

Class XI Session 2025-26

Subject - Geography

Sample Question Paper - 5

Time Allowed: 3 hours

Maximum Marks: 70

General Instructions:

Read the following instructions carefully and follow them:

1. This question paper contains 30 questions. All questions are compulsory.
2. Question paper is divided into five sections A, B, C, D and E.
3. Section A Questions no. 1 to 17 are Multiple Choice type questions. Each question carries 1 mark.
4. Section B Questions no. 18 and 19 are Source-based questions. Each question carries 3 marks.
5. Section C Questions no. 20 to 23 are Short Answer type questions. Each question carries 3 marks. Answer to these questions shall be written in 80 to 100 words.
6. Section D Questions no. 24 to 28 are Long Answer type questions. Each question carries 5 marks. Answer to these questions shall be written in 120 to 150 words.
7. Section E Questions no. 29 and 30 are Map-based questions. Each question carries 5 marks.
8. There is no overall choice given in the question paper. However, an internal choice has been provided in a few questions in all sections other than Section A.

Section A

- What is the main characteristic of geography which got introduced from the very beginning? [1]
a) Dualism
b) Cultural
c) Socialism
d) Naturalism
- Which one of the following forests are found in the western slope of the Western Ghats, hills of the northeastern region and the Andaman and Nicobar Islands? [1]
a) Tropical Thorn forests
b) Montane forests
c) Tropical Evergreen and Semi Evergreen Forests
d) Tropical Deciduous forests
- The size of the galaxies range from [1]
a) 50,000 to 180,000
b) 80,000 to 160,000
c) 80,000 to 150,000
d) 60,150,000
- Consider the following statements and choose the correct option from the given options [1]
I. The speed of wave in the ocean depends upon the depth of water. It is more in the shallow water than in the ocean deep.

II. The impact of tsunami is more over the ocean and less near the coast where they cause large-scale devastations.

- a) Both the statements I and II are incorrect b) Only Statement II is correct
c) Only statement I is correct d) Both the statements are true and statement II correctly present the reason for statement I

5. The study of plants and natural vegetation is known as [1]

- a) Environmental geography b) Plant geography
c) Zoo-geography d) Ecology

6. _____ is frozen raindrops and refrozen melted snow-water. [1]

- a) Cloud b) Sleet
c) Mist d) Frost

7. Watershed is also known as [1]

- a) Catchment area b) Radial
c) Dendritic d) Trellis

8. Isotherm indicates places having equal _____. [1]

- a) radiation b) pressure
c) humidity d) temperature

9. **Assertion (A):** Peninsular part of India extends towards the Indian Ocean. [1]

Reason (R): It has contributed towards the evolving of the regional identity of the Indian subcontinent.

- a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false. d) A is false but R is true.

10. Which of the following is the highest altitude national park? [1]

- a) Kaziranga National Park b) Hemis National Park
c) Nagarhole National Park d) Jim Corbet Park

11. Arrange the following in correct sequence: [1]

- i. These conditions help in the northward shift in the position of the ITCZ.
ii. This causes the formation of intense low pressure in the north western part of the subcontinent.
iii. During April and May when the sun shines vertically over the Tropic of Cancer, the large landmass in the north of Indian ocean gets intensely heated.
iv. Since the pressure in the Indian Ocean in the south of the landmass is high as water gets heated slowly, the low-pressure cell attracts the southeast trades across the Equator.

- a) (ii) - (i) - (iv) - (iii) b) (iv) - (ii) - (i) - (iii)
c) (iii) - (ii) - (iv) - (i) d) (i) - (iv) - (iii) - (ii)

12. Which one of the following forest has trees like Tendu, palas, amaltas, bel, khair, axlewood? [1]



- a) Tropical Evergreen and Semi Evergreen forests
- b) Tropical Thorn forests
- c) Tropical Deciduous forests
- d) Montane forests

13. Sri Lanka is separated from India by the _____. [1]

- a) Gulf of Mannar and Palk Strait
- b) Gulf of Mannar
- c) Gulf of khambhat
- d) Palk Strait

14. Which of the following pairs is matched correctly? [1]

River	Catchment area sq. km
(a) Mahi	(i) 21,674
(b) Kalinadi	(ii) 5,397
(c) Dhandhar	(iii) 2,770
(d) Sabarmati	(iv) 2,029

- a) (d) - (iv)
- b) (b) - (ii)
- c) (c) - (iii)
- d) (a) - (i)

