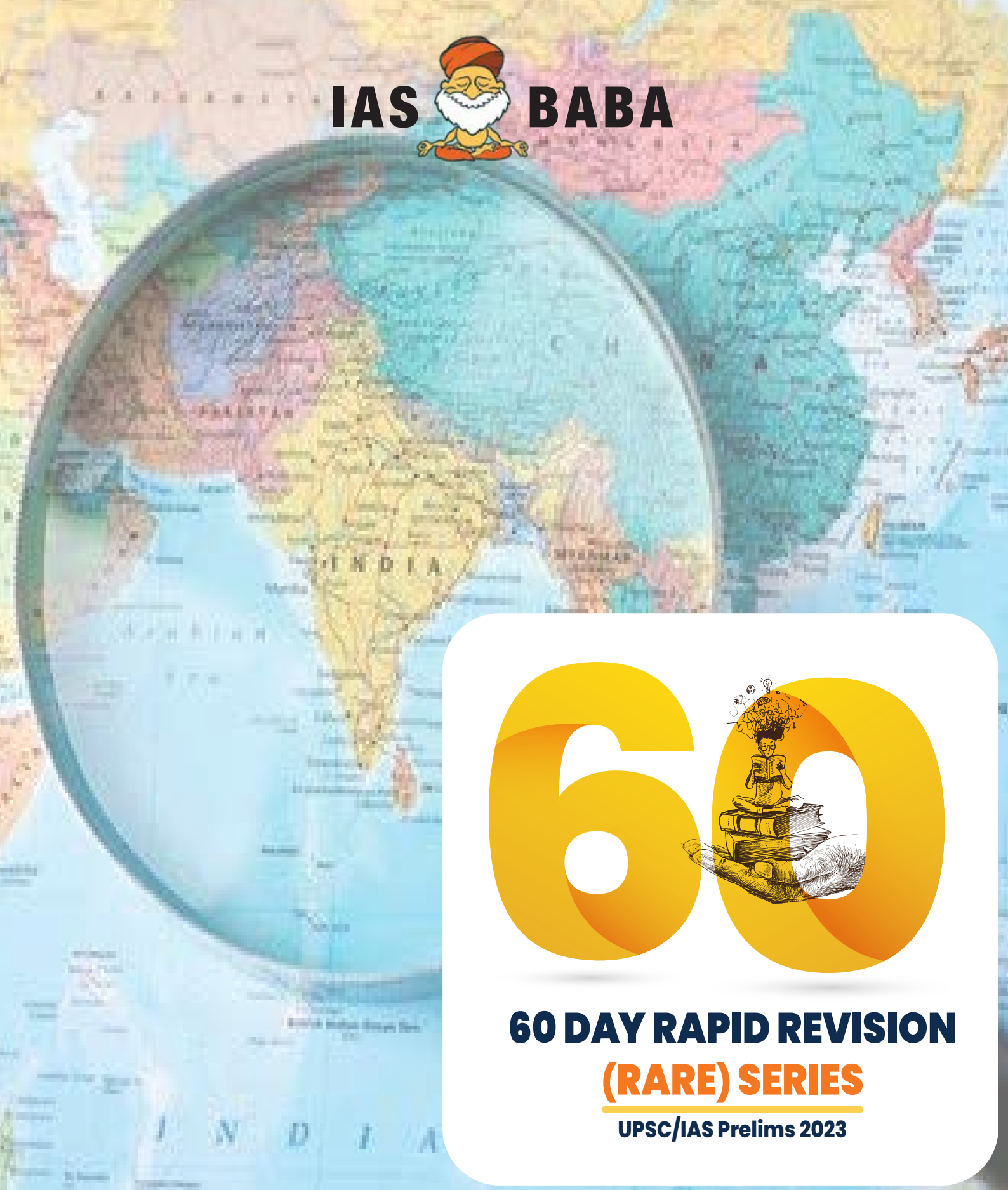
IAS BABA



60 DAY RAPID REVISION

(RARE) SERIES

UPSC/IAS Prelims 2023

GEOGRAPHY

PART -1 COMPILATION

Q.1) What are Cratons?

a) Volcanic mountains formed by subduction
b) Regions of continental crust that are billions of years old
c) Large-scale geological structures that form at plate boundaries
d) Underground cavities formed by the dissolution of limestone

Q.1) Solution (b)

Explanation:

- Volcanic mountains formed by subduction: This option refers to a type of geological formation known as volcanic arc, which is formed by the subduction of oceanic lithosphere beneath continental lithosphere. These regions are characterized by intense volcanic and seismic activity and are often associated with tectonic plate boundaries.**Hence Statement 1 is incorrect.**
- Cratons, on the other hand, are the oldest and most stable parts of the continental lithosphere, which form the cores of continents. These regions are typically characterized by thick, ancient rocks that have been tectonically stable for billions of years. Cratons are important geological structures because they provide clues about the early history and evolution of the Earth's continents **Hence Statement 2 is correct.**
- This option is similar to option a) and refers to the tectonic plate boundaries where two plates move towards each other (convergent plate boundaries), apart from each other (divergent plate boundaries), or slide past each other (transform plate boundaries). These regions are characterized by a variety of geological features such as earthquakes, mountain building, and volcanic activity. **Hence Statement 3 is incorrect.**
- Underground cavities formed by the dissolution of limestone: This option refers to a geological formation known as a cave or cavern. These structures are formed by the dissolution of soluble rocks such as limestone, dolomite, or gypsum by acidic groundwater. **Hence Statement 4 is incorrect.**

Q.2) Which of the following statements about the peaks of the Himalayas are correct?

1. Mount Everest is the highest peak in the Himalayas and but not in the world.
2. K2, also known as Mount Godwin-Austen, is the second-highest peak in the Himalayas and the world.
3. The Annapurna peak is located in Uttarakhand state of India

Which of the statements given above is/are correct?

a) 3 only
b) 2 and 3 only
c) 1 and 2 only
d) 2 only

Q.2) Solution (d)

Explanation:

- Mount Everest is not only the highest peak in the Himalayas but also the highest peak in the world, with an elevation of 8,848 meters (29,029 feet). **Hence Statement 1 is incorrect.**
- K2, also known as Mount Godwin-Austen, is the second-highest peak in the Himalayas and the world, with an elevation of 8,611 meters (28,251 feet). **Hence Statement 2 is correct.**
- The Annapurna peak is not located in Uttarakhand state of India but is part of the Annapurna massif, which is located in Nepal. The Annapurna massif has several peaks over 8,000 meters, including Annapurna I, which is the 10th highest peak in the world, with an elevation of 8,091 meters (26,545 feet). **Hence Statement 3 is incorrect.**

Q.3) Bhutan is surrounded by which of the following Indian States?

a) Assam, Arunachal Pradesh, West Bengal, Sikkim.
b) Assam, Mizoram, West Bengal, Bihar.
c) Arunachal, Pradesh, Meghalaya, West Bengal, Bihar.
d) Arunachal Pradesh, Sikkim, Bihar, Meghalaya.

Q.3) Solution (a)

Explanation:

- Bhutan shares its borders with the following Indian states:
  - Arunachal Pradesh - approximately 217 km
  - Assam - approximately 267 km
  - West Bengal - approximately 183 km
  - Sikkim - approximately 32 km
- Therefore, Bhutan is surrounded by four Indian states, with a total length of approximately 699 kilometers. **Hence option a is correct.**

Q.4) Which of the following statements about the Western Ghats and Eastern Ghats are correct?

1. The Western Ghats are older than the Eastern Ghats.
2. The Western Ghats are continuous and uninterrupted, while the Eastern Ghats are discontinuous and fragmented.
3. The Western Ghats are taller and more rugged than the Eastern Ghats.
4. The Eastern Ghats are closer to the coast than the Western Ghats.
5. The Eastern Ghats are more extensive than the Western Ghats.

Which of the statements given above is/are correct?

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

Q.4) Solution (b)

Explanation:

- The Eastern Ghats are older than the Western Ghats. The Eastern Ghats are believed to have formed around 1.2 billion years ago, while the Western Ghats formed around 150 million years ago. **Hence Statement 1 is incorrect.**
- The Western Ghats are continuous and uninterrupted, stretching for over 1,600 km from Gujarat to Tamil Nadu, while the Eastern Ghats are discontinuous and fragmented, running for over 1,750 km from Odisha to Tamil Nadu. **Hence Statement 2 is correct .**
- The Western Ghats are taller and more rugged than the Eastern Ghats. The Western Ghats have an average elevation of about 1,200 meters, with several peaks over 2,000 meters, while the Eastern Ghats have an average elevation of about 600 meters, with few peaks over 1,500 meters. **Hence Statement 3 is correct**
- The Western Ghats are closer to the coast than the Eastern Ghats. The Western Ghats run parallel to the western coast of India, while the Eastern Ghats are located farther inland, parallel to the eastern coast. **Hence Statement 4 is incorrect.**
- The Western Ghats are more extensive than the Eastern Ghats. The Western Ghats cover a total area of around 140,000 sq km, while the Eastern Ghats cover an area of around 75,000 sq km **Hence Statement 5 is incorrect.**

Q.5) Consider the following statements

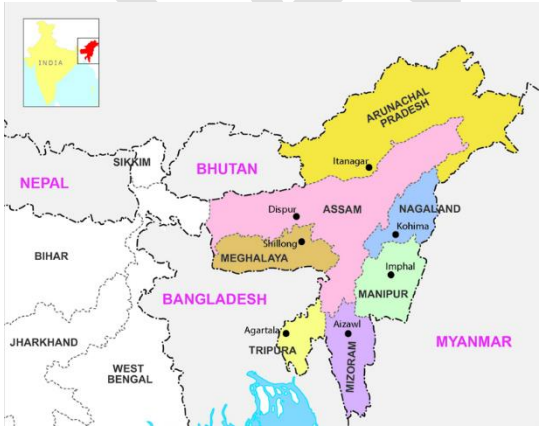
1. Assam shares a border with Bhutan and Bangladesh.
2. West Bengal shares a border with Bhutan and Nepal.
3. Mizoram shares a border with Bangladesh and Myanmar.

Which of the statements given above are correct?

a) 1, 2 and 3
b) 1 and 2 only
c) 2 and 3 only
d) 1 and 3 only

Q.5) Solution (a)

Explanation:



- Assam shares its borders with Bhutan to the north and Bangladesh to the south.
- West Bengal shares its borders with Bhutan to the north and Nepal to the northwest.
- Mizoram shares its borders with Bangladesh to the west and Myanmar to the east and south.
- **Therefore, all three statements are correct.**

Q.6) What is the correct order of occurrence of the following places as one moves from east to west?

1. Murshidabad
2. Gorakhpur
3. Bhopal
4. Bhavnagar

Select the correct code.

a) 2-4-3-1
b) 4-3-2-1
c) 1-3-4-2
d) 1-2-3-4

Q.6) Solution (d)

Explanation:

The correct order of occurrence of the following places, as one moves from east to west are Murshidabad, Gorakhpur, Bhopal and then Bhavnagar.

- Murshidabad is a district located in the Indian state of West Bengal.
- Gorakhpur is a city located in the Indian state of Uttar Pradesh.
- Bhopal is the capital city of the Indian state of Madhya Pradesh.
- Bhavnagar is a city located in the Indian state of Gujarat.**Hence option d is correct**

Q.7) The Indian Standard Meridian passes through the States and Union territories of:

1. Uttar Pradesh
2. Odisha
3. Andhra Pradesh
4. Chhattisgarh
5. Madhya Pradesh
6. Andaman and Nicobar
7. Uttarakhand
8. Tamilnadu

Select the correct code.

a) 1, 2, 3, 4 ,5
b) 2, 3, 4, 5, 6
c) 3, 4, 5, 6, 7
d) 1, 3, 5, 6, 7

Q.7) Solution (a)

Explanation:

- The Indian Standard Meridian (82.5° E) is a longitude that passes through 5 Indian states, namely Uttar Pradesh, Madhya Pradesh, Chhattisgarh, Odisha, and Andhra Pradesh. It passes through the city of Mirzapur in Uttar Pradesh, which is located at the point of intersection of the Tropic of Cancer and the Indian Standard Meridian. **Hence option a is correct**

Q.8) Which one of the following sequences in the ascending order of their geographical size is correct?

a) Madhya Pradesh – West Bengal - Telangana – Tamil Nadu
b) West Bengal – Telangana - Tamil Nadu – Madhya Pradesh
c) Telangana – Tamil Nadu – West Bengal – Madhya Pradesh
d) West Bengal – Madhya Pradesh - Tamil Nadu – Telangana

Q.8) Solution (b)

Explanation:

West Bengal has an area of 88,752 km², Telangana has an area of 114,840 km², Tamil Nadu has an area of 130,060 km², and Madhya Pradesh has an area of 308,245 km². Therefore, the correct sequence in ascending order of geographical size is West Bengal, Telangana, Tamil Nadu, and Madhya Pradesh.**Hence option b is correct.**

Here are the states of India listed in ascending order of their geographical size:

Rank	State	Area (in sq. km)
1	Goa	3,702
2	Sikkim	7,096
3	Tripura	10,486
4	Nagaland	16,579
5	Mizoram	21,081
6	Manipur	22,327
7	Meghalaya	22,429
8	Kerala	38,863
9	Haryana	44,212
10	Punjab	50,362
11	Uttarakhand	53,483
12	Himachal Pradesh	55,673
13	Assam	78,438

14	Jharkhand	79,716
15	Arunachal Pradesh	83,743
16	West Bengal	88,752
17	Telangana	1,12,077
18	Tamil Nadu	1,30,058
19	Chhattisgarh	1,35,191
20	Odisha	1,55,707
21	Andhra Pradesh	1,62,968
22	Karnataka	1,91,791
23	Gujarat	1,96,024
24	Uttar Pradesh	2,40,928
25	Maharashtra	3,07,713
26	Madhya Pradesh	3,08,245
27	Rajasthan	3,42,239

Q.9) Consider these pairs

	Tribe	**State(s) of presence**
1	Bhil	Meghalaya
2	Bodo	Assam
3	Chenchu	Telangana
4	Khasi	Madhya Pradesh

Which of the above pairs are correctly matched?

a) 1 and 2
b) 2 and 3
c) 3 and 4
d) 2 and 4

Q.9) Solution (b)

Explanation:

Tribe	**State(s) of presence**
Apatani	Arunachal Pradesh
Bhil	Rajasthan, Madhya Pradesh, Gujarat
Bodo	Assam
Chenchu	Andhra Pradesh, Telangana

Gond	Maharashtra, Madhya Pradesh, Chhattisgarh, Telangana, Andhra Pradesh
Ho	Jharkhand, Odisha
Khasi	Meghalaya
Kuki	Manipur, Nagaland, Mizoram
Mizo	Mizoram
Naga	Nagaland, Manipur, Arunachal Pradesh
Santhal	Jharkhand, West Bengal, Odisha
Sentinelese	Andaman and Nicobar Islands
Warli	Maharashtra
Yanadi	Andhra Pradesh, Telangana
Zeliangrong	Manipur, Nagaland, Assam
Andamanese	Andaman and Nicobar Islands

Q.10) Which of the following passes and locations is/are wrongly matched?

