

ForumIAS

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Prelims Marathon

16th to 22nd May, 2022

*HISTORY
ECONOMICS
POLITY
SCIENCE AND TECHNOLOGY
GEOGRAPHY AND ENVIRONMENT*

FORUMIAS



Geography

Q.1) Consider the following statements with respect to forest area in the country:

1. In India more than 35 percent of the geographical land cover with forest area
2. According to National Forest Policy 1952, 33% of the geographical area should be forest area

Which of the following codes given below is/are correct?

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

ANS: B

Explanation: Forest area in the country is far lower than the desired 33 per cent of geographical area, as it was outlined in the National Forest Policy (1952). It was considered essential for maintenance of the ecological balance.

Source: NCERT

Q.2) Consider the following statements with respect to black soils:

1. Black soils also called as regur soils
2. It covers the areas of Punjab, Rajasthan and Maharashtra
3. The black soils are made up of extremely coarse material

Which of the following codes given below is/are NOT correct?

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

ANS: C

Explanation: Black soils are black in colour and are also known as regur soils. Black soil is ideal for growing cotton and is also known as black cotton soil. It is believed that climatic conditions along with the parent rock material are the important factors for the formation of black soil. This type of soil is typical of the Deccan trap (Basalt) region spread over northwest Deccan plateau and is made up of lava flows. They cover the plateaus of Maharashtra, Saurashtra, Malwa, Madhya Pradesh and Chhattisgarh and extend in the south east direction along the Godavari and the Krishna valleys. The black soils are made up of extremely fine i.e. clayey material. They are well-known for their capacity to hold moisture. In addition, they are rich in soil nutrients, such as calcium carbonate, magnesium, potash and lime. These soils are generally poor in phosphoric contents. They develop deep cracks during hot weather, which helps in the proper aeration of the soil. These soils are sticky when wet and difficult to work on unless tilled immediately after the first shower or during the pre-monsoon period.

Source: NCERT

Q.3) Consider the following statements with respect to “Himalayan Yew”:

1. Chemical compound called ‘taxol’ is extracted from this tree, and it has been successfully used to treat some cancer
2. This tree is abundantly found in Western Ghats

Which of the following codes given below is/are correct?

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

ANS: A

Explanation: The Himalayan Yew (*Taxus wallachiana*) is a medicinal plant found in various parts of Himachal Pradesh and Arunachal Pradesh. A chemical compound called ‘taxol’ is extracted from the bark, needles, twigs and roots of this tree, and it has been successfully used to treat some cancers – the drug is now the biggest selling anti-cancer drug in the world. The species is under great threat due to over-exploitation. In the last one decade, thousands of yew trees have dried up in various parts of Himachal Pradesh and Arunachal Pradesh.

Source: NCERT

Q.4) The primitive form of cultivation is called ‘Bewar’ or ‘Dahiya’ in which of the following state?

- a) Assam
- b) Kerala
- c) Haryana
- d) Madhya Pradesh

ANS: D

Explanation: The ‘slash and burn’ agriculture is known as ‘Milpa’ in Mexico and Central America, ‘Conuco’ in Venezuela, ‘Roca’ in Brazil, ‘Masole’ in Central Africa, ‘Ladang’ in Indonesia, ‘Ray’ in Vietnam. In India, this primitive form of cultivation is called ‘Bewar’ or ‘Dahiya’ in Madhya Pradesh, ‘Podu’ or ‘Penda’ in Andhra Pradesh, ‘Pama Dabi’ or ‘Koman’ or ‘Bringa’ in Odisha, ‘Kumari’ in Western Ghats, ‘Valre’ or ‘Waltre’ in South-eastern Rajasthan, ‘Khil’ in the Himalayan belt, ‘Kuruwa’ in Jharkhand, and ‘Jhumming’ in the North-eastern region.

Source: NCERT

Q.5) Consider the following statements with respect to wheat crop:

1. It is a kharif crop
2. It requires 50 to 75 cm rainfall
3. It is the main food crop, in north and north-western part of the country

Which of the following codes given below is/are correct?

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

ANS: C

Explanation: Wheat is the second most important cereal crop. It is the main food crop, in north and north-western part of the country. This rabi crop requires a cool growing season and a bright sunshine at the time of ripening. It requires 50 to 75 cm of annual rainfall evenly distributed over the growing season. There are two important wheat-growing zones in the country – the Ganga-Satluj plains in the northwest and black soil region of the Deccan. The major wheat-producing states are Punjab, Haryana, Uttar Pradesh, Bihar, Rajasthan and parts of Madhya Pradesh.

Source: NCERT

Q.6) The two volcanic islands in the Indian territory are:

- a) Kavaratti and New Moor
- b) Bitra and Kavaratti
- c) Pamban and Barren
- d) Narcondam and Barren

ANS: D

Explanation: A volcano is a rupture in the crust of a planetary-mass object, such as Earth, that allows hot lava, volcanic ash, and gases to escape from a magma chamber below the surface.

India's only active volcano is located in Barren island of Andaman, which is also the only confirmed active volcano in South Asia.

Narcondam Island is classified as a dormant volcano by the Geological Survey of India. The Mountain house second tallest point in the Andaman and Nicobar Islands.

Source: NCERT

Q.7) “It requires sandy loams, loams and well drained black soils which allow enough aeration.”

Which of the following crop is talked in the above statement?