15. Which of the following layer of the Earth is made up of very heavy material i.e. nickel and iron? [1]

- a) Crust
- b) Core
- c) Caldera
- d) Mantle

16. Match column I with column II and select the correct answer using the codes given below. [1]

Column I	Column II
(a) India started its Northward journey towards Asian continent	(i) 200 million years ago
(b) Upliftment of the Himalayas	(ii) 40-50 million years ago
(c) India's location at 50°s latitude	(iii) 140 million years ago
(d) Formation of the Deccan Traps	(iv) Around 60 million years ago

- a) (a) - (i), (b) - (ii), (c) - (iv), (d) - (iii)
- b) (a) - (iii), (b) - (i), (c) - (ii), (d) - (iv)
- c) (a) - (iv), (b) - (iii), (c) - (ii), (d) - (i)
- d) (a) - (i), (b) - (ii), (c) - (iii), (d) - (iv)

17. **Assertion (A):** At low latitudes, from 15°-30° rainfall occurs. [1]

Reason (R): It is the result of subsidence and inversion of temperature.

- a) Both A and R are true and R is the correct explanation of A.
- b) Both A and R are true but R is not the correct explanation of A.
- c) A is true but R is false.
- d) A is false but R is true.

Section B

18. Read the following text carefully and answer the questions that follow: [3]

The study of seismic waves provides a complete picture of the layered interior. An earthquake in simple words is shaking of the earth. It is a natural event. It is caused due to release of energy, which generates waves that travel in all directions. The release of energy occurs along a fault. A fault is a sharp break in the crustal rocks. Rocks

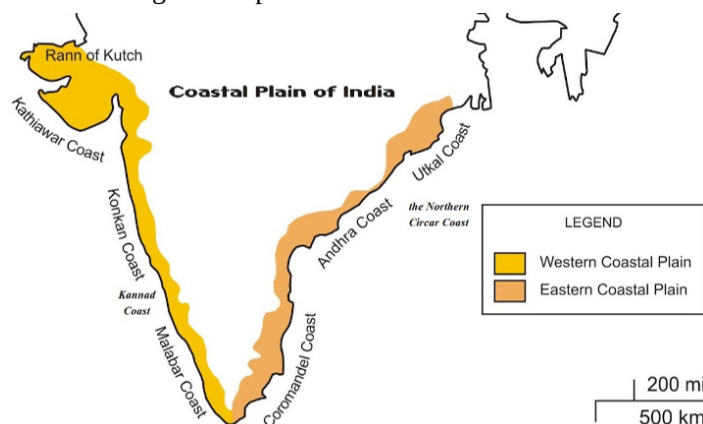


along a fault tend to move in opposite directions. As the overlying rock strata press them, the friction locks them together. However, their tendency to move apart at some point of time overcomes the friction. As a result, the blocks get deformed and eventually, they slide past one another abruptly. This causes a release of energy, and the energy waves travel in all directions. The point where the energy is released is called the focus of an earthquake, alternatively, it is called the hypocentre. The energy waves travelling in different directions reach the surface. The point on the surface, nearest to the focus, is called epicentre. It is the first one to experience the waves. It is a point directly above the focus.

- i. Name the location where the energy is released during an earthquake. (1)
- ii. How an earthquake originates? (1)
- iii. Define Epicentre. (1)

19. Observe the given map:

[3]



- i. What are the two major divisions of the Indian coastline based on their location and active geomorphological processes? (1)
- ii. What are the distinguishing features of the Malabar coast? (1)
- iii. What are the different divisions of the western coast of India, extending from the Gujarat coast in the north to the Kerala coast in the south? (1)

20. State the passes in N.W. part of India and explain their importance.

[3]

OR

What is a Strait?

21. What is need for Conservation of Forest?

[3]

22. Why are parent material and time considered as passive control factors in soil formation?

[3]

OR

Describe the various factors helping mass movements.

23. State the efforts that have been undertaken at international level to combat greenhouse effect.

[3]

Section C

24. On the basis of past experiences, frequency and certain causal relationships with the controlling factors like geology, geomorphic agents, slope, land-use, vegetation cover and human activities, India has been divided into how many zones?

[5]

25. According to tectonic plates theory in how many plates has the earth been divided? Explain.

[5]

OR

Explain important theories associated with the movement of continents.

26. Explain about distribution of water on the earth's surface.

[5]

OR



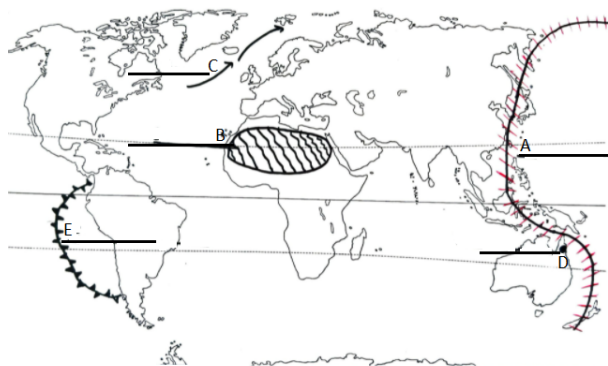
- Explain the landforms that are seen in upper part of the river.
27. Discuss the factors affecting the speed and direction of wind. [5]
- OR
- Describe the different processes of physical weathering.
28. Explain the spatial variation in temperature in India. [5]
- OR
- Differentiate between Consequent rivers and Antecedent rivers.

