

**Q.1) With reference to Jet Streams, consider the following statements:**

1. Jet streams are long meandering waves moving at the upper atmosphere, strong at 30° to 60° latitude.
2. The jet streams on Earth typically run from west to east.
3. Temperature influences the velocity of the jet stream, they are more active in winter.
4. Both the Northern and Southern hemispheres have jet streams.

**Which of the statements given above is/are correct?**

- a) 1, 2 and 3
- b) 2, 3 and 4
- c) 1, 2 and 4
- d) All of the above

**Q.1) Solution (d)**

Jet streams are like rivers of wind high above in the atmosphere. These slim strips of strong winds have a huge influence on climate, as they can push air masses around and affect weather patterns.

The jet streams on Earth — other planets have jet streams as well, notably Jupiter and Saturn — typically run from west to east, and their width is relatively narrow compared to their length. Jet streams are typically active at 20,000 feet (6,100 meters) to 50,000 feet (9,144 meters), or about 7 miles (11 kilometers) above the surface and travel in what is known as the troposphere of Earth's multi-layered atmosphere.

The seasons of the year, location of low and high pressure systems and air temperature all affect when and where a jet stream travels. Jet streams form a border between hot and cold air. Because air temperature influences jet streams, they are more active in the winter when there are wider ranges of temperatures between the competing Arctic and tropic air masses.

Temperature also influences the velocity of the jet stream. The greater the difference in air temperature, the faster the jet stream, which can reach speeds of up to 250 mph (402 kph) or greater, but average about 110 mph (177 kph).

Both the Northern and Southern hemispheres have jet streams, although the jet streams in the north are more forceful. Each hemisphere has two primary jet streams — a polar and a subtropical. The polar jet streams form between the latitudes of 50 and 60 degrees north

and south of the equator, and the subtropical jet stream is closer to the equator and takes shape at latitudes of 20 to 30 degrees.

**Q.2) Which of the factors influence the origin and nature of ocean currents?**

1. Difference in density
2. Temperature
3. Salinity
4. Earth's rotation
5. Winds

**Choose the correct answer:**

- a) 1, 2 and 4
- b) 1, 2, 4 and 5
- c) 2, 4 and 5
- d) 1, 2, 3, 4 and 5

**Q.2) Solution (d)**

As we all know, the density of sea water varies from place to place according to its temperature and proportion of salinity. The density increases with an increase in salinity and decreases with a decrease in salinity. But when the temperature increases, density decreases and when the temperature decreases density increases.

This increase and decrease in density due to the differences in temperature and salinity causes the water to move from one place to another.

Earth's rotation causes Coriolis force which deflects the air to its right in the northern hemisphere and to its left in the southern hemisphere-Ferrel's Law.

Similarly, oceans water also affected by the Coriolis force and follows the Ferrel's Law.

Hence, ocean currents in the northern hemisphere move in a clockwise (towards right) direction and ocean currents in southern hemisphere moves in an anti-clockwise (towards left) direction.

The winds like trade winds and westerlies drive the ocean water in a steady flow in front of them. When the direction of the winds changes, the direction of the current also gets changed.

Hence, Solution (d) – All of the factors provided above influence the origin and nature of ocean currents.

**Q.3) Consider the following:**

1. Gyres are spiraling circulations thousands of miles in diameter and rimmed by large, permanent ocean currents.
2. Eddies are smaller, temporary loops of swirling water that can travel long distances before dissipating.

**Which of the statements given above is/are correct?**

- a) 1 only
- b) 2 only
- c) Both 1 and 2
- d) Neither 1 nor 2

**Q.3) Solution (c)**

Even on the calmest days, Earth's oceans are constantly on the move. At the surface and beneath, currents, gyres and eddies play a crucial role in physically shaping the coasts and ocean bottom; in transporting and mixing energy, chemicals and other materials within and among ocean basins; and in sustaining countless plants and animals that rely on the oceans for life—including humans.

These features are important components of Earth's global ocean circulation that move water mainly horizontally. Their effects can also extend down for miles, in some places reaching the ocean bottom.

Currents are coherent streams of water moving through the ocean and include both long, permanent features such as the Gulf Stream, as well as smaller, episodic flows in both coastal waters and the open ocean. They are formed primarily by wind blowing across the surface of the ocean and by differences in the temperature, density and pressure of water and are steered by Earth's rotation as well as the location of the continents and topography of the ocean bottom.

Gyres are spiraling circulations thousands of miles in diameter and rimmed by large, permanent ocean currents.