- a) Wheat
- b) Cotton
- c) Groundnut
- d) Coffee

ANS: C

Explanation: Groundnut grows best in deep, well-drained soils with a sandy or very loose surface layer. If the moist soil is rubbed between the index finger and the thumb should not form a ribbon but should fall apart easily. Such soil is best for groundnut crop. In addition to

soil fertility, soil – texture is vitally important aspect of groundnut production. Well – drained, light – textured, loose, friable sandy – loam or sandy clay loam soils, well – supplied with calcium and a moderate amount of organic matter are ideal for groundnut cultivation.

Gujarat tops with 27.87 percent of total production followed by Andhra Pradesh 24.19 percent, Tamil Nadu 14.84 Percent and Karnataka 1095 percent. Though other states like Maharashtra, Rajasthan, Orissa, Madhya Pradesh, Uttar Pradesh and West Bengal are the important groundnut producing states.

Source: NCERT

Q.8) Kaber Taal Lake which has been protected as the Kanwar Lake Bird Sanctuary is which type of lake?

- a) Tectonic lake
- b) Ox bow lake
- c) Glacial lake
- d) Lagoon

ANS: B

Explanation: An oxbow lake is a U-shaped body of water, originally a curve in a river. That curve has been separated from the rest of the river and, as an oxbow lake, is now a free-standing body of water. Oxbow lakes can be found all over the world. In Australia, they are known as billabong. In the US state of Texas, oxbow lakes formed from the Rio Grande are referred to as resacas.

Kaber Taal Lake located in India is one of the largest oxbow lakes in Asia. Today, this lake has been protected as the Kanwar Lake Bird Sanctuary. It is home to around 106 resident bird species and provides shelter to at least 60 recorded migratory birds. The lake and its ecosystem are threatened by pollution, like excessive chemicals which are used to capture birds. Many of the bird species here are endangered or threatened, including the: long-billed vulture, oriental white-backed vulture, lesser kestrel, and greater spotted eagle.

Source: NCERT

Q.9) “These are dark, dull clouds, clearly layered and also known as ‘rain clouds’. It brings continuous rain, snow or sleet”.

Which of the following cloud is talked about in the above statement?

- a) Cumulonimbus
- b) Cirrus
- c) Nimbostratus
- d) Cirrostratus

ANS: C

Explanation: Clouds are given different names based on their shape and their height in the sky. Some clouds are near the ground. Others are almost as high as jet planes fly. Some are puffy like cotton. Others are grey and uniform.

The different types of clouds are cumulus, cirrus, stratus and nimbus.

- Cirrus Clouds: Cirrus clouds are the thin, wispy clouds seen high in the sky. They look as if someone took a cloud, stretched it, pulling pieces off, like a cotton ball when it is pulled apart. They are thin because they are made of ice crystals instead of water droplets. A blue sky and a few cirrus clouds high in the sky, usually means it is going to be a nice day.

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- **Cumulus Clouds:** Cumulus clouds are the puffy clouds that are usually scattered throughout the sky. In Latin, the word cumulus means pile. Just like when we say “accumulate,” it means things pile up. This type of cloud is formed when warm air rises carrying water vapor with it by evaporation. Cumulus clouds can be white or gray. A white fluffy cloud means no rain, but when they form into dark or gray clouds, it is going to rain.
- **Stratus Clouds:** Stratus clouds look like a huge thick blanket covering the sky. These clouds are a sure sign of rain if it is warm and snow if it is cold. If stratus clouds are near the ground, they form fog. These clouds form when the weather has been cold and warmer moist air blows in. The amount of moisture in the air and the difference between warm and cold air determine how thick the cloud or fog is.
- **Nimbus Clouds:** The word nimbus means a cloud that already has rain or snow falling from it. These clouds are dark and seen during a thunderstorm along with thunder and lightning. They can be a combination of two clouds, like a cumulonimbus, which means a puffy black cloud with rain falling out of it, or a nimbostratus, which is a dark blanket with rain falling out of it.

Source: NCERT

Q.10) Chinook winds are the local winds in which of the following area:

- a) Sahara Desert
- b) Switzerland
- c) Southern California
- d) Eastern slopes of Rockies

ANS: D

Explanation:

Local Winds are produced due to local variability in temperature and pressure condition. Thus, they are more localised in their extent and cover limited horizontal and vertical dimensions and confined to the lower levels of the troposphere. However, it is important to remember that some of the local winds can have very large dimensions like, Northers of North America, which originate in Arctic Canada and reach as south as the Gulf of Mexico.

Source: NCERT

Geography

Q.1) Consider the following statements with respect to mica:

1. Properties of mica is excellent di-electric strength and low power loss factor
2. Koderma Gaya-Hazaribagh belt of Jharkhand is the leading producer of mica

Which of the following above statements is/are correct?

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

ANS: C

Explanation:

- Mica is a mineral made up of a series of plates or leaves. It splits easily into thin sheets. These sheets can be so thin that a thousand can be layered into a mica sheet of a few centimeters high.
- Mica can be clear, black, green, red yellow or brown. Due to its excellent di-electric strength, low power loss factor, insulating properties and resistance to high voltage, mica is one of the most indispensable minerals used in electric and electronic industries.
- Mica deposits are found in the northern edge of the Chota Nagpur plateau. Koderma Gaya – Hazaribagh belt of Jharkhand is the leading producer.
- In Rajasthan, the major mica producing area is around Ajmer. Nellore mica belt of Andhra Pradesh is also an important producer in the country.

Source: NCERT

Q.2) Consider the following statements Agro-based industries in India:

1. The first successful textile mill was established in Mumbai in 1854
2. The first jute mill was set up near Kolkata in 1859

Which of the following codes below given is/are correct?