	Pass Name	**State(s)**
1	Zojila Pass	Ladakh
2	Baralacha La Pass	Uttarakhand
3	Shipki La Pass	Sikkim
4	Mana Pass	Uttarakhand

Select the appropriate code given below

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

Q.10) Solution (b)

Explanation:

Pass Name	**State(s)**
Rohtang Pass	Himachal Pradesh
Zojila Pass	**Ladakh**

Nathu La Pass	Sikkim
Baralacha La Pass	**Himachal Pradesh**
Chang La Pass	Jammu and Kashmir
Khardung La Pass	Jammu and Kashmir
Shipki La Pass	**Himachal Pradesh**
Mana Pass	**Uttarakhand**
Jelep La Pass	Sikkim
Bomdila Pass	Arunachal Pradesh
Niti Pass	Uttarakhand
Lipu Lekh Pass	Uttarakhand

Q.11) Which one of the following is the correct sequence of the given hills starting from the north and going towards the south?

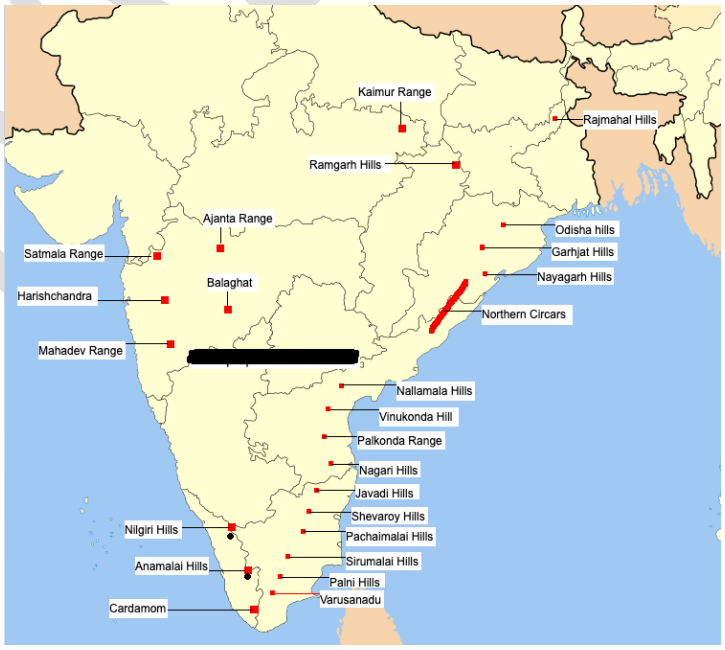
a) Nallamalai Hills – Nilgiri Hills – Javadi Hilis – Anaimalai Hills – Cardamom Hills
b) Anaimalai Hills – Javadi Hills – Nilgiri Hills – Nallamalai Hills – Cardamom Hills
c) Nallamalai Hills – Javadi Hills – Nilgiri Hills – Anaimalai Hills – Cardamom Hills
d) Anaimalai Hills – Nilgiri Hills – Javadi Hills – Nallamalai Hills – Cardamom Hills

Q.11) Solution (c)

Explanation:

The correct sequence of the given hills starting from the north and going towards the south are Nallamalai Hills – Javadi Hills – Nilgiri Hills – Anaimalai Hills — Cardamom Hills.

- Nallamalai Hills - Andhra Pradesh
- Javadi Hills - Tamil Nadu
- Nilgiri Hills - Tamil Nadu and Kerala
- Anaimalai Hills - Tamil Nadu and Kerala
- Cardamom Hills – Kerala



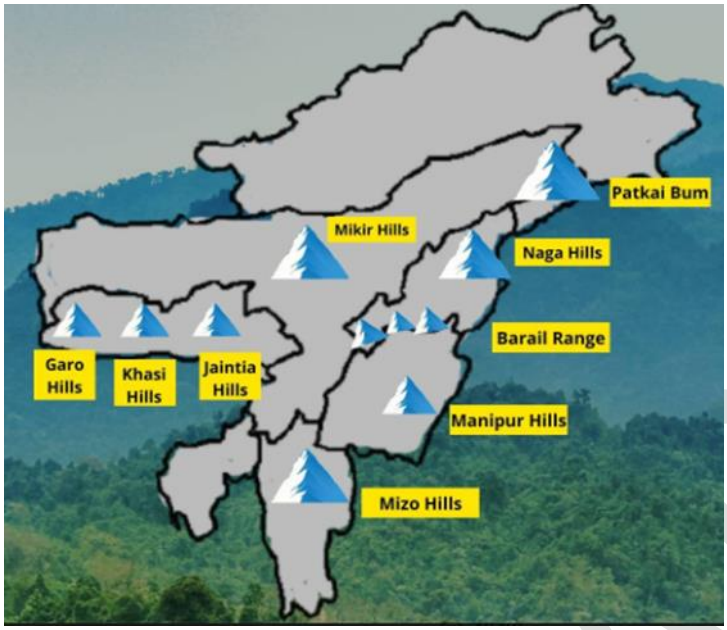
Q.12) Which of the following gives the correct sequence of hills in the east-west direction?

a) Naga, Mikir, Khasi, Garo
b) Garo, Khasi, Mikir, Naga
c) Khasi, Garo, Naga, Mikir
d) Mikir, Naga, Khasi, Garo

Q.12) Solution (a)

Explanation:

The following that gives the correct sequence of hills in the east-west direction are Naga, Mikir, Khasi and Garo.



Q.13) Which one among the following is nearest to the Tropic of Cancer?

a) Agra
b) Delhi
c) Gwalior
d) Jhansi

Q.13) Solution (d)

Explanation:

- The city of Agra, is located at a latitude of 27.1767 degrees north.
- The city of Delhi at 28.7041 degrees north
- The city of Gwalior at 26.2183 degrees north
- The city of Jhansi at 25.4484 degrees north. **Therefore, the correct answer is:Option d**

Q.14) Which Indian state do not share its border with Myanmar?

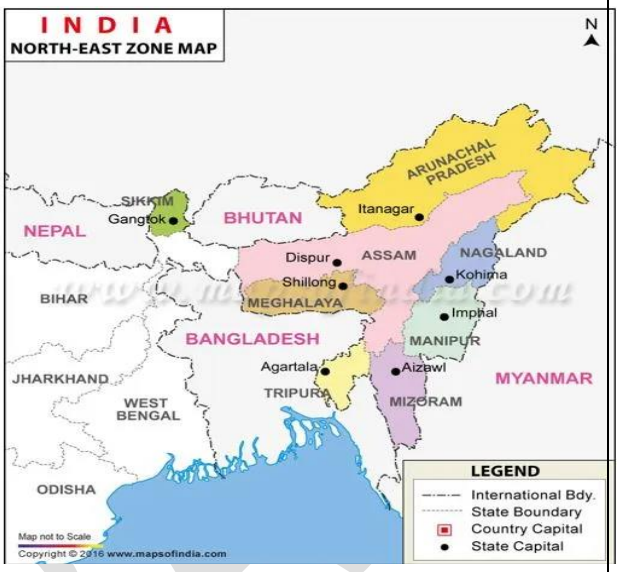
a) Arunachal Pradesh
b) Mizoram
c) Tripura
d) Nagaland

Q.14) Solution (c)

Explanation:

Four states in India share their border with Myanmar. They are:

- Arunachal Pradesh: The easternmost state of India shares a 520 km long border with Myanmar.
- Nagaland: The state of Nagaland shares a 215 km long border with Myanmar.
- Manipur: The state of Manipur shares a 398 km long border with Myanmar.
- Mizoram: The state of Mizoram shares a 510 km long border with Myanmar.



Q.15) Consider the following statements:

1. Uttar Pradesh shares its borders with the maximum number of other Indian states.
2. West Bengal shares its longest border among Indian states with Bangladesh
3. China shares its longest border with India

Select the correct answer using the codes given below.

a) 1 only
b) 2 and 3 only
c) 1 and 2 only
d) 1, 2 and 3

Q.15) Solution (c)

Explanation:

- Uttar Pradesh is the Indian state that shares its borders with the maximum number of other Indian states. It shares its borders with a total of nine states, including Uttarakhand, Himachal Pradesh, Haryana, Rajasthan, Madhya Pradesh, Chhattisgarh, Jharkhand, Bihar, and the National Capital Territory of Delhi. **Hence Statement 1 is correct.**
- Bangladesh and India share a 4,096-kilometre-long (2,545 mi) international border, the fifth-longest land border in the world, including 262 km (163 mi) in Assam, 856 km (532 mi) in Tripura, 318 km (198 mi) in Mizoram, 443 km (275 mi) in Meghalaya, and 2,217 km (1,378 mi) in West Bengal. **Hence Statement 2 is correct.**

- While China and India share a long international border that stretches for over 3,488 km, it is not the longest border for either country. China's longest international border is with Russia, stretching for over 4,200 km, while India's longest international border is with Bangladesh, stretching for over 4,096 km. **Hence Statement 3 is incorrect.**

Q.16) Consider the following statements:

1. Peninsular Plateau is also known as Deccan Plateau
2. Kerala has the largest maritime border among Indian states
3. Sir Creek is a disputed territory between India and China

Select the correct answer using the codes given below.

a) 1 only
b) 1 and 3 only
c) 1 and 2 only
d) 1, 2 and 3

Q.16) Solution (a)

Explanation:

- The Peninsular Plateau is also mentioned as Deccan Plateau. **Hence Statement 1 is correct.**
- Kerala has a significant maritime border along the Arabian Sea, but it is not the largest among Indian states. Gujarat has the largest maritime border among Indian states, stretching over 1,600 km along the Arabian Sea. **Hence Statement 2 is incorrect.**
- Sir Creek is a disputed territory between India and Pakistan, not India and China. The creek is located in the Rann of Kutch marshlands, and both India and Pakistan claim ownership of the area. **Hence Statement 3 is incorrect.**

Q.17) With respect to the peninsular plateau, consider the following statements:

1. Cauvery River forms the southern boundary of the Peninsular Plateau
2. The average height of the Peninsular Plateau is 1500-2000 meters
3. Kanha National Park is located in the Peninsular Plateau
4. Satpura Range is the highest mountain range in the Peninsular Plateau

Select the correct answer using the codes given below.

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

Q.17) Solution (d)

Explanation:

- The average height of the Peninsular Plateau is 600-900 meters. All the other statements are correct.**Hence statement 2 is incorrect**
- The Cauvery River is a major river in southern India that originates in the Western Ghats and flows eastward into the Bay of Bengal. The river forms the southern boundary of the Peninsular Plateau, which is a vast region of elevated terrain that covers much of peninsular India. The plateau is bordered by the Eastern and Western Ghats on either side, and the Cauvery River marks its southernmost boundary before flowing into the sea **Hence statement 1 is correct**
- Kanha National Park is situated in the Peninsular Plateau region of India, which is characterized by a vast expanse of rugged terrain and diverse flora and fauna. The Peninsular Plateau is a large region that stretches across central and southern India and is home to many important national parks and wildlife sanctuaries. Kanha National Park is famous for its population of Bengal tigers, which are among the most iconic and endangered species in the region. **Hence statement 3 is correct**
- Satpura Range is a mountain range located in central India, which stretches over the states of Maharashtra, Madhya Pradesh, and Gujarat. The range is the highest mountain range in the Peninsular Plateau, with its highest peak, Dhoopgarh, standing at an altitude of 1,350 meters (4,429 feet) above sea level. **Hence statement 4 is correct**

Q.18) Consider the following statements

1. India, Myanmar and Bhutan share the Indo-Gangetic Plain
2. Indus, Ganges, and Yamuna are responsible for the formation of the Indo-Gangetic plain

Which of the statements given above is/are correct with respect to Indo-Gangetic plain?

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

Q.18) Solution (b)

Explanation:

- The Indo-Gangetic Plain is a large, fertile plain in northern India and parts of Pakistan, but it does not extend into Bhutan or Myanmar. However, India shares some of its eastern border with Myanmar and Bhutan. **Hence statement 1 is incorrect**
- The Indo-Gangetic Plain is formed by the sedimentary deposits of the Indus, Ganges, and Brahmaputra river systems. These rivers bring large amounts of sediment and silt down from the Himalayas, which has created the fertile alluvial plain over millions of years. The plain is an important agricultural region in South Asia, supporting the livelihoods of millions of people. **Hence statement 2 is correct**

Q.19) Which of the following statements about the Thar Desert is true?

a) The Thar Desert is located primarily in southern India.
b) The Thar Desert is the largest desert in the world.

c) The Thar Desert is also known as Marusthali
d) The Thar Desert receives heavy rainfall throughout the year.

Q.19) Solution (c)

Explanation:

- The Thar Desert is not located primarily in southern India. It is a large arid region that covers parts of northwestern India and eastern Pakistan. **Hence statement a is incorrect**
- The Thar Desert is not the largest desert in the world. It is the seventh largest desert in the world, covering an area of approximately 200,000 square kilometers. **Hence statement b is incorrect**
- The Thar Desert is also known as Marusthali, which means "land of the dead". It is a hot and arid region with sparse vegetation and is home to a number of endemic species. **Hence statement c is correct**
- The Thar Desert does not receive heavy rainfall throughout the year. It is a dry region with a low annual rainfall, and much of the rainfall occurs during the monsoon season from July to September. **Hence statement d is incorrect**

Q.20) Which of the following statements about Coastal Plains and Ghats in India is true?

a) Coastal Plains are narrow strips of land along the Arabian Sea and Bay of Bengal, while Ghats are mountain ranges running parallel to the coast.
b) Coastal Plains are characterized by high elevations and rugged terrain, while Ghats are flat and low-lying areas.
c) Coastal Plains and Ghats are both regions of high rainfall and are important agricultural areas in India.
d) Coastal Plains and Ghats are both located in northern India and are known for their cold and dry climate.