Eddies are smaller, temporary loops of swirling water that can travel long distances before dissipating. They are relatively small, contained pockets of moving water that break off from the main body of a current and travel independently of their parent. They can form in almost any part of a current, but are especially pronounced in western boundary currents.

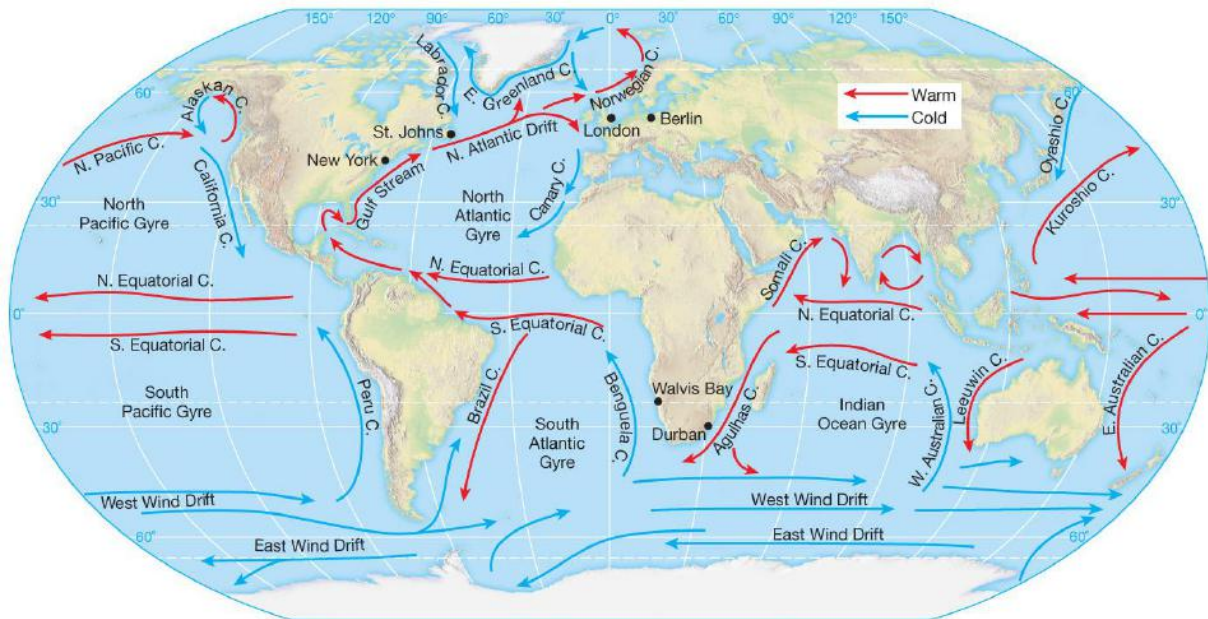
**Q.4) Consider the map given below and answer the following question:**



Four ocean currents – are marked as A, B, C and D – Identify them:

- a) 1. Guinea Current  
2. Greenland Current  
3. Peru Current  
4. Oyashio Current
- b) 1. Guinea Current  
2. Labrador Current  
3. Humboldt Current  
4. Kuroshio Current
- c) 1. Benguela Current  
2. Labrador Current  
3. Humboldt Current  
4. Oyashio Current
- d) 1. Benguela Current  
2. Greenland Current  
3. Peru Current  
4. Kuroshio Current

Q.4) Solution (c)



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**Q.5) Which country falls in all three natural regions - Hot desert, Mediterranean and Cool temperate type of climate?**

- a) Chile
- b) Lebanon
- c) Peru
- d) Israel

**Q.5) Solution (a)**

Mediterranean climate is found between the 30° and 45° degree latitudes. This climate is often found on the western sides of continents. Mediterranean climate gets its name from the climate found around the Mediterranean Sea.

Lebanon has a Mediterranean climate characterized by long, hot, dry summers and short, cool, rainy winters. The climate is determined by Lebanon's location between the subtropical aridity of the African continent and the subtropical humidity of the eastern Mediterranean area. Lebanon is the only Middle Eastern country without a desert.