Section D

29. On the outline map of India, locate and label the following: [5]
- Highest peak
 - River also known as **Sorrow of Bihar**
 - The most widespread and most productive category of soil
 - Aravalli Ranges
 - Areas having montane forests



30. With the help of the following key, identify the areas marked as A, B, C, D, and E on the given outline map of the World. Write the correct name of the place in the blank space given on the map. [5]
- Name this seismically active belt passing from Japan, Philippines, Australia, Papua New Guinea, Indonesia, New Zealand, and Antarctica.
 - Included in World Biomes is a hot and dry desert in Africa.
 - This is a strong warm current within the Atlantic Ocean that extends the Gulf Stream northeastward.
 - This ecological hotspot is located in Australia.
 - This tectonic plate is between South America and the Pacific plate.



Solution

Section A

1. (a) Dualism
Explanation:
Dualism is one of the main characteristics of geography which got introduced from the very beginning. This dualism depended on the aspect emphasised in the study.
2. (c) Tropical Evergreen and Semi Evergreen Forests
Explanation:
Tropical Evergreen and Semi Evergreen Forests
3. (c) 80,000 to 150,000
Explanation:
Galaxies spread over vast distances that are measured in thousands of light-years. The diameters of individual galaxies range from **80,000-150,000** light-years.
4. (c) Only statement I is correct
Explanation:
The speed of wave in the ocean depends upon the depth of water. It is more in the shallow water than in the ocean deep. Because of this the impact of tsunami is **less** over the ocean and **more** near the coast where they cause large-scale devastations.
5. (b) Plant geography
Explanation:
Plant geography is the study of the distribution of world vegetation, with particular emphasis on the influence of the environmental factors that determine this distribution.
6. (b) Sleet
Explanation:
Sleet is frozen raindrops and refrozen melted snow-water. When a layer of air with the temperature above freezing point overlies a subfreezing layer near the ground, precipitation takes place in the form of sleet.
7. (a) Catchment area
Explanation:
A river drains the water collected from a specific area, which is called its 'catchment area'. The boundary line separating one drainage basin from the other is known as the **watershed**. The catchments of large rivers are called **river basins** while those of small rivulets and rills are often referred to as **watersheds**.
8. (d) temperature
Explanation:
The **Isotherms** are lines joining places having an equal temperature. They are commonly used in meteorology to show the distribution of temperature at the Earth's surface or on a chart indicating constant level or constant pressure.



9.
(c) A is true but R is false.
Explanation:
The peninsular extension of India in Indian Ocean has provided it with a coastline of 6,100 km on the mainland and 7,517 km on the entire geographical coast of the mainland plus the island groups Andaman and Nicobar located in the Bay of Bengal and the Lakshadweep in the Arabian Sea.
10.
(b) Hemis National Park
Explanation:
Hemis National Park (or Hemis High Altitude National Park) is a high altitude national park in the eastern Ladakh Union Territory of the Republic of India.
11.
(c) (iii) - (ii) - (iv) - (i)
Explanation:
(iii) - (ii) - (iv) - (i)
12.
(c) Tropical Deciduous forests
Explanation:
Tropical Deciduous forests
13. (a) Gulf of Mannar and Palk Strait
Explanation:
Sri Lanka is separated from India by the **Gulf of Mannar and Palk Strait**.
14.
(c) (c) - (iii)
Explanation:
Dhandhar - 2,770
15.
(b) Core
Explanation:
Core
16.
(d) (a) - (i), (b) - (ii), (c) - (iii), (d) - (iv)
Explanation:
 - India is supposed to have started her northward journey about **200 million years** ago.
 - India collided with Asia about 40-50 million years ago causing rapid uplift of the Himalayas.
 - About 140 million years before the present, the subcontinent was located as south as 50°S. latitude.
 - During the movement of the Indian plate towards the Eurasian plate, a major event that occurred was the outpouring of lava and formation of the **Deccan Traps**. This started somewhere around **60 million years ago** and continued for a long period of time.
17.
(d) A is false but R is true.
Explanation:
At low latitudes, from 15° - 30°, dry climate occurs in the area of subtropical high where subsidence and inversion of temperature **do not produce rainfall**.