Q.20) Solution (a)

Explanation:

- Coastal Plains are narrow strips of land along the Arabian Sea and Bay of Bengal, while Ghats are mountain ranges running parallel to the coast. The Western Ghats run parallel to the western coast of India, while the Eastern Ghats run parallel to the eastern coast of India. These two mountain ranges are separated by a narrow strip of Coastal Plain. **Hence statement a is correct**
- Coastal Plains are not characterized by high elevations and rugged terrain. They are flat and low-lying areas that are formed by the deposition of sediment by rivers and the sea. Ghats, on the other hand, are characterized by high elevations and rugged terrain. **Hence statement b is incorrect**
- Coastal Plains and Ghats are regions of high rainfall, but Coastal Plains are not necessarily important agricultural areas in India. Some parts of the Coastal Plains are suitable for agriculture, but other parts are covered by mangroves and are unsuitable for agriculture. The Ghats are important agricultural areas, particularly for the cultivation of tea, coffee, and spices. **Hence statement c is incorrect**

- Coastal Plains and Ghats are not located in northern India, but rather in the southern and western parts of the country. The climate in these regions is generally warm and humid, with high levels of rainfall. **Hence statement d is incorrect.**

Q.21) Consider the following statements

1. P-waves are body waves whereas S-waves are surface waves
2. Surface waves are the most damaging waves
3. For each earthquake, there exists an similar shadow zone.
4. The shadow zone of S-wave is much larger than that of the P-waves

Which of the above statements is/are correct?

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

Q.21) Solution (a)

Explanation:

- P-waves are primary waves that travel through the body of the Earth and can travel through solid and liquid materials, while S-waves are secondary waves that travel only through solid materials. Both these waves are in interior of the earth and not on surface. Therefore, P-waves are body waves, and S-waves are also body waves, not surface waves.**Hence Statement 1 is incorrect**
- Surface waves, also known as Love and Rayleigh waves, are the most damaging waves because they travel along the surface of the Earth and cause the ground to shake more intensely, leading to greater damage to buildings and other structures. **Hence Statement 2 is correct**.
- For each earthquake, there is an associated shadow zone, which is a region on the Earth's surface where the seismic waves from that earthquake cannot be detected by seismographs due to the bending of the waves as they travel through the Earth's interior.However this differs for each wave depending upon the location and depth of an earthquake.**Hence Statement 3 is incorrect.**
- The shadow zone of S-waves is much larger than that of P-waves because S-waves cannot travel through the Earth's liquid outer core, which creates a larger shadow zone for S-waves. In contrast, P-waves can travel through both solid and liquid materials, so their shadow zone is smaller than that of S-waves. **Hence Statement 4 is correct**

Q.22) Consider the following statements.

1. The crust can be divided into Oceanic crust which is Sial and Continental crust which is known as Sima.

2. Core is primarily composed of iron and nickel an is thus know as Nife
3. Mantle is responsible for generating the Earth's magnetic field

Which of the above statements are correct?

a) 2 only
b) 1 only
c) 2 and 3 only
d) 3 only

Q.22) Solution (a)

Explanation:

- As continental crust is rich in silica and aluminum, it is referred to as sial. Oceanic crust is generally basaltic and is composed of rocks rich in silica and magnesium. As oceanic crust is rich in silica and magnesium, it is referred to as sima. **Hence Statement 1 is incorrect**
- The Earth's core is primarily composed of iron(Fe) and nickel,(Ni) with smaller amounts of other elements. The core is divided into two main layers: the outer core, which is liquid, and the inner core, which is solid. **Hence Statement 2 is correct**
- The Earth's magnetic field is generated by the movement of molten iron in the outer core, not by the mantle. The mantle is the layer of the Earth between the crust and the core, and although it plays an important role in the Earth's dynamics, it is not responsible for generating the magnetic field. **Hence Statement 1 is incorrect**

Q.23) Consider the following statements

1. Orogenesis results in the upward movement of the Earth's crust leading to creation of mountain ranges.
2. Folding results in the bending of rock layers due to compression
3. Faulting results in the breaking and displacement of rocks along a fracture

Which of the above statements are correct?

a) 2 and 3 only
b) 1, 2 and 3
c) 1 and 2 only
d) 1 only

Q.23) Solution (b)

Explanation:

- Orogenesis refers to the process of mountain building, which occurs when large- scale

tectonic forces cause the Earth's crust to buckle and fold, resulting in the formation of mountain ranges.

- There are several different types of orogeny, including collisional orogeny, where two tectonic plates converge and one is thrust up over the other, and volcanic orogeny, where volcanic activity builds up over time to form a mountain range. The process of orogenesis can be initiated by a variety of tectonic forces, including the collision of two continental plates, the subduction of an oceanic plate beneath a continental plate, or the movement of a tectonic plate over a hotspot, causing volcanic activity to build up over time. **Hence Statement 1 is correct**
- Folding is a type of deformation that occurs when rocks are subjected to compressional forces, causing them to bend and warp. Folding can result in the formation of large-scale structures such as anticlines and synclines. Anticlines are upwardly convex folds that resemble arches, while synclines are downwardly concave folds that resemble troughs. Folding is often associated with mountain-building processes. **Hence Statement 2 is correct**
- Faulting is a type of deformation that occurs when rocks break along a fault plane due to the movement of tectonic plates. Faults can be classified into several types, including normal faults, reverse faults, and strike-slip faults. Normal faults occur when rocks are pulled apart, resulting in the hanging wall moving downward relative to the footwall. Reverse faults occur when rocks are pushed together, resulting in the hanging wall moving upward relative to the footwall. Strike-slip faults occur when rocks slide past each other horizontally. **Hence Statement 3 is correct**

Q.24) Which of the following statements is true regarding exogenic earth movements and weathering?

a) Exogenic earth movements and weathering are both caused by internal forces acting on the earth's surface.
b) Exogenic earth movements and weathering are unrelated processes
c) Exogenic earth movements refer to the physical and chemical breakdown of rocks, while weathering refers to the internal movements of the earth's crust.
d) Exogenic earth movements and weathering are closely related to each other

Q.24) Solution (d)

Explanation:

- Exogenic earth movements and weathering are caused by external forces acting on the earth's surface such as water, wind, and ice. Endogenic forces, which are internal forces within the earth, are responsible for movements such as plate tectonics and volcanic activity, not exogenic movements and weathering. **Hence Statement 1 is**

incorrect

- Exogenic earth movements and weathering are closely related processes. Exogenic earth movements such as erosion and deposition can expose rocks to external weathering agents such as water, wind, and temperature changes, which can then break down the rocks and minerals over time. **Hence Statement 2 is incorrect**
- Exogenic earth movements refer to the outward movements on the earth's surface caused by external forces such as water, wind, and ice. Weathering, on the other hand, refers to the physical and chemical breakdown of rocks and minerals caused by external processes such as water, wind, and temperature changes. **Hence Statement 3 is incorrect**
- Exogenic earth movements are outward movements on the earth's surface caused by external forces such as water, wind, and ice. Weathering is the physical and chemical breakdown of rocks and minerals caused by external processes such as water, wind, and temperature changes. These two processes are closely related as exogenic movements can expose rocks to external weathering agents, leading to their breakdown over time. **Hence Statement 4 is correct**

Q.25) Which of the following statements accurately describes geosynclines?

a) Geosynclines are elongated depressions that develop along the edges of continents.
b) Geosynclines are mountainous regions that form through tectonic activity.
c) Geosynclines are zones of subsidence in which thick sedimentary deposits accumulate.
d) Geosynclines are volcanic islands that form along the mid-ocean ridges.

Q.25) Solution (c)

Explanation:

- Geosynclines do not necessarily develop along the edges of continents; they can also occur in the middle of continents or on ocean floors. **Hence Statement a is incorrect**
- While mountain ranges can form as a result of geosynclinal processes, geosynclines themselves are not mountainous regions. **Hence Statement b is incorrect**
- Geosynclines are long, narrow basins or troughs that form in the Earth's crust due to subsidence, often caused by tectonic activity. These depressions accumulate large amounts of sediment over time, resulting in the formation of thick sedimentary deposits. **Statement c is correct**
- Volcanic islands that form along mid-ocean ridges are typically associated with processes such as seafloor spreading and plate tectonics, but not with geosynclines. **Hence Statement d is incorrect**

Q.26) Consider the following statements about theory of Continental Drift

1. It lacks a plausible mechanism to show on how the continents can move

2. The theory of continental drift is universally accepted
3. The theory of continental drift explains all geological phenomena

Which of the above statements is/are correct ?

a) 2 and 3 only
b) 1 and 3 only
c) 1 and 2 only
d) 1 only

Q.26) Solution (d)

Explanation:

- One criticism of the theory of continental drift when it was first proposed was that it lacked a plausible mechanism to explain how continents could move. This was partly due to a lack of understanding of plate tectonics at the time, but it remained a point of criticism until the mid-20th century when plate tectonics became widely accepted. **Hence Statement 1 is correct**
- While the theory of continental drift is widely accepted today, it was not always the case. When it was first proposed by Alfred Wegener in the early 20th century, it was met with skepticism and criticism. **Hence Statement 2 is incorrect**
- While the theory of continental drift is an important part of our understanding of the Earth's geological history, it does not explain all geological phenomena. Other processes, such as volcanic activity and erosion, also play important roles in shaping the Earth's surface. **Hence Statement 3 is incorrect**

Q.27) Consider the following statements about Paleomagnetism

1. Paleomagnetism is the study of the magnetic properties of rocks and minerals to understand the Earth's magnetic field in the past.
2. Paleomagnetism can provide information about the movement of tectonic plates over time.
3. The magnetic field of the Earth has remained constant throughout its history.
4. Paleomagnetism is not useful for understanding the history of the Earth's magnetic field because the magnetic properties of rocks change over time.

Which of the above statements is/are incorrect ?

a) 2 and 3 only
b) 3 and 4 only
c) 1 and 2 only
d) 1 and 3 only

Q.27) Solution (b)

Explanation:

- Paleomagnetism is the study of the magnetic properties of rocks and minerals to understand the Earth's magnetic field in the past. By analyzing the magnetization of rocks and minerals, scientists can reconstruct the past movement of the Earth's magnetic poles and the strength and direction of the magnetic field. **Hence Statement 1 is correct**
- Paleomagnetism can provide information about the movement of tectonic plates over time. As the oceanic crust forms, it records the magnetic polarity of the Earth at the time of its formation. As the crust spreads and moves away from the mid-ocean ridges, the recorded magnetic polarity can be used to determine the age and rate of movement of the oceanic plates. **Hence Statement 2 is correct**
- The magnetic field of the Earth has not remained constant throughout its history. The polarity of the Earth's magnetic field has reversed numerous times in the past, and the strength and direction of the magnetic field have also changed over time. **Hence Statement 3 is incorrect**
- Paleomagnetism is useful for understanding the history of the Earth's magnetic field because the magnetic properties of rocks do not change over time, as long as the rocks remain undisturbed. This allows scientists to reconstruct the past behavior of the magnetic field based on the magnetization of rocks and minerals that formed at that time. **Hence Statement 4 is incorrect**

Q.28) Which of the following statements about the movement of the Indian Plate are correct?

1. The Indian Plate broke away from the Eurasian Plate and started moving southward.
2. The movement of the Indian Plate is responsible for the formation of the Andes mountain range.
3. The Indian Plate began to collide with the Eurasian Plate around 50 million years ago.
4. The collision between the Indian Plate and the Eurasian Plate has not caused any seismic activity in the region.
5. The collision between the Indian Plate and the Eurasian Plate has caused the formation of the Himalayan mountain range.

Which of the above statements is/are correct ?

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

Q.28) Solution (a)

Explanation:

- The Indian Plate broke away from the Eurasian Plate and started moving southward. (This statement is incorrect as the Indian Plate broke away from the African Plate and moved northward towards the Eurasian Plate). **Hence Statement 1 is incorrect**
- The movement of the Indian Plate is responsible for the formation of the Andes mountain range. (This statement is incorrect as the Andes mountain range was formed due to the subduction of the Nazca Plate under the South American Plate). **Hence Statement 2 is incorrect**
- The Indian Plate began to collide with the Eurasian Plate around 50 million years ago. (This statement is correct as the Indian Plate started colliding with the Eurasian Plate around 50 million years ago, resulting in the formation of the Himalayan mountain range). **Hence Statement 3 is correct**
- The collision between the Indian Plate and the Eurasian Plate has not caused any seismic activity in the region. (This statement is incorrect as the collision between the two plates has resulted in significant seismic activity, including earthquakes). **Hence Statement 4 is incorrect**
- The collision between the Indian Plate and the Eurasian Plate has caused the formation of the Himalayan mountain range. (This statement is correct as the collision between the two plates caused the upliftment of the Himalayas due to the compression and folding of the crust). **Hence Statement 5 is correct**

Q.29) Consider the following statements with respect to Island Arc

1. Island arcs are formed by the collision of a oceanic plate with either a oceanic or a continental plate
2. Island arc is a chain of volcanic islands formed above a subduction zone
3. Aleutian Islands is example of an island arc
4. Stratovolcanoes is commonly associated with island arcs

Which of the statements given above are correct?