The northern and coastal regions of Israel show Mediterranean climate characterized by hot and dry summers and cool rainy winters. However the country does not fall in all 3 regions - Hot desert, Mediterranean and Cool temperate type of climate. Israel is located, between

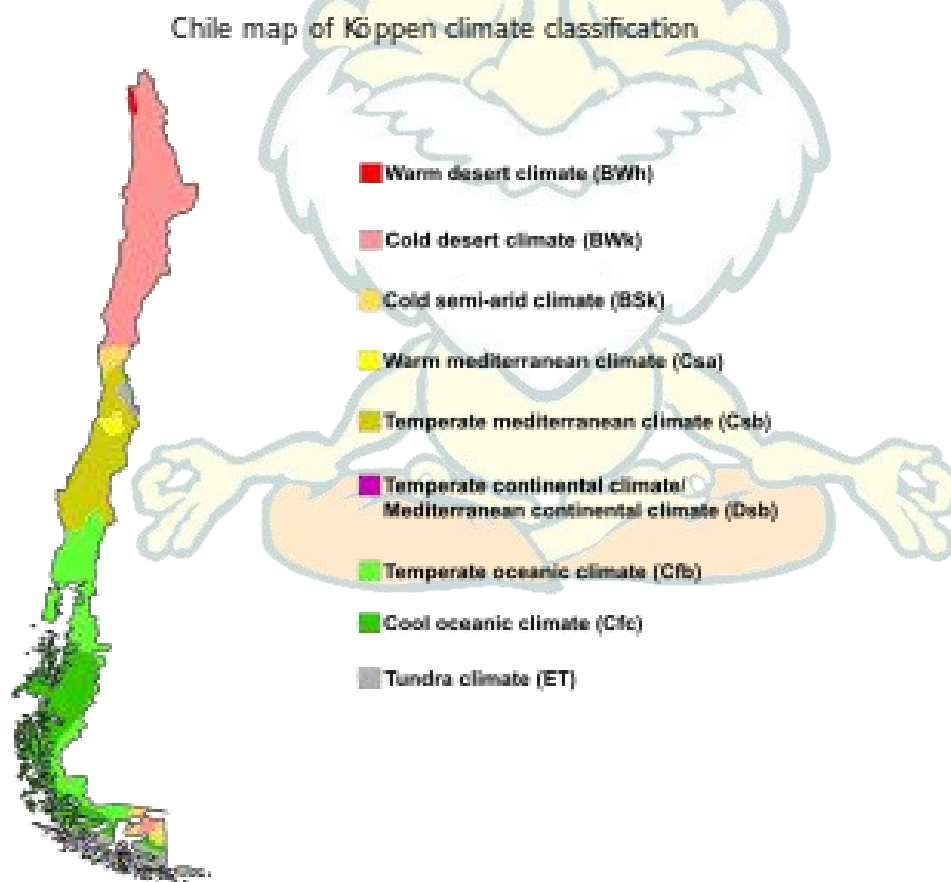
29°-33° north of the equator, which is characterized as a subtropical region, between the temperate zone and the tropical zone.

Peru does not have Mediterranean climatic condition; hence, Chile is the correct answer.

The climate of Chile comprises a wide range of weather conditions across a large geographic scale, extending across 38 degrees in latitude, making generalizations difficult. According to the Köppen system, Chile within its borders hosts at least seven major climatic subtypes, ranging from low desert in the north, to alpine tundra and glaciers in the east and southeast, humid subtropical in Easter Island, Oceanic in the south and Mediterranean climate in central Chile.

Generally, Chile can be divided into three major climatic areas — very arid in the far north, cool and damp in the south, and what can be characterized as a temperate Mediterranean climate in central Chile.

Below figure shows the climatic regions of Chile:

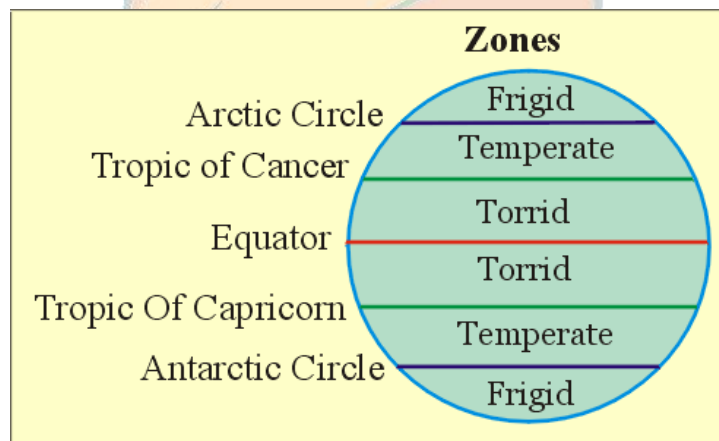


Q.6) Which of the following natural regions is not found in the Torrid Zone?

- a) Temperate deserts
- b) Equatorial forests
- c) Monsoon regions
- d) Tropical grasslands

**Q.6) Solution (a)**

The torrid zone refers to the area of the earth between the Tropic of Cancer and the Tropic of Capricorn. Geographically, the torrid zone is defined by 23.5 degrees north latitude and 23.5 degrees south latitude. The tropic zone is another name for the torrid zone.



The tropical zone contains areas that are the hottest places on earth. Most have a wet season and a dry season as opposed to the more typical cold and hot seasons of the temperate zones. Most locales within the torrid zone receive plenty of rainfall to promote lush vegetation growth with the aid of the sun directly overhead. The temperature stays relatively uniform from day to night.

**Q.7) The organic deposits in the ocean are called 'Oozes'. Consider the following statements regarding the oozes:**

- 1. The 'Oozes' can be classified as Calcareous and Siliceous.
- 2. Calcareous oozes are not found below 1000m.
- 3. Radiolarian and Diatoms are types of calcareous oozes.

**Which of the above statements are incorrect?**

- a) 1 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) None of the above

**Q.7) Solution (b)**

Oozes are broadly classified as calcareous and siliceous. Calcareous oozes are found up to the depth of 4000m.

Calcareous oozes are further classified into Pteropod and Globigerina.

Siliceous oozes are classified as Radiolarian and diatom.

**Q.8) Which of the following regions has the maximum volume of the marine sediments?**

- a) Continental Shelves
- b) Continental Slopes
- c) Continental Rises
- d) Deep Ocean Floors

**Q.8) Solution (b)**

Continental Shelves - 15%

Continental Slopes - 41%

Continental Rises - 31%

Deep Ocean Floors – 13%

**Q.9) Consider the statements regarding volcanoes:**

1. More than 95% of the global volcanoes are along the plate boundaries.
2. High intensity volcano types like Visuvius type, Peelean type etc are concentrated in the convergent plate boundaries.
3. Low intensity volcano like Mid Atlantic Ridge are concentrated in the divergent plate boundary regions.

**Which of the statements given above are correct?**

- a) 1 and 2 only
- b) 2 and 3 only



- c) 1 and 3 only
- d) 1, 2 and 3

**Q.9) Solution (d)**

In the convergent plate boundaries, one plate is subducted by the other plate and the plate which is pushed underneath the other plate goes to greater depth and starts melting, this result in high intensity volcanoes.

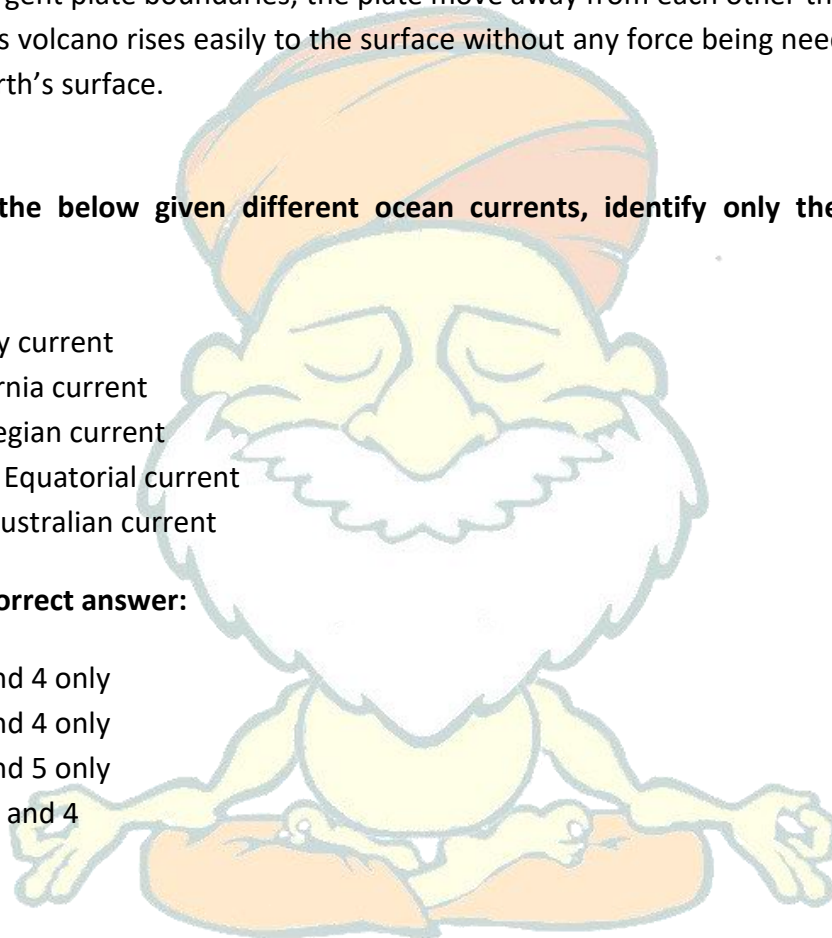
While in divergent plate boundaries, the plate move away from each other thus thinning the crust and thus volcano rises easily to the surface without any force being needed to apply to rise to the Earth's surface.

**Q.10) From the below given different ocean currents, identify only the warm ocean currents:**

1. Canary current
2. California current
3. Norwegian current
4. North Equatorial current
5. East Australian current

**Choose the correct answer:**

- a) 1, 3 and 4 only
- b) 2, 3 and 4 only
- c) 3, 4 and 5 only
- d) 1, 2, 3 and 4

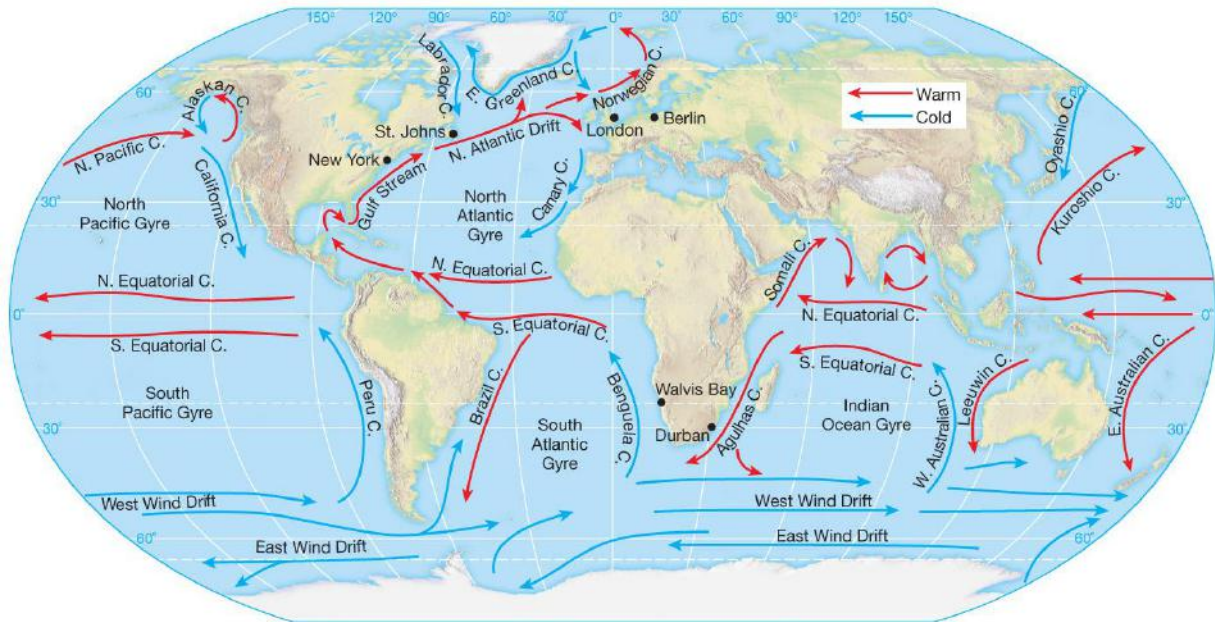


**Q.10) Solution (c)**

In general, currents in the western part of every continent are cold and currents coming from the polar region are generally cold.

Those currents which flow from equatorial regions towards poles which have a higher surface temperature and are called warm current. They are usually observed on the east coast of the continents in the lower and middle latitudes of both hemispheres.

In the northern hemisphere, they are also found on the west coast of the continents in the higher latitudes (E.g. Alaska and Norwegian Currents). Refer below figure



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**Q.11) With reference to North Equatorial Current, consider the below statements and identify the incorrect statement:**

- It is a significant Pacific and the Atlantic Ocean current that flows from east to west.
- They flow in between  $10^{\circ}$  north and  $20^{\circ}$  north latitudes.
- The current passes or cuts through the equator, hence the name North Equatorial Current.
- In both oceans, it is separated from the equatorial circulation by the equatorial counter current, which flows eastward.