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

ANS: C

Explanation:

- In ancient India, cotton textiles were produced with hand spinning and handloom weaving techniques. After the 18th century, power-looms came into use. Our traditional industries suffered a setback during the colonial period because they could not compete with the mill-made cloth from England.
- The first successful textile mill was established in Mumbai in 1854. The two world wars were fought in Europe, India was a British colony.

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- There was a demand for cloth in U.K. hence; they gave a boost to the development of the cotton textile industry.
- The first jute mill was set up near Kolkata in 1859 at Rishra. After Partition in 1947, the jute mills remained in India but three-fourth of the jute producing area went to Bangladesh (erstwhile East Pakistan).

Source: NCERT

Q.3) Consider the following elements of the earth's crust:

1. Oxygen
2. Silicon
3. Aluminum
4. Iron

Which of the following code is correct ascending order of elements of the earth's crust?

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

ANS: C

Explanation:

- The earth is composed of various kinds of elements. These elements are in solid form in the outer layer of the earth and in hot and molten form in the interior.
- About 98 per cent of the total crust of the earth is composed of eight elements like oxygen, silicon, aluminium, iron, calcium, sodium, potassium and magnesium and the rest is constituted by titanium, hydrogen, phosphorous, manganese, sulphur, carbon, nickel and other elements.

The Major Elements of the Earth's Crust Elements By Weight (%):

- Oxygen- 46.60
- Silicon- 27.72
- Aluminum- 8.13
- Iron- 5.00
- Calcium- 3.63
- Sodium- 2.83
- Potassium- 2.59
- Magnesium- 2.09
- Others- 1.41

Source: NCERT

Q.4) Consider the following statements with respect to Tropical Thorn Forest:

1. These occur in areas with rainfall less than 50 cm
2. Important species found here are oak, teak and sal
3. The forests are given an expression of scrub vegetation

Which of the following codes below given is/are correct?

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

ANS: B

Explanation:

- Tropical thorn forests occur in the areas which receive rainfall less than 50 cm. These consist of a variety of grasses and shrubs.
- It includes semi-arid areas of south west Punjab, Haryana, Rajasthan, Gujarat, Madhya Pradesh and Uttar Pradesh. In these forests, plants remain leafless for most part of the year and give an expression of scrub vegetation.
- Important species found are babool, ber, and wild date palm, khair, neem, khejri, palas, etc. Tussocky grass grows upto a height of 2 m as the under growth.

Source: NCERT

Q.5) Consider the following pairs:

- | | | |
|-------------|---|----------------------------------|
| Region | : | Well-known for the production of |
| 1. Sirsi | : | Areca nut |
| 2. Ongole | : | Tobacco |
| 3. Gudaspur | : | Turmeric |

Which of the above pairs is/are correctly matched?

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

ANS: B

Explanation:

- Sirsi Arecanut: For the first time in the arecanut sector, 'Sirsi Supari' grown in Uttara Kannada has received the Geographic Indication (GI) tag.
- It is cultivated in Yellapura, Siddapura and Sirsi taluks. Totgars' Cooperative Sale Society Ltd., Sirsi, is the registered proprietor of the GI.
- The arecanut grown in these taluks have unique features like a round and flattened coin shape, particular texture, size, cross-sectional views, taste, etc. These features are not seen in arecanut grown in any other regions.
- Tobacco: Most of the tobacco growing areas are concentrated in Ongole, Kaikalur, Addanki, Chirala, Giddalur areas of Prakasam district in Andhra Pradesh.

NOTE: Celery crop is cultivated mainly in the states of Punjab (Jalandhar, Gudaspur and Amritsar districts), Haryana and western Uttar Pradesh (Ladhwa and Saharanpur districts) over an area of about 5000 ha. About 90% of the total produce comes from Punjab.

Source: ForumIAS

Q.6) The term “rohi” is related to which of the following?

- a) Fertile tracts
- b) kind of jhum cultivation
- c) Tribal festival
- d) None

ANS: A

Explanation:

- The Rajasthan Bagar region (Bagar refers to the semi-desert area which is west of Aravallis. Bagar has a thin layer of sand.
- It is drained by Luni in the south whereas the northern section has a number of salt lakes) have a number of short seasonal streams which originate from the Aravallis.
- These streams support agriculture in some fertile patches called Rohi.

Source: NCERT

Q.7) Consider the following statements regarding the Storm Surge:

1. Storm surge is the abnormal rise in seawater level during a storm, measured as the height of the water above the normal predicted astronomical tide.
2. The amplitude of the storm surge at any given location depends on the orientation of the coast line with the storm track, the intensity, size, speed of the storm, and the local bathymetry.

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

ANS: C

Explanation: Storm Surge:

- Storm surge is the abnormal rise in seawater level during a storm, measured as the height of the water above the normal predicted astronomical tide.
- The surge is caused primarily by a storm's winds pushing water onshore.
- The amplitude of the storm surge at any given location depends on the orientation of the coast line with the storm track;
- The intensity, size, and speed of the storm; and the local bathymetry.

Source: NCERT

Q.8) Which of the following city is farthest city to 80° E longitude in India?

- a) Kanpur
- b) Jabalpur
- c) Chennai
- d) Hyderabad

ANS: D

Explanation:

- 80° E longitude passes near through Kanpur (UP), Jabalpur (MP), Nellore in Andhra Pradesh and Chennai in Tamil Nadu.

Source: Oxford school Atlas

Q.9) Arrange the following Islands of South China Sea from South to North:

1. Parcels Islands
2. Scarborough Shoal Islands
3. Spratlys Islands

Select the correct answer using the code given below:

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

ANS: D

Explanation:

- Tensions between China and both the Philippines and Vietnam have recently cooled, even as China increased its military activity in the South China Sea by conducting a series of naval maneuvers and exercises in March and April 2018.
- Meanwhile, China continues to construct military and industrial outposts on artificial islands it has built in disputed waters.



Source: ForumIAS

Q.10) The oldest known natural pearl in the world was discovered at a Neolithic site on Marawah Island is located at which of the following?

- a) Persian Gulf
- b) Gulf of Oman
- c) Gulf of Aden
- d) Gulf of Suez

ANS: A

Explanation:

- The oldest known natural pearl in the world was discovered recently off the coast of Abu Dhabi, United Arab Emirates (UAE) by Abu Dhabi archaeologists working at a Neolithic site on Marawah Island (Persian Gulf).
- It has been dubbed as 'Abu Dhabi Pearl'.
- It was discovered in soil layers that have been radiocarbon dated to 5,800-5,600 BCE, during the Neolithic period.

Source: ForumIAS

Geography

Q.1) Which of the following landmasses are separated by 'Bass Strait'?

- a) Australia and Tasmania Islands
- b) South Korea and Japan
- c) United Kingdom and France
- d) Mexico and Cuba

ANS: A

Explanation:

- The Bass Strait is a sea strait separating Tasmania from the south of the Australian mainland, specifically the state of Victoria.
- The strait was named after George Bass after he and Matthew Flinders passed through it while circumnavigating Van Diemen's Land (Tasmania) in the Norfolk in 1798-99. At Flinders' recommendation in 1800, the Governor of New South Wales named the stretch of water between the mainland and Tasmania "Basses Strait". Later it became known as Bass Strait.

Source: ForumIAS

Q.2) The term "Selvas" is related to which of the following?

- a) Tundra vegetation
- b) Mediterranean vegetation
- c) Grass land vegetation
- d) Equatorial vegetation

ANS: D

Explanation:

- High temperature and abundant rainfall support a luxuriant tropical rain forest. In the Amazon lowlands, the forest is so dense that it is called 'selvas'. [selvas: A dense tropical rainforest usually having a cloud cover (dense canopy)].
- Unlike the temperate regions, the growing season here is all the year round-seeding, flowering, fruiting and decaying not take place in a seasonal pattern.

Source: ForumIAS

Q.3) "EGA-WLS formula" is related to which of the following?

- a) Atmospheric pressure
- b) Time measurement
- c) Ocean acidification
- d) Thermal insulation

ANS: B

Explanation:

- Since the earth makes one complete rotation of 360° in one day or 24 hours, it passes through 15° in one hour or 1° in 4 minutes.

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- The earth rotates from west to east, so every 15° we go eastwards, local time is advanced by 1 hour. If we know G.M.T, to find local time, we merely have to add or subtract the difference in the number of hours from the given longitude, as illustrated below.
- A simple memory aid for this will be East-Gain-Add (E.G.A.) and West-Lose-Subtract (W.L. S.).

Source: ForumIAS

Q.4) Which of the following countries is/are sharing border with “Red Sea”?

1. Saudi Arabia
2. Egypt
3. Sudan
4. Israel
5. Djibouti

Select the correct answer using the code given below:

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

ANS: C

Explanation:

- Red Sea runs between the two continents Africa and Asia.
- It is a seawater inlet of the Indian Ocean. Four African countries border the Red Sea on the western side, while two Asian countries in east.
- The countries that border Red Sea are:
 - Egypt to the west and north, and
 - Sudan, Djibouti, and Eritrea to the west.
 - Yemen and Saudi Arabia in East.

Source: ForumIAS

Q.5) Which of the following statements is/are correct about “Great and Small Circles”?

1. A Great Circle is any circle that circumnavigates the Earth and passes through the centre of the Earth.
2. Equator and all longitudes are great circles.
3. Circles which do not pass through the centre of the earth are the small circles.

Select the correct answer using the code given below:

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

ANS) D

Explanation:

- A Great Circle is any circle that circumnavigates the Earth and passes through the centre of the Earth.

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- A great circle always divides the Earth in half, thus the Equator is a great circle (but no other latitudes) and all lines of longitude are great circles.
- The shortest distance between any two points on the Earth lies along a great circle. Circles which do not pass through the centre of the earth are the small circles.

Source: ForumIAS

Q.6) Which of the following are causes of “Ocean Currents”?

1. Level of salinity
2. Temperature
3. The Earth’s rotation
4. Earthquakes or storms

Select the correct answer using the code given below:

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

ANS: D

Explanation:

- Surface currents in the ocean are driven by global wind systems that are fueled by energy from the sun. Patterns of surface currents are determined by wind direction, Coriolis forces from the Earth’s rotation, and the position of landforms that interact with the currents.
- Surface wind-driven currents generate upwelling currents in conjunction with landforms, creating deepwater currents. Currents may also be caused by density differences in water masses due to temperature (thermo) and salinity (haline) variations via a process known as thermohaline circulation.
- These currents move water masses through the deep ocean—taking nutrients, oxygen, and heat with them. Occasional events such as huge storms and underwater earthquakes can also trigger serious ocean currents, moving masses of water inland when they reach shallow water and coastlines.
- Earthquakes may also trigger rapid downslope movement of water-saturated sediments, creating strong turbidity currents.

Source: ForumIAS

Q.7) Which of the following statements is/are correct about “Red soils” in India?

1. Red soil is formed as a result of weathering of metamorphic and igneous rocks.
2. It is rich in nitrogen content but lacks potash, humus and phosphate content.

Choose the correct answer from the code given below:

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

ANS: A

Explanation:

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Statement 1 is correct:

- Red soil is formed as a result of weathering of metamorphic and igneous rocks.
- The red color of the soil comes from the high percentage of iron content. The soil's texture varies from being sandy to clayey, but it is mainly loamy.

Statement 2 is incorrect:

- Red soil is rich in potash content but lacks phosphate, humus and nitrogen content. The red soil is found in regions such as Tamil Nadu, Madhya Pradesh, Jharkhand, Odisha, some parts of Karnataka and southeast Maharashtra.

Source: ForumIAS

Q.8) With reference to the 'Major ports in India', which of the following statements is/are correct?

1. Kolkata port is the only riverine port in India.
2. Vishakhapatnam port is India's deepest land locked port.

Select the correct answer using the code given below:

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

ANS: C

Explanation: Major ports in India.

Statement 1 is correct:

- Kolkata is the only riverine major port in India. Known for twin dock systems viz., Kolkata Dock System (KDS) on the eastern bank and Haldia Dock Complex (HDC) on the western bank of river Hooghly.

Statement 2 is correct:

- Vishakhapatnam is India's deepest landlocked port handling crude oil and petroleum products.

Source: ForumIAS

Q.9) Which of the following statements is/are correct about 'Golden Quadrilateral'?

1. It is a network of highways connecting India's four top metropolitan cities, namely Delhi, Mumbai, Chennai and Kolkata, thereby, forming a quadrilateral.
2. It was launched in 2001 as part of National Highways Development Project (NHDP).

Select the correct answer using the code given below:

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

ANS: C

Explanation: Golden Quadrilateral.

- Golden Quadrilateral is a network of highways connecting India's four top metropolitan cities, namely Delhi, Mumbai, Chennai and Kolkata, thereby, forming a quadrilateral.

Statement 2 is correct:

- The largest highway project in India, the Golden Quadrilateral project was launched in 2001 as part of National Highways Development Project (NHDP).

Source: ForumIAS

Q.10) Which of the following crops is/are grown in 'kharif season'?

1. Rice
2. Maize
3. Jute
4. Mustard

Select the correct answer using the code given below:

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

ANS: A

Explanation:

- The kharif crops are associated with the Southwest Monsoon.
- They are sown in the months of June and July and harvested in autumn months, i.e., in September and October. Important kharif crops are rice, jowar, bajra, ragi, maize, sugarcane, cotton and jute.

Source: ForumIAS

Science and Technology

Q.1) With reference to the 'Heavy water (D2O)',

Which of the following statements is/are correct?

1. It is used as both coolant and moderator in the Pressurized Heavy Water Reactors (PHWRs).
2. India is the largest importer of Heavy Water in the world.

Select the correct answer using the code given below:

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

ANS: A

Explanation:

- Heavy water is nothing but D₂O. Its uses are as a coolant as well as moderator in Pressurized Heavy Water Reactors (PHWRs).
- India is the largest producer of best quality Heavy Water in the world and is not only meeting in-house Heavy water requirements for the Indian Nuclear Power Program but is also exporting to various countries.

Source: ForumIAS

Q.2) "Azeotropic Distillation Technology" is related to which of the following?

- a) Shale gas
- b) Natural gas
- c) Methane extraction
- d) Ethanol production

ANS) D

Explanation:

- The technology for manufacture of ethanol (dehydrated/Anhydrous Alcohol) involves special processing of alcohol/rectified spirit.
- The technology for ethanol production from rectified spirit using azeotropic distillation is well established in India as a number of plants exist in the country based on this technology.
- This technology involves distillation system employing benzene as the third component has been in use in India since World War II.

Source: ForumIAS

Q.3) Which of the following statements is/are correct about “Sublimation”?

1. It is a process in which solids directly change to gases.
2. Camphor is an example of solids that undergo sublimation.

Select the correct answer using the code given below:

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

ANS) C

Explanation:

- The process in which solids directly change to gases is known as sublimation. This occurs when solids absorb enough energy to completely overcome the forces of attraction between them.
- Dry ice and Camphor are examples of solids that undergo sublimation.

Source: ForumIAS

Q.4) Which of the following statements is/are correct about “Quantum Computers”?

1. Quantum computers use logical units called quantum bits that can be put into a quantum state where they can simultaneously represent both 0 and 1.
2. Quantum computers work at a temperature of $-273\text{ }^{\circ}\text{C}$ ($-459\text{ }^{\circ}\text{F}$) with hardly any atmospheric pressure and isolated from Earth’s magnetic field.

Select the correct answer using the code given below:

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

ANS: C

Explanation:

- Quantum Computers work by harnessing the properties of quantum mechanics.

Statement 1 is correct:

- As the reality of a quantum computer comes closer, it is useful for us to understand both how one functions and how it’s different from a traditional computer. The first thing to bear in mind is that they use different basic units of data: ‘bits’ and ‘qubits’.
- Every element of a classical computer is written in binary code (1s and 0s) and is translated into electricity: high voltage is represented by 1, and low voltage by 0.
- In quantum computing, qubits are the basic unit and their value can be 1, 0, or 1 and 0 simultaneously, overlapping (superposition) and intertwining (entanglement) according to the laws of physics.
- This means that qubits, as opposed to bits, can take on various values at one time and can perform calculations that a conventional computer cannot.

Statement 2 is correct:

- The classical computer, if there is interference with the system;
- the system can correct itself and continue running. For the time being, this is not the case with quantum computers.

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- “External disturbances force the system to define itself as 1 or 0, causing it to lose its quantum coherence.
- To avoid this kind of external ‘noise,’ the system has to be completely isolated: the atoms have to be very quiet, ensuring nothing makes them collide or interact with the surroundings.
- Quantum computers have to be at a temperature of $-273\text{ }^{\circ}\text{C}$ ($-459\text{ }^{\circ}\text{F}$) with hardly any atmospheric pressure and isolated from Earth’s magnetic field.

Source: ForumIAS

Q.5) Which of the following is/are cause/causes for the formation of rainbow?

1. Reflection
2. Refraction
3. Dispersion

Select the correct answer using the code given below:

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

ANS: D

Explanation:

- A rainbow is a meteorological phenomenon that is caused by reflection, refraction and dispersion of light in water droplets resulting in a spectrum of light appearing as a circular arc in the sky.
- It is often visible after rainfall due to highly humid atmosphere and absence of air pollution. The position of the sun and the raindrops in relation to the observer need to be just right for a rainbow to form:
- The sun needs to be behind the viewer
- The sun needs to be low in the sky, at an angle of less than 42° above the horizon.
- The lower the sun in the sky the more of an arc of a rainbow the viewer will see Rain, fog or some other source of water droplets must be in front of the viewer The size of the raindrops does not directly affect the geometry of a rainbow, but mist or fog tends to disperse the effect more.
- Rainbows only appear semi-circular over level ground at sunrise or sunset, when the sun is exactly on the horizon, the majority of the time a smaller segment of an arc is seen

Source: ForumIAS

Q.6) Which of the following ape shares 99% of its DNA with human DNA?

- a) Chimpanzee
- b) Gorilla
- c) Orangutan
- d) Gibbon

ANS: A

Explanation:

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- Ever since researchers sequenced the chimp genome in 2005, they have known that humans share about 99% of our DNA with chimpanzees, making them our closest living relatives.
- But there are actually two species of apes that are this closely related to humans: bonobos (*Pan paniscus*) and the common chimpanzee (*Pan troglodytes*).
- This has prompted researchers to speculate whether the ancestor of humans, chimpanzees, and bonobos looked and acted more like a bonobo, a chimpanzee, or something else—and how all three species have evolved differently since the ancestor of humans split with the common ancestor of bonobos and chimps between 4 million and 7 million years ago in Africa.

Source: ForumIAS

Q.7) Consider the following statements regarding the Supermoon:

1. It is used to refer to a full moon 90 percent or closer to Apogee.
2. It has no precise astronomical definition.

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

ANS: B

Explanation:

- Full moons can occur at any point along the Moon's elliptical path, but when a full moon occurs at or near the perigee, it looks slightly larger and brighter than a typical full moon. That's what the term "supermoon" refers to.
- Because supermoon is not an official astronomical term, there is no definition about just how close to perigee the full moon has to be in order to be called "super."
- Generally, supermoon is used to refer to a full moon 90 percent or closer to perigee.
- A more accurate and scientific term is "perigee syzygy." Syzygy is the alignment of three celestial bodies, in this case the Sun, Moon and Earth.

Source: ForumIAS

Q.8) Consider the following statements regarding the nucleotide of DNA:

1. It is made up of three parts consists of phosphate group, a 5-carbon sugar, and a nitrogenous base.
2. The four nitrogenous bases in DNA are adenine, cytosine, guanine, and uracil.

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

ANS: A

Explanation:

- A nucleotide is an organic molecule that is the building block of DNA and RNA.
- They also have functions related to cell signaling, metabolism, and enzyme reactions.

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- A nucleotide is made up of three parts: a phosphate group, a 5-carbon sugar, and a nitrogenous base.

The four nitrogenous bases in DNA are adenine, cytosine, guanine, and thymine.

- RNA contains uracil, instead of thymine.
- A nucleotide within a chain makes up the genetic material of all known living things.
- They also serve a number of functions outside of genetic information storage, as messengers and energy moving molecules.

Source: ForumIAS

Q.9) Consider the following statements regarding the Neutrino:

1. The neutrino is a tiny elementary particle which is part of the atom.
2. Neutrino has a very tiny mass and with electrical charge.

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

ANS: D

Explanation:

- Proton, neutron, and electron are tiny particles that make up atoms.
- The neutrino is also a tiny elementary particle, but it is not part of the atom.
- Such particles are also found to exist in nature.
- Neutrino has a very tiny mass and no charge. It interacts very weakly with other matter particles.
- So weakly that every second trillions of neutrinos fall on us and pass through our bodies unnoticed.
- Neutrinos come from the sun (solar neutrinos) and other stars, cosmic rays that come from beyond the solar system, and from the Big Bang from which our Universe originated.
- They can also be produced in the lab.

Source: ForumIAS

Q.10) Consider the following statements regarding the Aerosols:

1. They are minute particles suspended in the atmosphere.
2. Cold climate with dry periods decreases the concentration of Aerosols in the Atmosphere.

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

ANS: A

Explanation:

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- Aerosols are minute particles suspended in the atmosphere. When these particles are sufficiently large, we notice their presence as they scatter and absorb sunlight.
- Their scattering of sunlight can reduce visibility (haze) and redden sunrises and sunsets.
- Aerosols interact both directly and indirectly with the Earth's radiation budget and climate.
- As a direct effect, the aerosols scatter sunlight directly back into space.
- As an indirect effect, aerosols in the lower atmosphere can modify the size of cloud particles, changing how the clouds reflect and absorb sunlight, thereby affecting the Earth's energy budget.
- Aerosols come from both natural and human sources—and sometimes both at once.
- Dust, for example, is scoured from deserts, the dried-out edges of rivers, dry lakebeds, and more.
- Its concentrations in the atmosphere rise and fall with climate; in cold, dry, periods in the planet's history like the last ice age, more dust filled the atmosphere than during warmer stretches of Earth's history.

Source: ForumIAS

Science and Technology

Q.1) Consider the following statements with respect to “Sodium Sulphur Battery”:

1. It is a high-temperature battery which operates at 300°C and utilizes a solid electrolyte.
2. It has a high-power density and is suitable for large-scale energy storage and space applications.
3. It is costlier than lithium battery.

Which of the following codes below given is/are NOT correct?

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

ANS: D

Explanation:

- Sodium Sulphur Battery is a high-temperature battery which operates at 300°C and utilises a solid electrolyte, making it unique among the common secondary cells (rechargeable batteries).
- It has a high-power density and is suitable for large-scale energy storage and space applications. As electrodes are solid are room temperature and therefore inactive when cold and the battery can be stored for more than 50 years in that state.
- The battery must be activated with a heat source and the electrodes become liquid. The biggest advantage of sodium is in the cost area, as it is a far more common material than lithium and is much more widely available. However, the safety concerns greatly inhibit their widespread adoption.

Source: ForumIAS

Q.2) Which of the following convention is called as “Satellite Convention”?

- a) Madrid Convention
- b) Marrakesh Convention
- c) Berne Convention
- d) Brussels Convention

ANS: D

Explanation:

- The Brussels or Satellites Convention provides for the obligation of each Contracting State to take adequate measures to prevent the unauthorized distribution on or from its territory of any programme-carrying signal transmitted by satellite.

Source: ForumIAS

Q.3) Consider the following statements with respect to Indian Institute of Remote Sensing (IIRS):

1. IIRS is located at Dehradun
2. IIRS is a premier institute with the objective of capacity building in Remote Sensing and Geo-informatics

Which of the following codes below given is/are correct?

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

ANS: C

Explanation:

- Indian Institute of Remote Sensing (IIRS) at Dehradun is a premier institute with the objective of capacity building in Remote Sensing and Geo-informatics and their applications through education and training programmes at postgraduate level. The Institute also hosts and provides support to the Centre for Space Science and Technology Education in Asia and the Pacific (CSSTE-AP), affiliated to the United Nations.

Source: ForumIAS

Q.4) The Earth's oldest known mineral is found in which of the following Continent?

- a) Antarctica
- b) North America
- c) Africa
- d) Australia

ANS: D

Explanation:

- A meteorite that crashed into rural southeastern Australia in a fireball in 1969 contained the oldest material ever found on Earth, stardust that predated the formation of our solar system by billions of years, scientists said on January 13 – 2020.
- The oldest of 40 tiny dust grains trapped inside the meteorite fragments retrieved around the town of Murchison in Victoria state dated from about 7 billion years ago, about 2.5 billion years before the sun, Earth and rest of our solar system formed, the researchers said.
- Scientists previously had found a pre-solar grain in the Murchison meteorite that was about 5.5 billion years old, until now the oldest-known solid material on Earth.
- The oldest-known minerals that formed on Earth are found in rock from Australia's Jack Hills that formed 4.4 billion years ago, 100 million years after the planet formed.

Source: ForumIAS

Q.5) Consider the following statements regarding the “benzoic acid”:

1. It exists as a crystalline, colorless solid under normal conditions.
2. It is used in the manufacture of dyes and in insect repellants.

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

ANS: C

Explanation:

- Benzoic acid is an organic compound which is described by the chemical formula C_6H_5COOH .
- It consists of a carboxyl group attached to a benzene ring. Therefore, benzoic acid is said to be an aromatic carboxylic acid.
- This compound exists as a crystalline, colorless solid under normal conditions.
- It is white and belongs to the family of carboxylic acid.
- The term ‘benzoate’ refers to the esters and salts of C_6H_5COOH .
- The commercial production of benzoic acid is done via the partial oxidation of toluene with oxygen, catalyzed by manganese or cobalt naphthenates.

Some important uses of C_6H_5COOH are listed below.

- The production of phenol involves the use of benzoic acid.
- This compound is used in ointments that prevent or treat fungal skin diseases.
- C_6H_5COOH is used as a preservative in the food industry.
- Benzoic acid is an ingredient in many cosmetic products, such as lipsticks.
- It is also a precursor to benzoyl chloride.
- One of the components of toothpaste, mouthwash, and face-wash creams is C_6H_5
- This compound is also used in the manufacture of dyes and in insect repellants.

Source: NCERT

Q.6) Which of the following pair (s) is/are correctly matched?

- Fruits : Vitamin/Antioxidant
1. Red grapes : Vitamin B6
 2. Mango : Fibre
 3. Banana : Antioxidant resveratrol

Select the correct answer using the code given below:

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

ANS: B

Explanation:

- Mangoes are seasonal fruits, and both are high on fibre. The former has vitamin A (a precursor to beta carotene and is antioxidant-rich) and C that helps build immunity.

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- Banana is one of the easiest snacks to consume: it 'pre-packaged' with B6, magnesium and potassium.
- Red wine is made from grapes that contain an antioxidant resveratrol that is good for the heart.

Source: NCERT

Q.7) The “Founder effect” is related to which of the following?

- a) Genetic drift
- b) Glacial lakes
- c) Geographical discoveries
- d) Chemical bonding

ANS: A

Explanation:

- Genetic drift can have major effects when a population is sharply reduced in size by a natural disaster (bottleneck effect) or when a small group splits off from the main population to found a colony (founder effect).
- The founder effect is another extreme example of drift, one that occurs when a small group of individuals breaks off from a larger population to establish a colony.
- The new colony is isolated from the original population, and the founding individuals may not represent the full genetic diversity of the original population.
- That is, alleles in the founding population may be present at different frequencies than in the original population, and some alleles may be missing altogether.
- The founder effect is similar in concept to the bottleneck effect, but it occurs via a different mechanism (colonization rather than catastrophe).
- Genetic studies done on the people of the Lakshwadeep archipelago by a team, led by K. Thangaraj at CSIR-Centre for Cellular and Molecular Biology (CCMB), for the first time have shown that a majority of human ancestry in Lakshadweep is largely derived from South Asia with minor influences from East and West Eurasia.
- And, there was no evidence of early human migration through the Lakshadweep islands.
- “We found a strong founder effect for both paternal and maternal lineages — a sign that the island population had limited genetic mixing”, said by scientists.

Source: ForumIAS

Q.8) Which of the following is/are examples of van der Waals materials?

1. Graphite
2. Antimony
3. Selenium

Select the correct answer using the codes given below:

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

ANS: D

Explanation:

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- Until six years ago, such materials did not exist but today, researchers believe that they hold the key to 'post-silicon' electronics.
- VdW materials are made of piles of ultra-thin layers that are held together by weak van der Waals bonds, which arise when atoms are in close proximity.
- The success of graphene — a well known vdW material — stimulated scientists to look for other 2D crystals, where layers can be changed, added or removed in order to introduce new physical properties such as magnetism.
- Controlling magnetism, as is typical of such materials, could replace the current hard drive assemblies in computers and even become the key to quantum computing.
- Other examples of natural elemental van der Waals materials, although much less abundant than graphite, are native bismuth, antimony, selenium, and tellurium.

Source: ForumIAS

Q.9) Consider the following statements about EOS-04 Satellite:

1. It is a Radar Imaging Satellite.
2. EOS-04 is the fourth in the series of earth observation satellites.
3. All other EOS satellites in the series namely, EOS-01, EOS-02 and EOS-03 have been successfully placed in the orbit.

Which of the statements given above is/are correct?

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

ANS: A

Explanation: About EOS-04 Satellite:

- ISRO has launched the EOS-04 Satellite on board the PSLV-C52. EOS-04 is the fourth in the series of earth observation satellites.
- It is a Radar Imaging Satellite, weighs about 1710 kg and will be placed in a sun-synchronous polar orbit.
- It will provide high-quality images under all weather conditions for applications such as agriculture, forestry and plantations, soil moisture & hydrology, and flood mapping.
- EOS-02 is yet to be launched. It is a microsatellite to be flown on a new launch vehicle called SSLV (Small Satellite Launch Vehicle).
- At present, India has 53 operational satellites, of which 21 are earth observation and another 21 are communication-based. The other eight are navigation satellites and 3 are science satellites.

Source: ForumIAS

Q.10) Consider the following statements about Negative Ions:

1. Negative ions are made when sunlight, radiation, air, or water break down oxygen.
2. These ions have an impact on pollutants by making them negatively charged and get them collected on surfaces.

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

ANS: C

Explanation: About Negative Ions:

- An ion is an atom, or a molecule, which has gained or lost one or more electrons;
- Negative ions are made when sunlight, radiation, air, or water break down oxygen.
- It is believed that negative ions create positive vibes and uplift the mood. These ions also have an impact on pollutants by making them negatively charged and get them collected on surfaces.

About Negative Ion Technology

- Negative ion technology embeds negative ions in personal products and is currently being advertised as a means to maintain health, balance energy, and improve well-being;
- This technology is used in certain silicone wristbands, quantum or scalar-energy pendants, sleep masks, jewellery among others;
- The minerals that produce these negative ions often include naturally occurring radioactive substances such as uranium and thorium.

Source: ForumIAS

Science and Technology

Q.1) The test is used for determining the biological quality of drinking water. What does it called?

- a) Acidity test
- b) Coliform test
- c) Iodine test
- d) Vidal test

ANS: B

Explanation: Water can dissolve many minerals or chemicals and transport microbiological contaminants. The Standard Drinking Water Test has been created to detect chemical and microbiological contaminants. The Standard Drinking Water Test has two components: Microbiological test and chemical quality test.

Microbiological tests: The microbiological test will identify total coliforms (a type of bacteria) and faecal coliforms in drinking water. The total coliform test will show the total bacterial loading found in the water sample. The faecal coliform test will indicate the level of faecal contamination in the water and how safe the water is to drink.

Chemical quality tests: The chemical quality test is made up of a range of chemical elements and compounds. Some of the elements are heavy metals that may pose a risk to your health while others may only affect the taste, odour and appearance of the water (These are called 'aesthetic' characteristics).

Source: NCERT

Q.2) Consider the following diseases:

- 1. Leprosy
- 2. Ringworm
- 3. