forces namely:

1. Primary forces that initiate the movement of water;
2. Secondary forces that influence the currents to flow.

Primary Forces: The primary forces that influence the currents are:

1. Heating by solar energy: Heating by solar energy causes the water to expand. That is why, near the equator the ocean water is about 8 cm higher in level than in the middle latitudes. This causes a very slight gradient and water tends to flow down the slope.

2. Wind: Wind blowing on the surface of the ocean pushes the water to move. Friction between the wind and the water surface affects the movement of the water body in its course.
3. Gravity: Gravity tends to pull the water down the pile and create gradient variation.
4. Coriolis force: The Coriolis force intervenes and causes the water to move to the right in the northern hemisphere and to the left in the southern hemisphere. These large accumulations of water and the flow around them are called Gyres. These produce large circular currents in all the ocean basins.