**Q.11) Solution (c)**

The North Equatorial Current is a significant Pacific and Atlantic Ocean current that flows east-to-west between about  $10^{\circ}$  north and  $20^{\circ}$  north. It is the southern side of a clockwise subtropical gyre. Despite its name, the North Equatorial Current is not connected to the equator. In both oceans, it is separated from the equatorial circulation by the Equatorial Countercurrent (also known as the North Equatorial Countercurrent), which flows eastward. The westward surface flow at the equator in both oceans is part of the South Equatorial Current.

**Q.12) Which one among the below given seas is the only sea without a land boundary?**

- a) Arafura Sea
- b) Sargasso Sea
- c) Coral sea
- d) Wadden sea

**Q.12) Solution (b)**

The Sargasso Sea, located entirely within the Atlantic Ocean, is the only sea without a land boundary. While all other seas in the world are defined at least in part by land boundaries, the Sargasso Sea is defined only by ocean currents. It lies within the Northern Atlantic Subtropical Gyre. The Gulf Stream establishes the Sargasso Sea's western boundary, while the Sea is further defined to the north by the North Atlantic Current, to the east by the Canary Current, and to the south by the North Atlantic Equatorial Current.

**Q.13) Consider the following statements:**

1. The islands along the Mid Atlantic Ridge are highly prone to volcanic activity.
2. The sea floor spreading is the main cause of earthquakes in the Atlantic Ocean.

**Which of the statements given above is/are correct?**

- a) 1 only
- b) 2 only
- c) Both 1 and 2
- d) Neither 1 nor 2

**Q.13) Solution (c)**

There are three types of plate boundaries:

#### **Divergent Boundaries**

Where new crust is generated as the plates pull away from each other. The sites where the plates move away from each other are called spreading sites. The best-known example of divergent boundaries is the Mid- Atlantic Ridge. At this, the American Plate(s) is/are separated from the Eurasian and African Plates.

### Convergent Boundaries

Where the crust is destroyed as one plate dived under another. The location where sinking of a plate occurs is called a subduction zone.

There are three ways in which convergence can occur. These are:

- (i) between an oceanic and continental plate;
- (ii) between two oceanic plates; and
- (iii) between two continental plates.

### Transform Boundaries

Where the crust is neither produced nor destroyed as the plates slide horizontally past each other. Transform faults are the planes of separation generally perpendicular to the midoceanic ridges. As the eruptions do not take all along the entire crest at the same time, there is a differential movement of a portion of the plate away from the axis of the earth. Also, the rotation of the earth has its effect on the separated blocks of the plate portions.

The Indian plate includes Peninsular India and the Australian continental portions. The subduction zone along the Himalayas forms the northern plate boundary in the form of continent—continent convergence. In the east, it extends through Rakinyoma Mountains of Myanmar towards the island arc along the Java Trench. The eastern margin is a spreading site lying to the east of Australia in the form of an oceanic ridge in SW Pacific. The Western margin follows Kirthar Mountain of Pakistan. It further extends along the Makrana coast and joins the spreading site from the Red Sea rift south-eastward along the Chagos Archipelago. The boundary between India and the Antarctic plate is also marked by oceanic ridge (divergent boundary) running in roughly W-E direction and merging into the spreading site, a little south of New Zealand.

**Q.14) Atacama desert is one of the driest deserts of the world. Apart from other reasons there is a particular current which has made it a driest desert. Which is that current?**

- a) Humboldt current
- b) Benguela current
- c) Okhotsk current
- d) None of the above

### Q.14) Solution (a)

The Humboldt Current System (HCS), also called the Peru Current, is a major Eastern Boundary Upwelling Ecosystem that flows north along the western coast of South America.

The Humboldt has a considerable cooling influence on the climate of Chile, Peru and Ecuador. It is also largely responsible for the aridity of Atacama Desert in northern Chile and coastal areas of Peru and also of the aridity of southern Ecuador. Marine air is cooled by the current and thus is not conducive to generating precipitation (although clouds and fog are produced).

**Q.15) Consider the below statements:**

1. An isthmus is a narrow piece of land connecting two larger areas across an expanse of water that otherwise separates them.
2. The Kra Isthmus is the narrowest part of the Malay Peninsula, in southern Thailand and Malaysia.

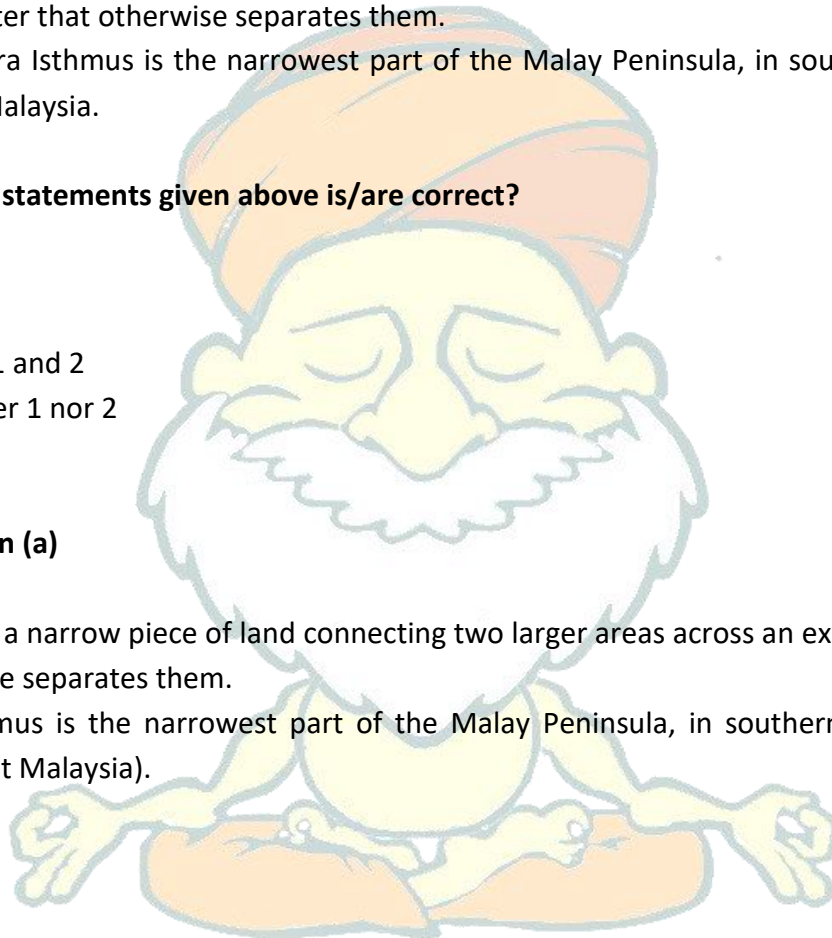
**Which of the statements given above is/are correct?**

- a) 1 only
- b) 2 only
- c) Both 1 and 2
- d) Neither 1 nor 2

**Q.15) Solution (a)**

An isthmus is a narrow piece of land connecting two larger areas across an expanse of water that otherwise separates them.

The Kra Isthmus is the narrowest part of the Malay Peninsula, in southern Thailand and Myanmar (not Malaysia).





**Q.16) A Minister cannot be elected as a member of which of the following Committees?**

1. Public Accounts Committee
2. Estimates Committee
3. Committee on Public Undertakings

**Select the correct code:**

- a) 1 and 2
- b) 2 and 3
- c) 1 and 3
- d) All of the above

**Q.16) Solution (d)**

A Minister cannot be elected as a member of the Committee and if a member after his election to the Committee is appointed a Minister, he ceases to be a member of the Committee from the date of such appointment.

**Parliamentary Committees - <http://www.parliamentofindia.nic.in/ls/intro/p21.htm>**

**Q.17) Oc(3000)0, Oc(3050)0, Oc(3066)0, Oc(3090)0 and Oc(3119)0 seen recently in news, are**

- a) Recently discovered sub-atomic particles
- b) Genetically modified varieties of cotton
- c) Recently discovered brown dwarfs
- d) None of the above

**Q.17) Solution (a)**

Scientists at CERN have discovered five new sub-atomic particles in a single analysis, with the help of the world's largest and most powerful particle accelerator.

The LHCb experiment is one of seven particle physics detector experiments collecting data at the Large Hadron Collider accelerator at CERN (European Organisation for Nuclear Research).

The collaboration has announced the measurement of a very rare particle decay and evidence of a new manifestation of matter-antimatter asymmetry.

The new particles were found to be excited states - a particle state that has a higher energy than the absolute minimum configuration (or ground state) - of a particle called Omega-c-zero.

This Omega-c-zero is a baryon, a particle with three quarks, containing two "strange" and one "charm" quark.

Omega-c-zero decays via the strong force into another baryon, called Xi-c-plus, (containing a "charm", a "strange" and an "up" quark) and a kaon K-.

Then the Xi-c-plus particle decays in turn into a proton p, a kaon K- and a pion p+.

From the analysis of the trajectories and the energy left in the detector by all the particles in this final configuration, the LHCb collaboration could trace back the initial event - the decay of the Omega-c-zero - and its excited states.

These particle states are named, according to the standard convention,  $O_c(3000)0$ ,  $O_c(3050)0$ ,  $O_c(3066)0$ ,  $O_c(3090)0$  and  $O_c(3119)0$ . The numbers indicate their masses in megaelectronvolts (MeV), as measured by LHCb.

This discovery will help in understanding how the three constituent quarks are bound inside a baryon and also to probing the correlation between quarks, which plays an important role in describing multi-quark states, such as tetraquarks and pentaquarks.

**Q.18) Which one of the following is not related to World Bank?**

- a) Multilateral Investment Guarantee Agency
- b) International Finance Corporation
- c) International Centre for Settlement of Investment Disputes
- d) Bank for International Settlements

**Q.18) Solution (d)**

The Multilateral Investment Guarantee Agency (MIGA) is an international financial institution which offers political risk insurance and credit enhancement guarantees. Such guarantees help investors protect foreign direct investments against political and non-commercial risks in developing countries. MIGA is a member of the World Bank Group and is headquartered in Washington, D.C., United States. It was established in 1988 as an investment insurance facility to encourage confident investment in developing countries.

The International Finance Corporation (IFC) is an international financial institution that offers investment, advisory, and asset management services to encourage private sector development in developing countries. The IFC is a member of the World Bank Group and is headquartered in Washington, D.C., United States. It was established in 1956 as the private sector arm of the World Bank Group to advance economic development by investing in strictly for-profit and commercial projects that purport to reduce poverty and promote development.

The International Centre for Settlement of Investment Disputes (ICSID) is an international arbitration institution established in 1965 for legal dispute resolution and conciliation between international investors. The ICSID is part of and funded by the World Bank Group, headquartered in Washington, D.C., in the United States.

The Bank for International Settlements (BIS) is an international financial institution owned by central banks which "fosters international monetary and financial cooperation and serves as a bank for central banks". The BIS carries out its work through its meetings programmes and through the Basel Process – hosting international groups pursuing global financial stability and facilitating their interaction. It also provides banking services, but only to central banks and other international organizations. It is based in Basel, Switzerland, with representative offices in Hong Kong and Mexico City.

**Q.19) Elephant Pass, which is frequently in the news, is mentioned in the context of the affairs of which one of the following?**



- a) Bangladesh
- b) India
- c) Nepal
- d) Sri Lanka

**Q.19) Solution (d)**

Elephant Pass, Northern Province, Sri Lanka is located in the gateway of Jaffna Peninsula. There are about 340km north from capital to here. It has an important military base and used to be the island's largest salt field. It has regularly been the site of battles during the civil war.

Elephant Pass controls access to the Jaffna Peninsula, therefore it is referred to as the Gateway to Jaffna. It is very crucial as it is on the isthmus connecting the peninsula to the Sri Lankan mainland, and to territory in the Southern Jaffna peninsula. Elephant Pass connects the militarily significant town of Chavakacheri in the Jaffna peninsula to the Sri Lankan mainland.

**Q.20) From which one of the following did Eritrea declare its independence?**

- a) Sudan
- b) Ethiopia
- c) Somalia
- d) Kenya

**Q.20) Solution (b)**

The United Nations established Eritrea as an autonomous region within the Ethiopian federation in 1952. However, when Ethiopia, under emperor Haile Selassie, annexed the region in 1962, it sparked a civil war that lasted 30 years. In 1991, the Eritrean People's Liberation Front (EPLF) ousted the Ethiopian forces, and on April 27, 1993, the country declared independence after a referendum.

**Q.21) The participants of 'Malabar Exercise' are**

1. India
2. United States of America

3. Australia
4. Japan

**Select the correct code:**

- a) 1, 2 and 3
- b) 1, 2 and 4
- c) 2, 3 and 4
- d) All of the above

**Q.21) Solution (b)**

Australia is keen on joining the Malabar trilateral naval exercises among India, Japan and the U.S., and has requested observer status at the upcoming edition.

Japan and the U.S. are keen on expanding the games to include Australia with officials from both countries specifically stating so on various occasions. However, India has been reluctant to antagonise China.

Australia had been a part of the exercises in 2007. But a sharp response from China, which saw the joint exercises as a coalition against it, put an end to the quadrilateral format.

The Malabar drills, which began in 1992 as a bilateral naval exercise between India and the U.S., has since grown in scope and complexity, acquiring considerable heft in recent times. In 2015, it was expanded into a trilateral format with the inclusion of Japan.

**Source:** <http://www.thehindu.com/news/international/canberra-keen-on-joining-naval-games/article18062371.ece>