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

Q.29) Solution (d)

Explanation:

- Island arcs are formed by the subduction of an oceanic plate under another plate. This process can occur between two oceanic plates or between an oceanic and a continental

plate. **Hence Statement 1 is correct**

- Island arcs are formed due to the subduction of an oceanic plate under another plate. This results in the melting of the subducted plate, and the magma generated rises to the surface to form a chain of volcanic islands above the subduction zone. **Hence Statement 2 is correct**
- The Aleutian Islands are an example of an island arc. They are located in the northern Pacific Ocean and were formed due to the subduction of the Pacific Plate under the North American Plate. **Hence Statement 3 is correct**
- Stratovolcanoes, also known as composite volcanoes, are typically associated with volcanic arcs. These volcanoes are formed due to the subduction of an oceanic plate under another plate. The explosive eruptions of these volcanoes are caused by the buildup of gases in the viscous magma. **Hence Statement 4 is correct**

30.) Consider the following statements:

1. When two continental plates collide, both plates are destroyed
2. When two oceanic plates converge, both plates are destroyed

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.30) Solution (d)

Explanation:

- When two continental plates collide, neither plate is destroyed. Instead, the plates are forced upward, and the collision results in the formation of mountains. **Hence Statement 1 is incorrect**
- When two oceanic plates converge, one plate is usually subducted under the other, and it melts into the mantle. So, in a sense, one plate is "destroyed." However, the other plate is not destroyed and continues to move. **Hence Statement 2 is incorrect**

Q.31) Which of the following option is 'odd' among the following?

a) Fold Mountains
b) Fault-Block Mountains
c) Dome Mountains
d) Erosion Mountains

Q.31) Solution (d)

Explanation:

- The odd option among the given options is "Erosion Mountains". Fold Mountains, Fault-Block Mountains, and Dome Mountains are all types of mountains that form due to tectonic activities, while Erosion Mountains are not formed by tectonic activities, but rather, by erosion and weathering of pre-existing rocks. **Hence option d is Correct.**

Q.32) Consider the following pairs:

Sl no	Mountain Range	Countries
1	Alps	Switzerland
2	Atlas Mountains	United States
3	Rocky Mountains	New Zealand
4	Southern Alps	Morocco

Which of the pairs given above is/are correctly matched?

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

Q.32) Solution (b)

Explanation:

Mountain Range	Countries
Alps	Switzerland
Atlas Mountains	Morocco
Rocky Mountains	United States
Southern Alps	New Zealand

Q.33.) Consider the following statements

1. Karst landforms are formed by the dissolution of soluble rocks, such as limestone and dolomite.
2. Karst topography is characterized by sinkholes, caves, and underground drainage

systems.

3. Karst landforms are only found in areas with high precipitation and high humidity.
4. Karst landforms are the result of volcanic activity.

Which of the following statements about Karst landforms is/are correct?

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

Q.33) Solution (c)

Explanation:

- Karst landforms are typically formed by the dissolution of soluble rocks, such as limestone and dolomite. This occurs when water infiltrates the rock and slowly dissolves it over time, resulting in the creation of unique landforms. **Hence Statement 1 is correct**
- Karst topography is characterized by sinkholes, caves, and underground drainage systems. This is because the dissolution of soluble rock can create voids and spaces underground, which can eventually lead to the formation of sinkholes and caves. **Hence Statement 2 is correct**
- Karst landforms can be found in a range of climatic conditions, and are not exclusively limited to areas with high precipitation and high humidity. They are most commonly found in areas with soluble rock deposits, regardless of the amount of rainfall or humidity in the region. **Hence Statement 3 is incorrect**
- Karst landforms are not the result of volcanic activity, but are instead formed by the dissolution of soluble rocks, typically limestone and dolomite. Volcanic activity can create a different set of landforms, such as volcanic cones and calderas. **Hence Statement 4 is incorrect**

Q.34) Which of the following factors can possibly affect the propagation of tsunami waves?

a) Water depth
b) Wind speed
c) Earthquake magnitude
d) All of the above

Q.34) Solution (d)

Explanation:

- Water depth: Tsunami waves travel faster in deeper water and slower in shallow water. As the waves approach the shoreline and the water depth decreases, the waves

become taller, and their speed decreases, leading to an increase in their destructive power. **Hence option a is Correct.**

- Wind speed: Wind speed does not directly affect the propagation of tsunami waves, but it can create surface waves on the ocean that may interfere with the propagation of the tsunami waves. However, strong winds can push the waves farther inland, causing more damage. **Hence option b is Correct.**
- Earthquake magnitude: Tsunami waves are usually generated by large earthquakes with a magnitude of 7.5 or higher on the Richter scale. The greater the magnitude of the earthquake, the more energy is released, resulting in larger and more destructive tsunami waves. **Hence option c is Correct.**

Q.35) Consider the statements about igneous, sedimentary, and metamorphic rocks.

1. Igneous rocks are formed from the accumulation and cementation of sediments.
2. Metamorphic rocks are formed from the alteration of preexisting rocks through heat and pressure.
3. Sedimentary rocks are typically more resistant to erosion than igneous or metamorphic rocks.
4. Sedimentary rocks are made up of fragments of pre-existing rocks that have been compacted and cemented together.

Select the correct answer using the code given below:

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

Q.35) Solution (b)

Explanation:

- Igneous rocks are formed by the solidification and crystallization of magma or lava, not by accumulation and cementation of sediments. **Hence Statement 1 is incorrect**
- Metamorphic rocks are formed from preexisting rocks that have undergone heat and pressure, causing them to recrystallize and change in texture, mineralogy, and sometimes chemical composition. **Hence Statement 2 is correct**
- Sedimentary rocks are typically less resistant to erosion than igneous or metamorphic rocks because they are often softer and composed of loosely cemented sediments. **Hence Statement 3 is incorrect**
- Sedimentary rocks are made up of sedimentary particles, such as rock fragments, minerals, and organic material, that have been transported and deposited by water, wind, or ice. Over time, the sedimentary particles become compacted and cemented together to form a solid rock. **Hence Statement 4 is correct**

Q.36) Which of the following statements is/are true about fluvial erosional landforms is true?

1. They are only found in arid environments.
2. They are formed by the erosion of rock and sediment by flowing water.
3. They are not influenced by the velocity of the water.

Select the correct answer using the code given below:

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

Q.36) Solution (b)

Explanation:

- Fluvial erosional landforms can be found in any environment where there is flowing water, not just in arid environments. **Hence Statement 1 is incorrect**
- Fluvial erosional landforms are formed by the continuous erosion of rock and sediment by flowing water over a long period of time. **Hence Statement 2 is correct**
- The velocity of the water is a crucial factor in the formation of fluvial erosional landforms. Higher velocity water can erode material more quickly and create different landforms compared to slower moving water. **Hence Statement 3 is incorrect**

37.) Which of the following statements is/are true regarding glacial landforms?

1. Glaciers can erode the landscape through processes such as plucking and abrasion.
2. Moraines are depositional landforms created by the accumulation of sediment at the edge or along the surface of a glacier.
3. A drumlin is a depositional landform created by the lateral movement of a glacier.
4. U-shaped valleys are erosional landforms formed by the down cutting of a glacier.

Select the correct answer using the code given below:

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

Q.37) Solution (d)

Explanation:

- Glaciers can erode the landscape through processes such as plucking and abrasion: Glaciers can pick up rocks and sediments and carry them away through plucking. This

occurs when the ice freezes onto the rock surface and pulls it away during glacier movement. Abrasion occurs when rocks carried by the ice wear down the bedrock beneath the glacier. **Hence Statement 1 is correct**

- Moraines are depositional landforms created by the accumulation of sediment at the edge or along the surface of a glacier: Moraines are piles of rock and sediment that accumulate along the edges and surface of a glacier. They are created when the glacier erodes the landscape and carries the debris along with it. **Hence Statement 2 is correct**
- A drumlin is a depositional landform created by the lateral movement of a glacier: A drumlin is an elongated hill formed by glacial till that has been molded into a streamlined shape by the movement of a glacier. They are formed by the deposition of material transported by a glacier. **Hence Statement 3 is correct**
- U-shaped valleys are erosional landforms formed by the down cutting of a glacier: U-shaped valleys are formed by the erosive power of glaciers. As glaciers move down valleys, they erode the valley floor and walls, forming a wide, U-shaped valley with a flat bottom. **Hence Statement 4 is correct**

Q.38) Which of the following statements is true about marine landforms and arid landforms?

a) Marine landforms are mainly formed by wind erosion and deposition, while arid landforms are mainly formed by water erosion and deposition.
b) Marine landforms are generally found at high altitudes only, while arid landforms are found at low altitudes.
c) Marine landforms are mostly characterized by the presence of water bodies, while arid landforms are characterized by the complete absence of water bodies.
d) Marine landforms are formed by the action of water, waves, and currents, while arid landforms are formed by the action of wind and occasional rainfall.

Q.38) Solution (d)

Explanation:

- Marine landforms are primarily formed by the action of water and not wind, while arid landforms are mainly formed by wind erosion and deposition rather than water erosion and deposition. **Hence option a is incorrect**
- Marine landforms are typically found in and around bodies of water, such as oceans, seas, and lakes, and can be found at a variety of elevations, from sea level to high altitudes. Some examples of marine landforms include coastlines, coral reefs, and seamounts.
- Similarly, arid landforms are not exclusively found at low altitudes. Arid landscapes are characterized by a lack of precipitation and high rates of evaporation, which can occur at any elevation depending on the climatic conditions of the region. Some examples of arid landforms include deserts, canyons, and mesas, which can be found at both high

and low elevations. **Hence option b is incorrect**

- Marine landforms are generally associated with water bodies, it's not entirely accurate to say that arid landforms are completely devoid of water. Arid regions can still have water bodies, such as oases, rivers, and occasional rainfall events that result in temporary lakes or streams. **Hence option c is incorrect**
- Marine landforms are formed by the action of water, waves, and currents, while arid landforms are formed by the action of wind and occasional rainfall. **Hence option d is correct**

Q.39) Consider the following statements

1. Lake Baikal is the deepest lake in the world
2. The Caspian Sea is the largest lake in the world
3. Lake Victoria is the largest lake in South America
4. Lake Titicaca is the highest navigable lake in the world

Which of the statements given above is/are correct?

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

Q.39) Solution (d)

Explanation:

- Lake Baikal, located in Russia, holds approximately 20% of the world's fresh water and is the deepest lake in the world. **Hence Statement 1 is correct**
- The Caspian Sea is technically a lake, with an area of 143,000 square miles, making it the largest lake in the world by both surface area and volume. **Hence Statement 2 is correct**
- Lake Victoria, located in East Africa, covers an area of approximately 26,590 square miles and is the largest lake in Africa and the second-largest freshwater lake in the world after Lake Superior. **Hence Statement 3 is incorrect**
- Lake Titicaca, located in the Andes Mountains on the border of Peru and Bolivia, is the highest navigable lake in the world at an altitude of 3,812 meters. **Hence Statement 4 is correct.**

Q.40) Which of the following statements about the plateaus of India are correct?

1. The Deccan Plateau is the largest plateau in India and is composed mainly of lava flows.
2. The Chota Nagpur Plateau is rich in minerals such as coal, iron, and mica.
3. The Malwa Plateau is a volcanic plateau formed by the eruption of ancient volcanoes.
4. The Western Ghats is a low-lying plain in India that is not considered a plateau.

5. The Aravalli Range is a plateau located in the central part of India.

Which of the statements given above is/are correct?

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

Q.40) Solution (c)

Explanation:

- The Deccan Plateau is the largest plateau in India and is primarily composed of volcanic rocks and lava flows. **Hence Statement 1 is correct**
- The Chota Nagpur Plateau is a mineral-rich plateau located in eastern India and is known for its abundance of coal, iron, mica, and other minerals. **Hence Statement 2 is correct**
- The Malwa Plateau is a volcanic plateau formed by the eruption of ancient volcanoes. **Hence Statement 3 is correct**
- The Western Ghats is not a plain, but rather a mountain range that runs parallel to the western coast of India. **Hence Statement 4 is incorrect**
- The Aravalli Range is not a plateau, but rather a range of mountains located in western India. **Hence Statement 5 is incorrect**

Q. 41) Consider the following statements

1. Carbon dioxide is transparent to incoming solar radiation but opaque to outgoing terrestrial radiation.
2. The earth receives most of its energy in long wavelengths

Choose the correct code:

a) Only 1
b) Only 2
c) Both 1 and 2
d) Neither 1 nor 2

Q.41) Solution (a)

Explanation

- Carbon dioxide is transparent to incoming solar radiation but opaque to outgoing terrestrial radiation. This means it allows the heat from the Sun to reach the earth's surface while the heat radiated by the earth's surface is trapped inside itself. CO_2 absorbs some part of the terrestrial radiation and some part is reflected back to earth's

surface. This is the property which makes CO2 a greenhouse. Greater the CO2 content, greater will be the warming up of the atmosphere. **Hence, statement 1 is correct**.

- The Earth receives most of its energy from the Sun in the form of short wavelengths, primarily in the visible and ultraviolet regions of the electromagnetic spectrum. This energy is then absorbed by the Earth's surface and re-emitted as long-wavelength infrared radiation, which is partly trapped by the atmosphere, contributing to the greenhouse effect and keeping the Earth's surface warm enough to support life. **Hence, statement 2 is incorrect**.

Q.42) With respect to the differential heating of the different atmospheric layers, consider the following statements:

1. Troposphere heats up mostly because of terrestrial radiations.
2. Stratosphere heats up because of the interaction between oxygen and UV rays
3. Mesosphere experiences a drop in temperature with height despite greater exposure to UV rays.
4. Oxygen is the limiting factor that leads to the variation in temperature in Stratosphere and Mesosphere.

Choose the correct code:

a) Only one statement is correct
b) Two statements are correct
c) Three statements are correct
d) Four statements are correct

Q.42) Solution (d)

Explanation

- The troposphere gets some of its heat directly from the Sun but mostly, it heats up because of terrestrial radiations. These terrestrial radiations are trapped by various gases in the troposphere. So, statement 1 is correct.
- In the stratosphere, ozone molecules absorb high-energy ultraviolet (UV) light from the Sun and transform it into heat. The continuous interaction between oxygen and UV rays leads to production of Ozone molecule which again dissociates and releases heat. This reaction is possible because oxygen is present in significant amount in this layer. The temperature in the stratosphere increases with height. Thus statement 2 is correct.
- Mesosphere experiences a drop in temperature with height despite greater exposure to UV rays because the oxygen at this level is negligible for any meaningful production of ozone. And without ozone, the UV rays cannot be converted to heat. So, the layer experiences the highest temperature at Stratopause and then the temperature reduces with height. So, statement 3 is correct.

- From the above explanation, it is clear that oxygen is the limiting factor that leads to the variation in temperature in Stratosphere and Mesosphere. Statement 4 is correct.

Q 43.) Arrange the following regions based on the amount of insolation received starting from the highest to the lowest:

1. Equator
2. Tropical areas
3. Subtropical desert
4. Temperate region

Choose the correct code:

a) 1-2-3-4
b) 2-3-1-4
c) 3-2-1-4
d) 3-1-2-4

Q.43) Solution (c)

Explanation

Maximum insolation is received over the subtropical deserts, where the cloudiness is the least. Equator receives comparatively less insolation than the tropics.

- **Subtropical desert regions, such as the Sahara in Africa and the Arabian Desert in the Middle East, receive the highest amount of insolation because they are located in areas of high atmospheric pressure where cloud cover is minimal. The high atmospheric pressure causes air to sink and warm up, leading to clear skies and high temperatures. As a result, these regions receive the highest amount of insolation per unit area per unit time.**
- **Tropical areas, such as the Amazon rainforest in South America and the Congo Basin in Africa, receive the second-highest amount of insolation because they are also located near the equator and experience almost perpendicular incidence of the sun's rays. However, tropical regions typically have more cloud cover than subtropical deserts, which results in a lower amount of insolation.**
- **Equator have highest cloud covers and daily rainfall , this reduces the overall insolation even though it is located more favourably to receiver insolation. This is majorly due to low atmospheric conditions due to convectional heating**
- **The temperate regions, such as the United States and Europe, receive the lowest amount of insolation because they are located far from the equator and experience oblique incidence of the sun's rays. The angle of incidence causes the sunlight to be spread over a larger area, resulting in a lower amount of insolation per unit area per unit time. Additionally, temperate regions tend to have more cloud cover and variable weather patterns, further reducing the amount of insolation.**

Q.44) The places at Higher elevation record lower temperature than places at sea level because of:

a) Standard Lapse Rate (SLR).
b) Adiabatic Lapse Rate
c) Moderation effect of the sea
d) Inversion of temperature

Q.44) Solution (b)

Explanation

- The As air rises in the atmosphere, it expands and cools adiabatically due to the decrease in air pressure. This results in a decrease in temperature with increasing altitude, and this is known as the adiabatic lapse rate. The adiabatic lapse rate is generally around 6.5°C per kilometer in the troposphere, which is the lowest layer of the atmosphere where we live and weather occurs. **Hence b is correct**
- The Standard Lapse Rate (SLR) is a hypothetical rate of temperature decrease with increasing altitude, assuming dry air and constant atmospheric pressure. It is not the reason for the temperature decrease at higher elevations, but rather a reference value used to calculate temperature variations with altitude. **Hence a is incorrect**
- The moderation effect of the sea (option c) is a phenomenon where the ocean acts as a temperature moderator, keeping coastal areas cooler in summer and warmer in winter compared to inland areas. This effect is due to the high heat capacity of water, which allows it to absorb and release heat more slowly than land. However, it is not relevant to the temperature differences between higher elevations and sea level. **Hence c is incorrect**
- An inversion of temperature (option d) is a situation where the normal decrease in temperature with altitude is reversed, and the temperature increases with height. This can occur when a layer of warm air lies above a layer of cooler air near the surface. However, this phenomenon is not relevant to the question at hand, which is why higher elevations have lower temperatures than places at sea level. **Hence d is incorrect**

Q.45) Consider the following statements with reference to the incoming solar radiation:

1. The insolation received by the earth is more at the aphelion than at the perihelion.
2. During winters in the Northern Hemisphere, the isotherms deviate to the North over Oceans and to the South over continents.

Which of the statements given above is/are correct?

a) Only 1
b) Only 2
c) Both 1 and 2
d) Neither 1 nor 2

Q.45) Solution (b)

Explanation

- One of the factor's affecting insolation is the variations in the distance between the earth and the sun. During its revolution around the sun, the earth is farthest from the sun on 4th July and this is called aphelion. On 3rd January, the earth is the nearest to the sun and this position is called the perihelion. Insolation received during perihelion will be slightly greater than during aphelion. Thus, **statement 1 is incorrect.**
- In January i.e., winters in the Northern Hemisphere, the isotherms deviate to the north over the ocean and to the south over the continent. This can be seen on the North Atlantic Ocean. The presence of warm ocean currents, Gulf Stream and North Atlantic drift, make the Northern Atlantic Ocean warmer and the isotherms bend towards the north. Over the land the temperature decreases sharply and the isotherms bend towards south. Thus**, statement 2 is correct.**

Q.46) Consider the following statements:

1. A long winter night with clear skies and still air is an ideal condition for temperature inversion.
2. Dense fogs in winter mornings are caused due to temperature inversion.
3. Temperature inversion happens throughout the year in polar areas.

Which of the above statements is/are correct?

a) Only 1 and 2
b) Only 2 and 3
c) Only 1 and 3
d) 1, 2 and 3

Q.46) Solution (d)

Explanation

- Normally, temperature decreases with increase in elevation. It is called the Normal Lapse Rate. But sometimes, the situation is reversed and the temperature decreases with increase in elevation. It is called Inversion of temperature.
- A long winter night with clear skies and still air is an ideal situation for inversion. The heat of the day is radiated off during the night, and by early morning hours, the earth is cooler than the air above. **Statement 1 is correct.**
- Dense fogs during winter mornings are common occurrences. **Statement 2 is correct**. Smoke and dust particles get collected beneath the inversion layer and spread horizontally to fill the lower strata of the atmosphere.
- Inversion is usually of short duration but quite common nonetheless. Over polar areas, temperature inversion is normal throughout the year. **Statement 3 is correct.**

Q.47) What is 'air drainage'?

a) Air pockets flowing along with the ocean currents
b) Air pockets being lifted up due to convectional winds
c) Air pockets moving down hills and mountains under the influence of gravity.
d) Air pockets draining the stratosphere due to stratospheric clouds

Q.47) Solution (c)

Explanation

- Air drainage refers to the process of cold and dense air flowing downhill or from higher elevations to lower elevations under the influence of gravity. This occurs because cold air is denser than warm air, and therefore it tends to sink to lower elevations. The process of air drainage is also known as cold-air drainage or katabatic winds.**Hence option c is correct**
- **Option (a)** is incorrect because air pockets do not flow along with ocean currents, but rather they can be transported by wind patterns in the atmosphere.
- **Option (b)** is incorrect because convectional winds typically lift air pockets upwards rather than causing them to drain downhill.
- **Option (d)** is also incorrect as stratospheric clouds do not drain air pockets from the stratosphere.

Q.48) Which of the following factors affect the formation of Pressure Belts?

1. Insolation
2. Rotation of Earth
3. Jet Streams in upper troposphere
4. Seasonal variations

Select the correct answer using the code given below:

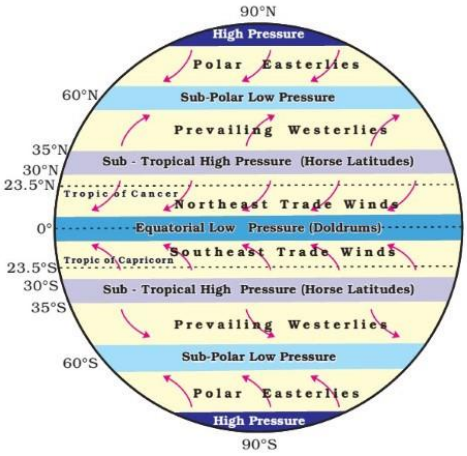
a) Only 1, 2 and 3
b) Only 1 and 2
c) Only 1, 3 and 4
d) 1, 2, 3 and 4

Q.48) Solution (d)

Explanation

- The pressure belts of the Earth are layers of high and low air pressure spectrums encompassing the Earth.
- Insolation is the primary factor that drives formation of pressure belts. At the equator, high insolation leads to thermal expansion of air. This forms a low-pressure belt at equator. The air then ascends in this region. Low insolation and thermal contraction of air is the reason for high pressure at the poles.
- Rotation of Earth leads to deflection of winds, resulting in a decrease in pressure. This leads to formation of low-pressure belts in the subpolar regions and of high-pressure belts in the subtropical regions.

- Jet Streams- These Jet Streams are responsible for pushing the air downwards and formation of the high-pressure belt in the sub-tropics.
- Season variations caused by apparent movement of the Sun leads to variations in these belts. In the northern hemisphere, they move southwards in winter and northwards in summer.



Major Pressure Belts and Wind System

Q.49) Consider the following statements:

1. The pressure gradient is strong where the isobars are close to each other.
2. Coriolis force acts parallel to the Pressure Gradient force.

Select the correct answer using the codes given below:

a) Only 1
b) Only 2
c) Both 1 and 2
d) Neither 1 nor 2

Q.49) Solution (a)

Explanation

- The velocity and direction of the wind respond to the combined effect of three forces – the pressure gradient force, the frictional force, and the Coriolis 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. Hence, **Statement 1 is correct.**
- The Coriolis force acts perpendicular to the pressure gradient force. At the equator, the Coriolis force is zero. **Hence, statement 2 is incorrect**.

Q.50) Match the following

Name of local winds	Location

1.	Sirocco	i	Central Asia
2.	Shamal	ii	Africa
3.	Norte	iii	North America
4.	Karaburan	iv	Middle East

Select the correct answer from the codes given below:

a) 1- i; 2- iii; 3- ii; 4- iv
b) 1- iii ; 2-iv; 3-ii; 4-i
c) 1-ii; 2-iv; 3-iii; 4-i
d) 1- iv; 2- ii; 3- iii; 4-i

Q.50) Solution (c)

Explanation

Q.51) Consider the following statements about Jet Streams:

1. Jet Streams occur in the Northern Hemisphere only.
2. Jet Streams are the result of interaction between air masses.
3. Jet Streams create cyclonic conditions in the Northern Hemisphere and anti-cyclonic conditions in the Southern Hemisphere.

Select the correct code

a) Only 1 statement is correct
b) Only 2 statements are correct
c) All statements are correct
d) None of the statements are correct

Q.51) Solution (a)

Explanation

- Jet streams are relatively narrow bands of strong wind in the upper levels of the atmosphere. The winds blow from west to east in jet streams. The flow often shifts seasonally to north and south. They are present in both hemispheres. Hence, **Statement 1 is incorrect.**
- The 50°-60° N/S region has the polar jet stream while the subtropical jet is located around 30°N.
- Jet streams follow the boundaries between hot and cold air masses. Since these hot and cold air boundaries are most pronounced in winter, jet streams are the strongest for both the northern and southern hemisphere winters. **Hence, statement 2 is correct.**
- During the winter, thermal contrast increases, as does the intensity of the high-pressure centre at the pole. It accelerates the formation of Jet Streams, as well as their extension and velocity.
- Troughs create upper-level divergence which is associated with convergence at the surface (low pressure – cyclonic conditions) and ridges create upper-level convergence which is associated with divergence at the surface (high pressure – anti-cyclonic conditions) i.e., **Cyclonic flow at trough and anti-cyclonic at crest/ridge.** So, cyclonic and anti-cyclonic conditions are present in every jet stream in both hemispheres. So, **statement 3 is incorrect.**

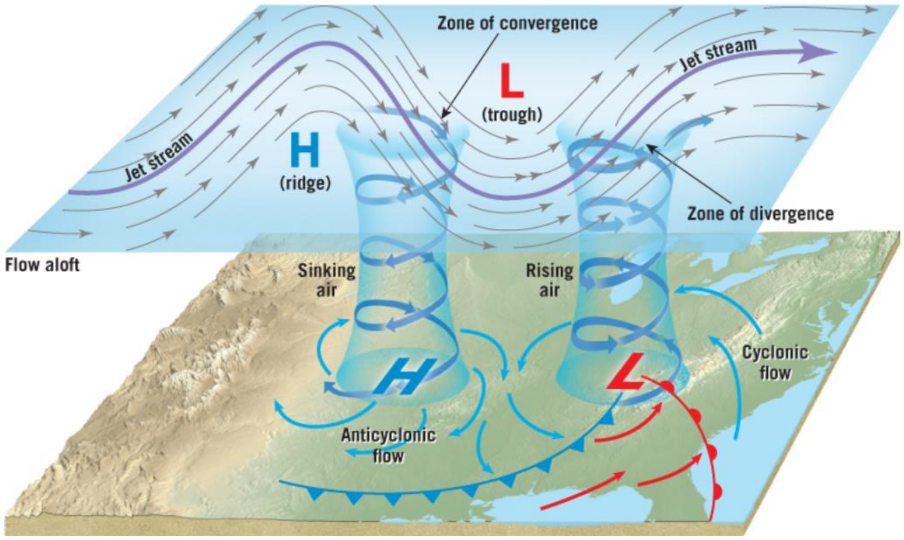


Figure 9.14 Idealized view of divergence and convergence aloft that supports cyclonic and anticyclonic circulation at the surface

Q.52) Consider the following with respect to Rossby waves:

1. Rossby waves are phenomenon is observed in both atmosphere and oceans.
2. Rossby waves cause the cyclonic and anti-cyclonic circulation seen near jet streams.
3. Rossby waves are caused due to rotation of the Earth.

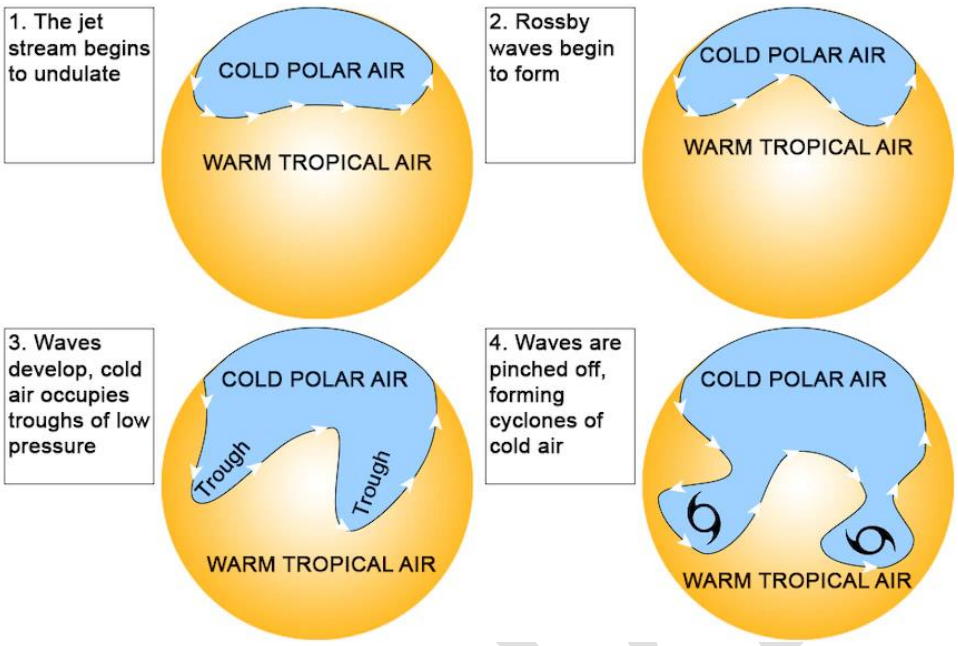
How many of the above statements is/are correct?

a) Only 1 statement is correct
b) Only 2 statements are correct
c) All statements are correct
d) None of the statements are correct

Q.52) Solution (c)

Explanation

- Rossby Waves are massive meanders in the atmosphere, also referred to as planetary waves, which have a significant impact on the weather.
- Rossby waves are natural phenomenon in the **atmosphere and oceans** due to **rotation of earth**. Thus, **Statement 1 and 3 are correct.**
- They bring the atmosphere back into equilibrium by transporting heat from the tropics toward the poles and cold air from poles toward the tropics.
- They split at times and form eddies. These become the cyclonic and anti-cyclonic circulation seen near jet streams. Thus**, Statement 2 is correct.**



Q.53) Consider the following with respect to Easterly and Westerly Jet Streams

1. Easterly jet stream is seasonal while westerly jet stream is present throughout the year.
2. The Easterly Jet Stream is present only in the Northern Hemisphere.
3. The easterly jet stream shifts southward during the southwest monsoon period.

Which of the above statements is/are correct?

a) Only 1 and 2
b) Only 2 and 3
c) Only 1 and 3
d) 1, 2 and 3

Q.53) Solution (a)

Explanation

- **Westerly jet streams -** They move in the upper troposphere to the north of the subtropical high-pressure belt in both the hemisphere that is above 30 degrees to 35-degree latitude. Their circulation is from west to east and is more regular than the polar front jet stream. It flows through most of the year and is produced by the rotation of the earth. It creates the high-pressure zone in the mid-latitudes by pushing air down.
- **The Tropical Easterly Jet Stream is a seasonal Jet Stream, unlike the Westerlies which are permanent.** So, **Statement 1 is correct**.
- **The Tropical Easterly Jet Stream is found in the northern hemisphere in summer** over southern Asia and northern Africa between 5° and 20°N. It flows from east to west over peninsular India at 6 – 9 km and over the Northern African region. Hence, **Statement 2 is correct.**

- The easterly jet stream steers the tropical depressions into India. These depressions play a significant role in the distribution of monsoon rainfall over the Indian subcontinent.
- In India, the **influence of the easterly jet stream starts in June over the Southern part.** In August, it is confined to 15°N latitude, and in September up to 22° N latitude. Hence, the influence of the easterly jet stream keeps increasing towards the north during the southwest monsoon period. So, **Statement 3 is incorrect.**

Q.54) Which of the following can be seen as an impact of jet streams?

1. Distribution of Monsoon
2. Cyclones and Anticyclones
3. Clouds in stratosphere
4. Dryness in certain areas

Select the correct answer from the codes given below:

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

Q.54) Solution (d)

Explanation

Jet streams severely affect weather conditions. Jet Streams can have any of the following impact on weather of a region:

i. They substantially contribute to **formation of cyclones, anticyclones,** storms, and depressions and influence their behaviour. The cyclones intensify when the jet streams are positioned above them.
ii. Recently, it has been proposed that gravity waves emitted from **highly unbalanced jet streams at the tropopause level** can also lead to significant mesoscale cooling in the Arctic middle stratosphere leading to formation of polar stratospheric clouds (PSCs).
iii. The **easterly jet stream** steers the tropical depressions into India. These depressions play a significant **role in the distribution of monsoon rainfall** over the Indian subcontinent.
iv. The **high-pressure condition** induced by the jet stream can lead to **dryness** in certain areas.

Q. 55) These are black or dark grey clouds present very near to the surface of the earth. These are extremely dense and opaque to the rays of the sun. Sometimes, the clouds are so low that they seem to touch the ground. They are treated as shapeless masses of thick vapour.

Which of the following types of clouds is described in the above passage?

a) Cirrus
b) Cumulus
c) Nimbus
d) Stratus

Q.55) Solution (c)

Explanation

- **Cumulus**: This is a vertical cloud with a rounded top and horizontal base, typical of humid tropical regions, associated with up-rising convectional currents. Its great white globular masses may look grey against the sun but it is a fair-weather cloud.
- **Cirrus:** This looks fibrous like cotton wool in the blue sky. They exist in patches and can be seen scattered here and there and have a flat base. It indicates fair weather and often gives a brilliant sunset.
- **Nimbus:** It is also known as a 'rain cloud'. It brings continuous rain, snow or sleet. In case of cumulonimbus, its black and white globular masses can be seen in a range of shapes and is frequently seen in tropical afternoons. When its cauliflower top spreads out like an anvil, it is also referred to as a 'thunder-cloud' and brings convectional rain, accompanied by lightning and thunder.
- **Stratus:** These are layered clouds covering large portions of the sky. These clouds are generally formed either due to loss of heat or the mixing of air masses with different temperatures.

Q.56) Consider the following statements:

1. Photochemical smog is observed due to pollution in urban areas during winters.
2. Inversion of temperature is a prerequisite for photochemical smog formation.

Which of the above statements is/are correct?

a) Only 1
b) Only 2
c) Both 1 and 2
d) Neither 1 nor 2

Q.56) Solution (d)

Explanation

- Photochemical smog, also known as summer smog, is a type of smog that is produced when **solar UV radiations interacts with the pollutants present in the atmosphere.** It usually manifests as a brown haze.
- It **requires neither smoke nor fog** and thus is **not related to inversion of atmospheric temperature.** It is simply because of high concentration of certain pollutants present in the urban atmosphere interacting with sunlight. Hence, **statement 2 is incorrect.**

- Common examples of **primary pollutants** include **oxides of nitrogen** and **most VOCs** (volatile organic compounds).
- Common examples of **secondary pollutants** include **tropospheric ozone**, and peroxyacyl nitrates (often abbreviated to PAN). Ozone in the stratosphere protects us from harmful ultraviolet radiation but it is detrimental to human health when it is present on the ground level.
- It is most commonly seen in highly populated cities placed in **relatively warm climates**. Furthermore, photochemical smog is most prominently visible **during the mornings and afternoons.** Thus, **statement 1 is incorrect.**

Q. 57) Consider the following statements:

1. Tropical cyclones cannot originate over land.
2. Presence of Coriolis force and large variations in the vertical wind speed are essential conditions for tropical cyclones to exist.
3. The cyclones near equator are more destructive than those which cross 20°N latitude due to availability of more warm oceanic surfaces near equator.

Select the correct answer from the codes given below:

a) Only 1 statement is correct
b) Only 2 statements are correct
c) All 3 statements are correct
d) None of the statements are correct

Q. 57) Solution (a)

Explanation

- Tropical cyclones originate and intensify over warm tropical oceans. Large sea surface with temperature higher than 27° C is a prerequisite for cyclone formation. Thus, cyclones cannot originate over land. Thus, **Statement 1 is correct.**
- Coriolis force causes circular motion of air & prevents all the air from rushing into the low-pressure centre. This helps formation of cyclone. At the equator, Coriolis force is negligible and hence cyclones do not form there.
- The variations in vertical wind speed must be minimum for the cyclone to survive. So, **statement 2 is incorrect.**
- The cyclones, which cross 20°N latitude generally, recurve and they are more destructive. Near the equator, the cyclones are less destructive as they have just started acquiring the energy and are still growing. So, **Statement 3 is correct.**

Q. 58) The formation of cyclones is lesser during southwest monsoon. Why?

a) The temperature of oceanic surface reduces post monsoon rainfall.
b) The ITCZ having shifted northwards hinders cyclone formation
c) Strong vertical wind shear due to easterly jet stream.
d) Lack of divergence of air in upper troposphere.

Q.58) Solution (c)

Explanation

- The southwest monsoon is characterized by the presence of strong easterly winds in the upper troposphere (above 9 km). This results in large vertical wind shear. **Strong vertical wind shear inhibits cyclone development during monsoons.**
- During this season, the low-pressure systems up to the intensity of depressions can form along the monsoon trough (ITCZ), which extends from northwest India to the north Bay of Bengal. These systems make landfall very quickly which is also one of the reasons for their non-intensification into intense cyclones.
- As per recent studies, Ocean warming is increasing the chances of cyclone formation in the Indian seas, close to the monsoon onset and withdrawal periods.

Q.59) In climatology, 'Blocking Highs' are used to refer to:

a) Mountains that cause orographic rainfall
b) Very slow moving anti-cyclones
c) Severe cyclones in higher latitudes
d) Stratospheric clouds that block the formation of ozone

Q.59) Solution (b)

Explanation

- Anti-cyclones are high pressure systems. Areas of high pressure can sometimes be very slow moving, almost stationary. Such a region of slow-moving air can prevent other, faster moving pressure systems from moving into a region. They are known as **'blocking highs' or blocking anticyclones because they obstruct the flow of temperate cyclones in mid-latitudes.**
- The region beneath a blocking high often experiences the same kind of weather for a long period (several weeks) and can also lead to prolonged droughts.
  In Europe, for example, blocking highs over Western, Russia, Eastern Europe and Scandinavia have caused long, severe winters.
- In Anti-cyclones, air blows outwards in a **clockwise direction in the Northern hemisphere** and anticlockwise direction in the southern hemisphere.

Q. 60) Consider the following statements:

1. Extra tropical cyclone starts with front formation, whereas tropical cyclones get their energy from warm oceans.
2. Extra tropical cyclones are speedier than tropical cyclones.

Which of the above statements are correct?

a) Only 1
b) Only 2
c) Both 1 and 2

d) Neither 1 nor 2

Q.60) Solution (a)

Explanation

- **Extra-tropical cyclone**, also known as wave cyclone or mid-latitude cyclone, is a type of storm system formed in middle or high latitudes, in regions of large horizontal temperature variations called **frontal zones. Tropical cyclones form over warm oceans. Hence, statement 1 is correct.**
- When the pressure drops along the front, the warm air moves northwards and the cold air move towards the south setting in motion an anti-clockwise cyclonic circulation. The cyclonic circulation leads to a well-developed extra-tropical cyclone, with a warm front and a cold front.
- Extra-tropical cyclones usually move in the **west to east direction in the Northern hemisphere.**
- Pattern of wind direction in extra-tropical cyclones is **anti-clockwise in the northern hemisphere.**
- They **cover a larger area** and can **originate over the land and sea**.
- The **wind velocity in a tropical cyclone is much higher** and it is more destructive. Thus, **statement 2 is incorrect.**

Q.61) Which of the following is NOT a type of drainage pattern?

a) Dendritic
b) Radial
c) Trellis
d) Perennial

Q.61) Solution (d)

Explanation:

- A dendritic drainage pattern looks like the branches of a tree, with small tributaries flowing into larger rivers.
- A radial drainage pattern flows outwards from a central point, like spokes on a wheel.
- A trellis drainage pattern has smaller tributaries flowing into larger parallel streams.
- A rectangular drainage pattern has streams that flow in a straight line, meeting at right angles.
- "Perennial" refers to the longevity of a stream, meaning it flows year-round. However, it is not a type of drainage pattern. **Hence Option d is correct answer**

Q.62) With reference to the Indian drainage system, consider the following statements:

1. More than 75% of the discharge of Indian rivers is oriented towards the Bay of Bengal.

2. A basin with catchment area of less than 2000 sq.km. is classified as a medium river basin.

Which of the above statements is/are correct?

a) Only 1
b) Only 2
c) Both 1 and 2
d) Neither 1 nor 2

Q.62) Solution (a)

Explanation:

- On the basis of discharge of water (orientations to the sea), it may be grouped into: (i) the Arabian Sea drainage; and (ii) the Bay of Bengal drainage.
  They are separated from each other through the Delhi ridge, the Aravalli and the Sahyadri
    - Nearly **77% of the drainage area** consisting of the Ganga, the Brahmaputra, the Mahanadi, the Krishna, etc. is **oriented towards the Bay of Bengal** while 23 per cent comprising the Indus, the Narmada, the Tapi, the Mahi and the Periyar systems discharge their waters in the Arabian Sea. Thus, **statement 1 is correct**.
- On the basis of the size of the watershed, the drainage basins of India are grouped into three categories:
    - Major river basins with more than 20,000 sq. km of catchment area. It includes 14 drainage basins such as the Ganga, the Brahmaputra, the Krishna, the Tapi, the Narmada, the Mahi, the Pennar, the Sabarmati, the Barak, etc.
    - Medium river basins with catchment area between 2,000-20,000 sq. km incorporating 44 river basins such as the Kalindi, the Periyar, the Meghna, etc.
    - **River basins with catchment area of less than 2,000 sq. km are termed as Minor River basins**. Thus, **statement 2 is incorrect**.

Q.63) With reference to the course of a river, consider the following statements:

1. Knick point is the point where the old and rejuvenated profile of a river meets.
2. A river gets rejuvenated when there is a subsidence of land or a rise in sea level.

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.63) Solution (a)

Explanation:

- **River Rejuvenation:**
  A knickpoint is a location on a river where there is a sharp change in the river's slope or gradient. It often marks the boundary between an upper reach with a steep gradient and a lower reach with a gentler gradient. The knickpoint represents a change in the river's erosion capability, and it is the point where the old, steep profile of the river meets the new, gentler profile. **Hence statement 1 is correct.**
- A river gets rejuvenated when there is an uplift of land or a drop in sea level. This uplift or drop exposes the river to new rock layers that are more easily eroded, leading to a change in the river's profile and the creation of a knickpoint. A drop in sea level can also cause a river to cut deeper into its channel and create a knickpoint. **Hence statement 2 is incorrect.**

Q.64) Consider the following statements with respect to difference between meanders over plains and Incised meanders:

1. Incised meanders are a feature of a river in its youth stage.
2. Incised meanders are formed due to vertical erosion, while meanders over flood and delta plains are because of lateral erosion.
3. Meanders, whether over plains or incised, lead to frequent shift of course of river.

Which of the above statements is/are correct?

a) 1 and 3 only
b) 2 and 3 only
c) 1 and 2 only
d) 1, 2 and 3

Q.64) Solution (c)

Explanation:

- **Meander** is not a landform but is only a type of channel pattern. It is usually found in the **mature or old phase** of the course of rivers.
- When the gradient of the channel becomes extremely low i.e., while flowing **on plains**, **water flows leisurely and starts working laterally**. Normally, in **meanders** of large rivers, there is active deposition along the concave bank and undercutting along the convex bank.
- But very deep and wide meanders can also be found cut in hard rocks. Such meanders are called incised or entrenched meanders. They are formed as a result of vertical erosion of river bed. Thus, **statement 2 is correct**.
- **Incised meanders are present at the youth stage.** It leads to formation of gorges and canyons in hard rocky areas over time. Thus, **statement 1 is correct.**
- In India, Jhelum River shows presence of incised meanders.
- Over the plains, rivers display a strong meandering tendency and shift their courses frequently but the incised meanders cut vertically and hence maintain their course to a large extent. **Statement 3 is incorrect.**

Q.65) Which of the following statements are correct about an antecedent river system?

1. Antecedent rivers flow across uplifted land masses without being diverted by the rising terrain.
2. Antecedent rivers have a alluvial fans in their mature stage.
3. Antecedent rivers originate from underground springs.
4. Antecedent rivers have steep gradients and narrow valleys.

Select the correct answer from the codes given below:

a) Only 1 statement is correct
b) Only 2 statements are correct
c) Only 3 statements are correct
d) All Four Statements are correct

Q.65) Solution (b)

Explanation:

- Antecedent rivers are rivers that existed before the present topography of a region was formed. As a result, they flow across uplifted land masses without being diverted or deflected by the rising terrain. They follow the original slope of the landform over which they flow. **Statement 1 is correct.**
- Antecedent rivers do not necessarily have alluvial fans in their mature stage. Alluvial fans are formed at the base of a mountain range where a river emerges from a steep canyon or gorge onto a flatter plain. Antecedent rivers can have any drainage pattern depending on the topography and the stage of the river. **Statement 2 is incorrect.**
- Antecedent rivers do not necessarily originate from underground springs. They can originate from any source, just like any other river. **Statement 3 is incorrect.**
- Antecedent rivers have features of youthful rivers because they retain their original course and characteristics even as the landscape around them changes. They often have steep gradients, high erosive power, and narrow valleys. Example: The Sindhu, Satluj, Arun Kosi and Brahmaputra are some of the antecedent rivers. **Statement 4 is correct.**

Q.66) Match the following pairs correctly:

Sr.no.	Drainage pattern	Characteristic
1.	Dendritic	Tree-branch like flow pattern found in plains
2.	Radial	The river discharges all of its water into a lake or depression.
3.	Trellis	The tributaries initially flow parallelly and later join at right angles.

Select the correct answer from the codes given below:

a) Only 1 pair is correctly matched
b) Only 2 pairs are correctly matched
c) All 3 pairs are correctly matched

d) None of the pairs are correctly matched.

Q.66) Solution (b)

Explanation:

- The flow of water through well-defined channels is known as 'drainage' and the network of such channels is called a 'drainage system'. The drainage pattern of an area is the outcome of the geological time period, nature and structure of rocks, topography, slope, amount of water flowing and the periodicity of the flow.
- Types of Drainage Patterns:
  - **I. Dendritic Drainage Pattern:**
    - The drainage pattern resembling the **branches of a tree** is known as "dendritic"
    - E.g. The rivers of the **northern plains**; Indus, Ganga and Brahmaputra. So, **Pair 1 is correctly matched.**
  - **II. Trellis Drainage Pattern:**
    - Such a pattern is formed when the **primary tributaries of main rivers flow parallel** to each other and **secondary tributaries join them at right angles.**
    - E.g. The rivers in the upper part of the Himalayan region; Indus and Brahmaputra. **So, Pair 3 is correct.**
  - **III. Rectangular Drainage Pattern:**
    - The tributary streams make sharp bends and enter the main stream at high angles.
    - E.g. Streams found in the Vindhya mountain range
  - **IV. Radial Drainage Pattern:**
    - When the rivers originate from a hill and flow in all directions, the drainage pattern is known as 'radial'.
    - E.g. The rivers originating from the Amarkantak range; Narmada and Son (tributary of Ganga). So, **Pair 2 is incorrect.**
  - **V. Centripetal Drainage Pattern:**
    - When the rivers discharge their waters from all directions in a lake or depression, the pattern is known as 'centripetal'.
    - E.g. Loktak Lake, Manipur

Q.67) Which of the following rivers are antecedent rivers?

1. Indus
2. Ganga
3. Godavari
4. Subansiri
5. Narmada

Select the correct answer from the codes given below:

a) Only 1, 2, 4 and 5

b) Only 1 and 4
c) Only 1, 2 and 4
d) All of them

Q.67) Solution (c)

Explanation:

- The Rivers that existed before the upheaval of the Himalayas and cut their courses southward by making gorges in the mountains are known as the antecedent rivers.
- **The Indus, Satluj, Ganga, Sarju (Kali), Arun (a tributary of Kosi), Tista and Brahmaputra are some of the important antecedent rivers, originating from beyond the Greater Himalayas.**
- The **Subansiri** which has its origin in Tibet, is an also **antecedent river.**
- **Godavari** is a **consequent river** i.e. it originated after the geological strata over which it flows.
- **Narmada** river flows in a rift valley and is **not an antecedent river.**
- **Hence Option c is correct**

Q. 68) With reference to a particular river in India, consider the following statements:

1. It is a west-flowing river.
2. It originates in the Vindhyas and drains into the Gulf of Khambhat
3. It crosses the Tropic of Cancer twice.

Which of the following rivers has been described in the statements given above?

a) Tapi
b) Narmada
c) Sabarmati
d) Mahi

Q.68) Solution (d)

Explanation:

- Mahi is one of the **major inter-state west flowing rivers** of India.
- The Mahi basin extends over states of Madhya Pradesh, Rajasthan and Gujarat.
- It is bounded by Aravalli hills on the north and the north-west, by Malwa Plateau on the east, by the Vindhyas on the south and by the Gulf of Khambhat on the west.
- **Mahi River is the only river in India that cuts the Tropic of Cancer twice**, first in Madhya Pradesh from where it flows towards Rajasthan and enters Gujarat.
- It **originates from the northern slopes of Vindhyas** in Dhar district of Madhya Pradesh and **drains into the Arabian Sea through the Gulf of Khambhat.**
- Hydro Power stations are located in Mahi Bajaj Sagar dam and at Kadana Dam.
- Vadodara is the important urban centre in the basin.

Q. 69) Consider the following rivers:

1. Brahmaputra
2. Cauvery
3. Mahanadi

Arrange the above rivers in the increasing order of catchment area (in India). Select the correct answer from the code given below:

a) 1-2-3
b) 3-2-1
c) 2-1-3
d) 2-3-1

Q.69) Solution (d)

Explanation:

- The correct increasing order of catchment areas of some major rivers in India is as follows:
  Cauvery < Narmada < **Mahanadi** < **Brahmaputra** < Krishna < Godavari < Indus < Ganga

Sl. No	Basin Code	Basin Name	Area(sq.km)
1	1	Indus (Up to border) Basin	453931.87
2	2a	Ganga Basin	808334.44
3	2b	Brahmaputra Basin	186421.6
4	2c	Barak and others Basin	45622.41
5	3	Godavari Basin	302063.93
6	4	Krishna Basin	254743.31
7	5	Cauvery Basin	85624.44
8	6	Subarnarekha Basin	25792.16
9	7	Brahmani and Baitarni Basin	51893.68
10	8	Mahanadi Basin	139659.15
11	9	Pennar Basin	54243.43
12	10	Mahi Basin	38336.8
13	11	Sabarmati Basin	30678.59
14	12	Narmada Basin	92670.51
15	13	Tapi Basin	63922.91

Q.70) Arrange the following tributaries of the river Yamuna from north to south according to the points where they join the river Yamuna:

1. Tons
2. Chambal
3. Hindon

4. Ken

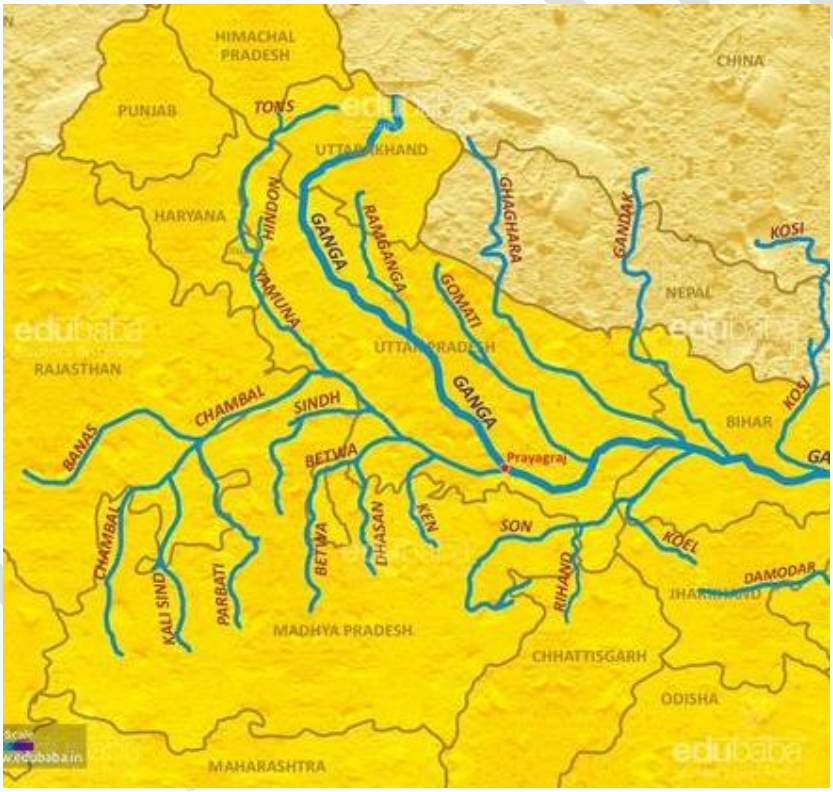
Select the correct answer using the code given below.

a) 1-3-2-4
b) 4-3-2-1
c) 3-1-4-2
d) 1-2-3-4

Q.70) Solution (a)

Explanation:

- **Tons River**: The Tons is the longest tributary of the Yamuna River and its flows through Garhwal, Uttarakhand. The river originates at an elevation of 3900 m and joins the Yamuna below Kalsi near Dehradun, Uttarakhand. It is one of the most major perennial Indian Himalayan rivers.



- **Giri River**: The river Giri is an important tributary of the Yamuna River. It is the main source of water in the South-Eastern Himachal Pradesh.
- **Hindon River**: Hindon River is an important tributary of Yamuna River. It has Ganga on the left and Yamuna on the right. Hindon originates from upper Shiwalik (Lower Himalayas). It is a purely rain fed river. This river has a total run of about 400 km.
- **Betwa River**: The Betwa River is a tributary of Yamuna River. The Betwa river originates in the Bhopal District in Madhya Pradesh. After traversing a distance of 590 km, the river joins the Yamuna River near Hamirpur. The basin is saucer shaped with sandstone hills around the perimeter. The Halali and Dhasan River are the important tributaries of the Betwa River.
- **Ken River**: Ken is an inter-state river, flowing through the state of Madhya Pradesh and Uttar Pradesh. The river originates near the village Ahirgawab in Jabalpur District of Madhya Pradesh and joins the Yamuna River, near Chilla village of U.P. The

important tributaries of the Ken River are Sonar, Bearma, Kopra, Bewas, etc, among others. The longest tributary is Sonar.

- **River Chambal:** The Chambal River is the largest of the rivers flowing through Rajasthan state. River Chambal, the biggest tributary of Yamuna rises in Vindhyan range near Mhow, Madhya Pradesh. Chambal basin is bound on north by the ridge separating it from Luni and Yamuna basins, on the south by Vindhyan range and on the west by Aravali range, on east lies the ridge separating it from Kunwari and Sind rivers of Yamuna basin. River Chambal forms a common boundary between Madhya Pradesh and Rajasthan.

Q. 71) Wainganga and Pranhita are tributaries of:

a) Godavari
b) Krishna
c) Narmada
d) Tapi

Q.71) Solution (a)

Explanation:

- The principal tributaries of the Godavari River are the Pravara, the Purna, the Manjra, the Penganga, the Wardha, the Wainganga, the Pranhita (combined flow of Wainganga, Penganga, Wardha), the Indravati and the Sabri.

Q.72) Which of the following rivers are the tributaries of the Brahmaputra River?

1. Subansiri
2. Manas
3. Teesta
4. Barak

Select the correct answer using the code given below.

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

Q.72) Solution (c)

Explanation:

- The Brahmaputra originates in the Chemayungdung glacier of the Kailash range near the Mansarovar lake. From here, it traverses eastward in a dry and flat region of southern Tibet, where it is known as the Tsangpo, which means 'the purifier.' The Rango Tsangpo is the major right-bank tributary of this river in Tibet.

- It emerges as a turbulent and dynamic river after carving out a deep gorge in the Central Himalayas near Namcha Barwa. The river emerges from the foothills under the name of Siang or Dihang. It enters India west of Sadiya town in Arunachal Pradesh. Flowing southwest, it receives its main left bank tributaries, viz., **Dibang** or Sikang and **Lohit;** thereafter, it is known as the Brahmaputra.
- The Brahmaputra receives numerous tributaries in the Assam valley. Its major left bank tributaries are the **Burhi Dihing** and **Dhansari** (South) whereas the important right bank tributaries are the **Subansiri, Kameng, Manas, and Sankosh**.
- The **Subansiri** which has its origin in Tibet is an antecedent river. The Brahmaputra enters Bangladesh near Dhubri and flows southward.
- **Teesta river:** Teesta River is a major right bank tributary of the Brahmaputra (known as Jamuna in Bangladesh), flowing through India and Bangladesh. It originates in the Himalayas in Sikkim and flows to the south through West Bengal before entering Bangladesh. The river joins the Brahmaputra in Bangladesh before it flows into the Bay of Bengal after meeting with the Ganges and the Meghna.
- **Hence, options 1, 2 and 3 are correct.**
- **Barak river**: Barak rises in the Manipur hills and enters the plains near Lakhipur, Assam. The river enters Bangladesh as Surma and Kushiyara. Later, the river is called the Meghna and receives the combined flow of the Ganga and Brahmaputra. The Barak sub-basin drains areas in India, Bangladesh and Burma. It is bound on the north by the Barail range separating it from the Brahmaputra sub-basin, on the east by the Lushai hills and on the south and west by Bangladesh. Hence, **option 4 is not correct**.

Q.73) With reference to the Monsoon winds of the Arabian Sea, consider the following statements:

1. Arabian Sea branch of the monsoon is much powerful than the Bay of Bengal branch.
2. These winds cause more rainfall on the eastern side of the Western Ghats than on the western side.
3. The rainfall by the Arabian Sea stream is characterized by a steady decline as we move from east to west.

Select the correct answer from the codes given below:

a) Only 1 statement is correct
b) Only 2 statements are correct
c) All 3 statements are correct.
d) None of the statements are correct.

Q.73) Solution (a)

Explanation:

- Monsoon winds beyond south Kerala progress in the form of two branches viz. the Arabian Sea branch and the Bay of Bengal branch.

- **Statement 1 is correct: Arabian Sea branch of the monsoon is much powerful than the Bay of Bengal branch** because:
    - The Arabian Sea is larger than the Bay of Bengal, and
    - The entire Arabian Sea current advances towards India, whereas only a part of the Bay of Bengal current enters India, the remainder proceeding to Myanmar, Thailand and Malaysia.
- The Arabian Sea branch of the southwest monsoons is divided into three distinct streams on arriving in the mainland of India.
    - The first stream strikes the west coast of India and causes heavy rainfall over western side of Western Ghats. Rainfall is drastically reduced to about 30-50 cm on the western side (leeward) side of the Ghats and it is seen as a narrow belt of marked aridity on the immediate leeward side of the Western Ghats. **Hence, statement 2 is incorrect.**
    - But once it is passed, the air starts rising again and the amount of rainfall increases further east.
    - The second stream enters Narmada—Tapi troughs (narrow rift valley) and reaches central India. It does not cause much rain due to the absence of major orographic obstacle across the rift. Some parts of central India receive rainfall from this stream (Ex: Nagpur).
    - The third stream moves parallel to the Aravali Range without causing much rainfall. However, some orographic effect occurs on the south-eastern edge of the Aravali Range leading to rainfall.
- The Bay of Bengal Branch of the southwest monsoon is divided into two distinct streams:
    - The first stream crosses the Ganga-Brahmaputra delta and reaches Meghalaya causing intense rainfall.
    - The second stream of the Bay of Bengal branch moves along Himalayan foothills as they are deflected to the west by the Himalaya and brings widespread rainfall to Ganga plain.
- **Statement 3 is incorrect: The rainfall by the Bay of Bengal stream (not the Arabian Sea Stream) of monsoon is characterized by a steady decline as we move from east to west in the plain** because:
    - The Bay of Bengal branch moves towards northeast and returns westwards covering the northern plains.
    - While they move towards west their moisture contains tends to reduce with subsequent rains. Hence the rainfall decreases from east to west in northern India.
- The Tamil Nadu coast remains relatively dry during the south-west monsoon period because of rain shadow effect of the Arabian Sea current and Bay of Bengal current which flows parallel to the coast.

Q.74) Consider the following statements with respect to Tibetan High:

1. Tibetan High is a warm anticyclone located in the upper troposphere during the monsoon period.

2. Greater the Tibetan High, stronger will be the monsoons in India.

Which of the statements given above is/are correct?

a) Only 1
b) Only 2
c) Both 1 and 2
d) Neither 1 nor 2

Q.74) Solution (c)

Explanation:

- Tibetan High is a warm anticyclone located over Tibetan Plateau in the middle/upper troposphere during the monsoon period. Hence**, statement 1 is correct.**
- The outflow of winds from this Tibetan High concentrate into jet stream. This becomes the Tropical Easterly Jetstream. This jet stream runs from the east coast of Vietnam to the west coast of Africa.
- This Jetstream then creates a low-pressure region in the upper troposphere over the Horn of Africa region. This leads to diversion of the Monsoon winds coming towards the Horn of Africa.
- Thus, in the upper troposphere,
  Greater the Tibetan High → Greater will be the low pressure over Horn of Africa→ Stronger will be the deflection of Monsoon winds → **Stronger will be the monsoons.**
  Thus, Statement 2 is correct.

Q.75) Consider the following statements regarding Pacific Decadal Oscillation (PDO):

1. Both El Niño and Positive Phase of PDO are similar in effect.
2. A positive PDO shows drought conditions in the eastern Pacific and good rainfall in the western Pacific.

Which of the statements given above is/are correct?

a) Only 1
b) Only 2
c) Both 1 and 2
d) Neither 1 nor 2

Q.75) Solution (a)

Explanation:

- The Pacific Decadal Oscillation (PDO) is often described as a long-lived El Niño-like pattern of Pacific climate variability. It is observed in the Northern Pacific Ocean.
- Its fluctuation is observed approximately every 20 to 30 years.
- PDO has two phases:

- **Positive phase**: Warm water accumulates near Eastern Pacific. This causes **rainfall in the western coast of North America i.e., eastern Pacific**. Thus, **Statement 2 is incorrect.**
  - But this affects the Indian Monsoons negatively.
- **Negative phase**: Warm water accumulates near the middle and Western Pacific Ocean. This

- **Statement 1 is correct:** During the **"positive", phase of PDO**, **the East Pacific becomes warmer. It is similar to conditions caused by El Nino.**
- PDO alone is not of much impact; but it can intensify or diminish the impacts of ENSO according to its phase.
  - If both ENSO and the PDO are in the same phase, it magnifies the El Niño/La Nina impacts.
  - If ENSO and the PDO are out of phase, they may offset one another, preventing ENSO from impacting the climate.

Q.76) Consider the following statements with reference to Madden Julian Oscillation (MJO):

1. It is a band of low-pressure systems moving from West to East.
2. It is a temporary Jet Stream observed during monsoons in the upper troposphere.
3. If MJO is over the Indian Ocean during Monsoons, it positively impacts the monsoon rainfall in India.

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.76) Solution (c)

Explanation:

- The Madden Julian Oscillation (MJO) is one of the most important atmosphere-ocean coupled phenomena in the tropics, which has a profound influence on the Indian Summer Monsoon
- **MJO** is a massive weather event consisting of **low-pressure systems** coupled with atmospheric circulation, **moving slowly eastward** over the Indian and Pacific Oceans. Thus, **statement 1 is correct.**
- Each cycle lasts approximately **30–60 days.** It is also known as the 30–60-day oscillation or intra-seasonal oscillation (ISO).
- The MJO involves variations in **wind, sea surface temperature (SST), cloudiness, and rainfall**.
- As it moves, strong MJO activity often splits the planet into two — one in which the MJO is in the active phase and brings rainfall, and the other in which it suppresses rainfall.

- In the active phase, MJO results in more than average rainfall for that time of the year, while in the suppressed phase, the area receives less than average rainfall. Thus, **Statement 3 is correct**.
- An active phase is generally followed by a weak or suppressed phase, in which there is little MJO activity.
- Because the MJO cycle lasts only 30-60 days, there can be multiple MJO events in a season**. Three active MJO periods are witnessed every year on average**.

- The effect of the MJO is witnessed mainly in the tropical region and India falls in this band.
- It is a **global band of low-pressure systems moving in the lower troposphere**. It has nothing to do with jet streams. Thus, **Statement 2 is incorrect.**

Q.77) The Tamil Nadu coast receives rainfall during the northeast monsoon season because:

1. Westerly Jet stream shifts to the north.
2. Bay of Bengal is warm and presence of depressions and cyclones create a low-pressure system.

Which of the above statements is/are correct?

a) Only 1
b) Only 2
c) Both 1 and 2
d) Neither 1 nor 2

Q.77) Solution (b)

Explanation:

- The weather in the **retreating monsoon** is **dry in north India** but it is associated with **rain in the eastern part of the Peninsula**. It is also called the winter monsoon.
- Northeast monsoon is important for Tamil Nadu, Puducherry, Karaikal, Yanam, coastal Andhra Pradesh, Kerala, north interior Karnataka, Mahe and Lakshadweep. Here, October and November are the rainiest months of the year. Some South Asian countries such as Maldives, Sri Lanka and Myanmar, too, record rainfall during October to December.
- The **Westerly Jet stream shifts to the South** bringing in Western disturbances in North India. The ITCZ also shifts southwards. The wind starts blowing from the North-East direction towards the Indian Ocean. Thus, **statement 1 is incorrect.**
- Two major reasons are cited for the Northeast monsoons:
  i. After the complete withdrawal of the Southwest monsoon from the country takes place by mid-October, the **wind pattern** rapidly changes from the **south-westerly to the north-easterly direction**. Once the North-easterly winds cross the Himalayas, they enter the Bay of Bengal. Since these winds **blow from sea to**

land, they pick up moisture from the Bay of Bengal. This is interrupted by the Eastern Ghats and thus there is rainfall in the Coromandel coast.

ii. The North-easterly winds are also accompanied by **depressions and cyclones** and create a low-pressure system. The widespread rain in this season is associated with the passage of **cyclonic depressions which originate over the Bay of Bengal** and manage to cross the eastern coast of the southern Peninsula. These tropical cyclones are very destructive. **A bulk of the rainfall of the Coromandel coast is derived from these depressions and cyclones.** Such cyclonic storms are less frequent in the Arabian Sea. So, **Statement 2 is correct.**

Q.78) Which of the following statements is correct regarding the season of retreating monsoon in India?

a) The weather in the retreating monsoon is dry in the eastern part of the Peninsula.
b) Monsoon withdrawal is experienced first in Western India.
c) The widespread rain in this season is associated with the passage of cyclonic depressions which originate over the Arabian Sea.
d) It is marked by clear skies and fall in temperature.

Q.78) Solution (b)

Explanation:

- The months of October and November are known for retreating monsoons. By the end of September, the southwest monsoon becomes weak as the low-pressure trough of the Ganga plain starts moving southward in response to the southward march of the sun.
- The monsoon retreats from the western Rajasthan by the first week of September. It withdraws from Rajasthan, Gujarat, Western Ganga plain and the Central Highlands by the end of the month.
- By the beginning of October, the low pressure covers northern parts of the Bay of Bengal and by early November, it moves over Karnataka and Tamil Nadu. By the middle of December, the centre of low pressure is completely removed from the Peninsula.
- This means that **the withdrawal of monsoons is first experienced in Western India**, then over Central India followed by Eastern India and finally over Southern India. Thus, **statement b is correct.**
- The retreating southwest monsoon season is marked by clear skies and rise in temperature. Hence, **statement d is incorrect.**
- The land is still moist. Owing to the conditions of high temperature and humidity, the weather becomes rather oppressive. This is commonly known as the 'October heat'.
- In the second half of October, the mercury begins to fall rapidly, particularly in northern India. The weather in the retreating monsoon is dry in north India but it is associated with rain in the eastern part of the Peninsula. Here, October and November are the rainiest months of the year. Hence, **statement a is incorrect.**

- The widespread rain in this season is associated with the passage of cyclonic depressions which originate over the Andaman Sea and manage to cross the eastern coast of the southern Peninsula. Hence, **statement c is incorrect.**
- These tropical cyclones are very destructive. The thickly populated deltas of the Godavari, Krishna and Kaveri are their preferred targets. Every year cyclones bring disaster here. A few cyclonic storms also strike the coast of West Bengal, Bangladesh and Myanmar. A bulk of the rainfall of the Coromandel coast is derived from these depressions and cyclones. Such cyclonic storms are less frequent in the Arabian Sea.

Q.79) With reference to monsoon depressions in India, consider the following statements:

1. Monsoon depressions generally do not intensify into cyclonic storms.
2. These can originate over the land as well.

Which of the statements given above is/are correct?

a) Only 1
b) Only 2
c) Both 1 and 2
d) Neither 1 nor 2

Q.79) Solution (c)

Explanation:

- The **depressions which form during the monsoon season** are called the monsoon depressions. These can be of:
  - Bay of Bengal origin,
  - Land origin (Hence, **statement 2 is correct**)
  - Arabian Sea origin.
- Monsoon depression is a cold core system (central temperature colder than the environment) over surface and in the lower levels and a warm core in upper levels (central temperature warmer than the environment).
- The monsoon depressions tilt southwards with height and if the monsoon depression is moving westward, the heavy rainfall is mainly concentrated in the SW quadrant.
- **Due to the high vertical wind shear present during the Southwest monsoon season, monsoon depressions generally do not intensify into cyclonic storms**. The depressions forming in pre-monsoon season and post monsoon season intensifies into cyclonic storm. Hence, **statement 1 is correct.**

Q. 80) Which of the following statements is correct with reference to the Western Disturbances?

a) Their arrival in India is characterized by a sudden rise in the prevailing night temperature.
b) They are anti-cyclonic systems originating over the eastern Mediterranean Sea.
c) It sustains the flow of water in the Himalayan rivers during the winter months.

d) They are steered in India by Tropical Easterly Jet Streams.

Q.80) Solution (a)

Explanation:

- **Western Disturbances:**
  - They are **shallow cyclonic depressions** (weak temperate cyclones) originating over the eastern Mediterranean Sea and travelling eastwards across West Asia, Iran, Afghanistan and Pakistan before they reach the north-western parts of India. Hence **option (b) is incorrect.**
  - **They are steered in India by Westerly Jet Streams. Hence option (d) is incorrect.**
  - On their way, the moisture content gets augmented from the Caspian Sea in the north and the Persian Gulf in the south.
  - Although the amount of rainfall caused by them is meagre, it is highly beneficial for rabi crops. **It sustains the flow of water in the Himalayan rivers during the summer months. Hence option (c) is incorrect.**
  - **An increase in the prevailing night temperature** generally indicates an advance in the arrival of these cyclones' disturbances. Hence **option (a) is correct.**