Section B

18. i. The point where the energy is released is called the focus of an earthquake, alternatively, it is called the hypocentre.
ii. It is caused due to release of energy, which generates waves that travel in all directions
iii. The point on the surface, nearest to the focus, is called epicentre. It is the first one to experience the waves. It is a point directly above the focus.
19. i. On the basis of the location and active geomorphological processes, it can be broadly divided into two:
a. the western coastal plains
b. the eastern coastal plains
ii. The Malabar coast has got certain distinguishing features in the form of 'Kayals' (backwaters), which are used for fishing, inland navigation and also due to its special attraction for tourists.
iii. Extending from the Gujarat coast in the north to the Kerala coast in the south, the western coast may be divided into following divisions – the Kachchh and Kathiawar coast in Gujarat, Konkan coast in Maharashtra, Goan coast and Malabar coast in Karnataka and Kerala respectively.
20. The only way people from outside could get into India was the Khyber Pass, near Safed Koh, and the Hindu Kush mountains and the Jolan pass between the Sulaiman and the Kirthar ranges in the north-west that separated the Indian realm from Afghanistan. It is through these routes that earlier central and west Asian tribes came to India, and later armies of Alexander, Afghan and Persians entered India.

OR

1. A naturally formed narrow strip of water between two continents, islands or two larger bodies of water is termed as Strait.
2. It is usually used for navigational purposes. Sometimes it is referred to as a channel when it is found between two land masses. Another term often used to refer to straits is Firth.
3. Straits have served as a crucial part for shipping routes and wars have been fought over the control of straits due to their paramount importance.
4. The strait of Gibraltar that separates northern Africa from the Rock of Gibraltar on the southernmost point of the Iberian Peninsula is perhaps the world's most famous strait as this is the shipping route that was most utilized for all commercial purposes between the Mediterranean Sea and the Atlantic Ocean.
21. Increasing Human and animal population has an adverse impact on natural vegetation. Areas that were once covered with forests have now become semi-desert. Even Rajasthan had forests. Forests are essential for ecological balance which in turn is essential for human survival and development. For balanced ecology and a healthy environment, at least one-third of the land of India must be kept under forest. Unfortunately, we do not have even one-fourth of the total area under forest. The need for a policy for conservation and management of forest resources, therefore, demands no emphasis.
22. (i) Parent Material: Parent material is a passive control factor in soil formation. Soil formation depends upon the texture (sizes of debris) and structure (disposition of individual grains/particles of debris) as well as the mineral and chemical composition of the rock debris/deposits. Nature and rate of weathering and depth of weathering mantle are important considerations under parent materials. There may be differences in soil over similar bedrock and dissimilar bedrocks may have similar soils above them. But when soils are very young and have not matured these show strong links with the type of parent rock. Also, in case of some limestone areas, where the weathering processes are specific and peculiar, soils will show clear relation with the parent rock.
- (ii) Time: It is the passive controlling factor in soil formation. The length of time the soil forming processes operate determine maturation of soils and profile development. A soil becomes mature when all soil forming processes act for a sufficiently long time developing a profile. Soils developing from recently deposited alluvium or glacial till are considered young and they exhibit no horizons or only poorly developed horizons. No specific length of time in absolute terms can be fixed for soils to develop and mature.

OR

Several activating or initiating causes precede mass movements. They are:

- i. removal of support from below to materials above through natural or artificial means
- ii. increase in gradient and height of slopes
- iii. overloading through the addition of materials naturally or by artificial filling
- iv. overloading due to heavy rainfall, saturation, and lubrication of slope materials
- v. removal of material or load from over the original slope surfaces
- vi. the occurrence of earthquakes, explosions or machinery vibrations



- vii. excessive natural seepage
 - viii. the heavy drawdown of water from lakes, reservoirs, and rivers leading to a slow outflow of water from under the slopes or river banks
 - ix. indiscriminate removal of natural vegetation. Heave (heaving up of soils due to frost growth and other causes), slide, and flow are the three forms of movements
23. (i) International efforts have been initiated for reducing the emission of Greenhouse gases into the atmosphere. Kyoto protocol, proclaimed in 1997 is the most important of all. It is an international treaty which extends the 1992 United Nations Framework Convention on Climate Change (UNFCCC) that commits state parties to reduce greenhouse gas emissions, based on the scientific and environmental consensus.
- (ii) This protocol came into effect in 2005 and was ratified by 141 nations.
- (iii) Kyoto protocol bounds the 35 industrialized countries to reduce their emissions by the year 2012 to 5 per cent less than the levels prevalent in the year 1990.

Section C

24. On the basis of past experiences, frequency and certain causal relationships with the controlling factors like geology, geomorphic agents, slope, land-use, vegetation cover and human activities, India has been divided into a number of zones were as:
- i. **Very High Vulnerability Zone:** Highly unstable, relatively young mountainous areas in the Himalayas and Andaman and Nicobar, high rainfall regions with steep slopes in the Western Ghats and Nilgiris, the north-eastern regions, along with areas that experience frequent ground-shaking due to earthquakes, etc. and areas of intense human activities, particularly those related to construction of roads, dams, etc. are very highly vulnerable.
 - ii. **High Vulnerability Zone:** Areas that have almost similar conditions to those included in the very high vulnerability zone are also included in this category. All the Himalayan states and the states from the north-eastern regions except the plains of Assam are included in the high vulnerability zones.
 - iii. **Moderate to Low Vulnerability Zone:** Areas that receive less precipitation such as Trans-Himalayan areas of Ladakh and Spiti, undulated yet stable relief and low precipitation areas in the Aravali, rain shadow areas in the Western and Eastern Ghats and Deccan plateau also experience occasional landslides. Landslides due to mining and subsidence are most common in states like Jharkhand, Orissa, Chhattisgarh, Madhya Pradesh, Maharashtra, Andhra Pradesh, Karnataka, Tamil Nadu, Goa, and Kerala.
 - iv. **Other Areas:** The remaining parts of India, particularly states like Rajasthan, Haryana, Uttar Pradesh, Bihar, West Bengal, Assam and Coastal regions of the southern States are safe as far as landslides are concerned.
25. The theory of plate tectonics proposes that the earth's lithosphere is divided into seven major and some minor plates. The major plates are as follows:
- i. Antarctica and the surrounding oceanic plate- The Antarctic Plate is a tectonic plate containing the continent of Antarctica and extending outward under the surrounding oceans. After breakup from Gondwana , the Antarctic plate began moving the continent of Antarctica south to its present isolated location causing the continent to develop a much colder climate.
 - ii. North American Plate- The North American Plate is a tectonic plate covering most of North America , Greenland, Cuba, the Bahamas, extreme northeastern Asia, and parts of Iceland and the Azores . It extends eastward to the Mid-Atlantic ridge and westward to the Chersky Range in eastern Siberia. The plate includes both continental and oceanic crust.
 - iii. South American Plate- The South American Plate is a major tectonic plate which includes the continent of South America as well as a sizable region of the Atlantic Ocean seabed extending eastward to the African Plate, with which it forms the southern part of the Mid-Atlantic Ridge.
 - iv. Pacific Plate- The Pacific Plate is an oceanic tectonic plate that lies beneath the Pacific Ocean. At 103 million square kilometres (40,000,000 sq mi), it is the largest tectonic plate.
 - v. India-Australia plate-The Indo-Australian Plate is a major tectonic plate that includes the continent of Australia and surrounding ocean , and extends northwest to include the Indian Subcontinent and adjacent waters. It was formed by the fusion of Indian and Australian plates approximately 43 million years ago.
 - vi. Africa with the eastern Atlantic floor plate- The African Plate is a major tectonic plate straddling the equator as well as the prime meridians . It includes much of the continent of Africa, as well as oceanic crust which lies between the continent and various surrounding ocean ridges.
 - vii. Eurasia and the adjacent oceanic plate- The Eurasian Plate is a tectonic plate which includes most of the continent of Eurasia (a landmass consisting of the traditional continents of Europe and Asia) , with the notable exceptions of the Indian Subcontinent the Arabian Subcontinent , and the area east of the Chersky region in East Siberia . It also includes oceanic crust extending westward to the Mid-Atlantic ridge and northward to the Gakkel Ridge.

Some important minor plates are:



- i. Cocos plate: It is between Central America and Pacific plate. The Cocos Plate is a young oceanic tectonic plate beneath the Pacific Ocean off the west coast of Central America named for Cocos Island which rides upon it. The Cocos Plate was created approximately 23 million years ago.
- ii. Nazca plate: It is between South America and Pacific plate. The Nazca Plate, named after the Nazca region of Southern Peru, is an oceanic tectonic plate in the eastern Pacific Ocean basin off the west coast of South America.
- iii. Arabian plate: It includes mostly the Saudi Arabian landmass. The Arabian Plate is a tectonic plate in the northern and eastern hemispheres. It is one of three continental plates (the African, Arabian, and Indian plate) that have been moving northward in recent geological history and colliding with the Eurasian Plate.
- iv. Philippine plate: It is between the Asiatic and Pacific plate. It is a tectonic plate comprising oceanic lithosphere that lies beneath the Philippine Sea to the east of the Philippines . Most segments of the Philippines, including Northern Luzon , are part of the Philippine Mobile belt, which is geologically and tectonically separate from the Philippine Sea Plate.
- v. Caroline plate: It is between the Philippine and Indian plate (North of New Guinea). The Caroline Plate is a minor tectonic plate that straddles the Equator in the eastern hemisphere located north of New Guinea. It forms a subduction zone along the border with the Bird's Head Plate and the Woodlark plate to the south.
- vi. Fuji plate: It includes North-east of Australia Pacific.

OR

- i. Continental drift theory : Continental Drift was a revolutionary scientific theory developed in the years 1908-1912 by Alfred Wegener (1880-1930), a German meteorologist, climatologist, and geophysicist, that put forth the hypothesis that the continents had all originally been a part of one enormous landmass or supercontinent about 240 million years ago before breaking apart and drifting to their current locations. Based on the work of previous scientists who had theorized about horizontal movement of the continents over the earth’s surface during different periods of geologic time, and based on his own observations drawing from different fields of science, Wegener postulated that about 200 million years ago this supercontinent that he called “Pangaea,” (which means “all lands” in Greek) began to break up.Over millions of years the pieces separated, first into two smaller supercontinents during the Jurassic period, called Laurasia and Gondwanaland, and then by the end of the Cretaceous period, into the continents we know today.
 - ii. Sea Floor Spreading: Seafloor spreading is a process that occurs at mid-ocean ridges , where new oceanic crust is formed through volcanic activity and then gradually moves away from the ridge. Seafloor spreading was proposed by an American geophysicist, Harry H. Hess in 1960. By the use of the sonar, Hess was able to map the ocean floor and discovered the mid-Atlantic ridge (mid-ocean ridge).He also found out that the temperature near to the mid-Atlantic ridge was warmer than the surface away from it. He believed that the high temperature was due to the magma that leaked out from the ridge. Harry Hess’s hypothesis about seafloor spreading had collected several pieces of evidence to support the theory. This evidence was from the investigations of the molten material, seafloor drilling, radiometric age dating and fossil ages, and the magnetic stripes. Two facts made Hess think about the consumption of the oceanic crust.(i) The younger age of the oceanic crust.(ii) The spreading of one ocean does not cause the shrinking of the other. He further maintained that the ocean floor that gets pushed due to volcanic eruptions at the crest, sinks down at the oceanic trenches and gets consumed.
 - iii. Plate Tectonic theory : It was in 1967, McKenzie and Parker and also Morgan, independently collected the available ideas and came out with another concept termed Plate Tectonics. The theory of plate tectonics proposes that the earth's lithosphere is divided into seven major and some minor plates. These plates have been constantly moving over the globe throughout the history of the earth. It is not the continent that moves as believed by Wegener. Continents are part of a plate and what moves is the plate. All the plates, without exception, have moved in the geological past, and shall continue to move in the future as well.
26. Water is quite unevenly distributed on the surface of the Earth. Many locations have plenty of water while others have a very limited quantity.

Water on the Earth's surface

Reservoir	Volume Percentage (Million of the Total Cubic km)	Percentage of the total
Oceans	1,370	97.25
IceCaps and Glaciers	29	2.05
Groundwater	9.5	0.68
Lakes	0.125	0.01
Atmosphere	0.013	0.001

Soil Moisture	0.065	0.005
Streams and Rivers	0.0017	0.0001
Biosphere	0.0006	0.00004

The above table shows the distribution of water on the surface of the earth. About 71 percent of the planetary water is found in the oceans. The remaining is held as freshwater in glaciers and ice caps, groundwater sources, lakes, soil moisture, atmosphere, streams and within life. Nearly 59 percent 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 a glacier. It is to be noted that renewable water on the earth is constant while the demand is increasing tremendously. This leads to the water crisis in different parts of the world-spatially and temporally. The pollution of river waters has further aggravated the crisis.

OR

In upper part of the river, many beautiful and attractive landforms are formed. Some of them are as follows:

- (i) V-Shaped valleys: Valleys start as small and narrow rills; the rills will gradually develop into long and wide gullies; the gullies will further deepen, widen and lengthen to give rise to valleys. Depending upon dimensions and shape, many types of valleys like V-Shape valley, gorge, canyon, etc. Can be recognised.
- (ii) Gorge: A gorge is a narrow valleywith steep, rocky walls located between hills or mountains. The term comes from the French word gorge, which means throat or neck. A gorge is often smaller than a canyon, although both words are used to describe deep, narrow valleys with a stream or river running along their bottom. A number of natural forces form gorges. The most common is erosion due to streams or rivers. Streams carve through hard layers of rock, breaking down or eroding it. Sediment from the worn-away rock is then carried downstream. Over time, this erosion will form the steep walls of a gorge. The flooding of streams or rivers increases the speed and intensity of this erosion, creating deeper and wider gorges.
- (iii) Canyon: A canyon is characterised by steep step - like side slopes and may be as deep as a gorgae. A Gorge is almost equal in width at this top as well as its bottom. In contrast, a canyon is wider at its top that at its bottom. In facts, a canyon is a variant of gorge.
- (iv) Waterfall: A waterfall is a river or other body of water's steep fall over a rocky ledge into a plunge pool below. Waterfalls are also called cascades. The process of erosion, the wearing away of earth, plays an important part in the formation of waterfalls. Waterfalls themselves also contribute to erosion. Often, waterfalls form as streams flow from soft rock to hard rock. This happens both laterally (as a stream flows across the earth) and vertically (as the stream drops in a waterfall). In both cases, the soft rock erodes, leaving a hard ledge over which the stream falls.
- (v) Plunge pools: Once a small and shallow depression forms, pebbles and boulders get collected in those depressions and get rotated by flowing water and consequently the depressions grow in dimensions. A series of such depressions eventually join and the stream valley gets deepened. At the foot of waterfalls also, large potholes, quite deep and wide, form because of the sheer impact of water and rotation of boulders. Such large and deep holes at the base of waterfalls are called plunge pools.

27. Wind speed, or wind flow velocity, is a fundamental atmospheric quantity. Wind speed is caused by air moving from high pressure to low pressure, usually due to changes in temperature. Wind speed affects weather forecasting, aircraft and maritime operations, construction projects, growth and metabolism rate of many plant species, and countless other implications. Wind speed is now commonly measured with an anemometer but can also be classified using the older Beaufort scale which is based on people's observation of specifically defined wind effects. Air is set in motion due to the differences in atmospheric pressure. The air in motion is called wind, which blows from high pressure to low pressure. The wind at the surface experiences friction. In addition, rotation of the earth also affects the wind movement. The force exerted by the rotation of the earth is known as the Coriolis force. Thus, the horizontal winds near the earth surface respond to the combined effect of three forces - the pressure gradient force, the frictional force and the Coriolis force. In addition, the gravitational force acts downward.
- a. Pressure gradient force: In atmospheric sciences (meteorology, climatology and related fields), the pressure gradient is a physical quantity that describes which direction and at what rate the pressure changes the most rapidly around a particular location. The differences in atmospheric pressure produce a force. The rate of change of pressure with respect to distance is the pressure gradient. The pressure gradient is strong where the isobars are close to each other and is weak where the isobars are apart.
 - b. Frictional force: Friction is the force resisting the relative motion of solid surfaces, fluid layers, and material elements sliding against each other. There are several types of friction: Dry friction is a force that opposes the relative lateral motion of two solid surfaces in contact. It affects the speed of the wind. It is greatest at the surface and its influence generally extends upto an elevation of 1 - 3 km. Over the sea surface, the friction is minimal.

- c. Coriolis force: Coriolis Force an artefact of the earth's rotation. Once air has been set in motion by the pressure gradient force, it undergoes an apparent deflection from its path, as seen by an observer on the earth. This apparent deflection is called the "Coriolis force" and is a result of the earth's rotation. The rotation of the earth about its axis affects the direction of the wind. This force is called the Coriolis force. It deflects the wind to the right direction in the northern hemisphere and in nature. They oscillate with the apparent movement of the sun. In the northern hemisphere in winter they move southwards and in the summer northwards.

OR

Physical Weathering Processes: Physical or mechanical weathering processes depend on some applied forces. **The applied forces could be:**

- i. gravitational forces such as overburden pressure, load and shearing stress.
- ii. expansion forces due to temperature changes, crystal growth or animal activity.
- iii. water pressures controlled by wetting and drying cycles.

Most of the physical weathering processes are caused by thermal expansion and pressure release. These processes are small and slow but can cause great damage to the rocks because of continued fatigue the rocks suffer due to the repetition of contraction and expansion umpteen times.

- i. **Unloading and Expansion:** Removal of overlying rock load because of continued erosion causes vertical pressure release and as a result, the upper layers of rock expand producing failure and consequently disintegration of rock masses. Fractures will develop roughly parallel to the ground surface. In areas of the curved ground surface, arched fractures tend to produce massive sheets or exfoliation slabs of rock. Deep-seated igneous rocks under as much as 25,000 or more pounds of pressure per square inch expand due to erosion of overlying rocks and consequent reduction of pressure. Exfoliation sheets resulting from expansion due to unloading and pressure release may measure hundreds or even thousands of feet in horizontal extent. Large, smooth rounded domes called exfoliation domes result due to this process.
 - ii. **Temperature Changes and Expansion:** Various minerals in rocks possess their own limits of expansion and contraction. With a rise in temperature, every mineral expands and crowds against its neighbour and as the temperature falls, a corresponding contraction takes place. Because of diurnal changes in the temperatures, this internal movement among the mineral grains of the superficial layers of rocks takes place regularly. This process is most effective in dry climates and high elevations where diurnal temperature changes are drastic. As has been mentioned earlier though these movements are very small they make the rocks weak due to continued fatigue. The surface layers of the rocks tend to expand more than the rocks at depth and this leads to the formation of stress within the rock resulting in heaving and fracturing parallel to the surface. Due to differential heating and resulting expansion and contraction of surface layers and their subsequent falloff as flakes (exfoliation) from the surface results in smooth rounded surfaces in rocks. In rocks like granites, smooth-surfaced and rounded, small to big boulders called tors form due to such flaking or exfoliation.
 - iii. **Freezing: Thawing and Frost Wedging:** Frost's weathering occurs due to the growth of ice within pores and cracks of rocks during repeated cycles of freezing and thawing (melting). This process is most effective at high elevations in mid-latitudes where freezing and thawing is repeated often. Glacial areas are subject to frost wedging daily. The pressure exerted by frozen water is about 2000 pounds per square inch. In this process, the rate of freezing is important. Rapid freezing of water causes its sudden expansion and high pressure. The resulting expansion affects joints, cracks and small inter-granular fractures to become wider and wider till rock breaks apart. Heaving and thrusting due to ice crystal growth in pore spaces of soils are quite significant.
 - iv. **Salt Weathering:** Salts in rocks expand due to thermal action, hydration, and crystallisation. Many salts like calcium, sodium, magnesium, potassium, and barium have high coefficients of volumetric expansion. The expansion of these salts depends on temperature and their thermal properties. High temperature ranges between 30° and 50°C and up to 80°C of surface temperatures in deserts favour such salt expansion. Salt crystals in near-surface pores cause the splitting of individual grains within rocks, which eventually fall off. This process of falling off of individual grains may result in granular disintegration or granular foliation. Under chemical weathering processes, hydration and dehydration of salts result in volume changes and cause expansion.
28. India has a hot monsoonal climate which is the prevalent climate in south and south-east Asia.
- i. While in the summer the mercury occasionally touches 55°C in the western Rajasthan, it drops down to as low as minus 45°C in winter around Leh.
 - ii. Churu in Rajasthan may record a temperature of 50°C or more on a June day while the mercury hardly touches 19°C in Tawang (Arunachal Pradesh) on the same day.



- iii. On a December night, the temperature in Drass (Jammu and Kashmir) may drop down to minus 45°C while Thiruvananthapuram or Chennai on the same night records 20°C or 22°C.
- iv. In Kerala and in the Andaman Islands, the difference between day and night temperatures may be hardly seven or eight degrees Celsius. But in the Thar desert, if the day temperature is around 50°C, at night, it may drop down considerably up to 15°-20°C.
- v. While snowfall occurs in the Himalayas, it only rains over the rest of the country. Similarly, variations are noticeable not only in the type of precipitation but also in its amount.

OR

Basis	Consequent rivers	Antecedent rivers
Shape	These rivers maintain their original shapes, deposits, the rise of land due to folding. The rivers keep on following in the same direction.	It is an uplift area the rivers flow in the direction resulting as consequent of the slope
Age	These rivers are older than the old mountain.	These rivers are formed after the uplift of an area.
Gorges	These rivers cut deep gorges due to downcutting.	These rivers do not form gorges.
Examples	Trans-Himalayan rivers such as Indus, Satluj, represent consequent rivers.	The eastward flowing river of a peninsular plateau which flows according to the slope is antecedent rivers.

Section D

- 29. i. **k2:** It lies in the Karakoram range, in part in the Gilgit-Baltistan region of Pakistan-administered Kashmir and in part in a China-administered territory of the Kashmir region.
- ii. **River Son:** It originates at Amarkantak in Madhya Pradesh and flows through the states of Uttarakhand, Bihar, Jharkhand, and even the Northeast.
- iii. **Alluvial Soils:** Found in Rajasthan, Haryana, and Southern Punjab.
- iv. **The Aravali Ranges:** It lies on the western and northwestern margins of the peninsular plateau. They extend from Gujarat to Delhi in a southwest-northeast direction.
- v. **Montane Forests:** Areas of Arunachal Pradesh.

[Note: Alluvial Soils and Montane forests are found in multiple areas]



- 30. A. Ring of Fire (Circum-Pacific Belt)
- B. Sahara Desert
- C. North Atlantic Drift
- D. Queensland
- E. Nazca Plate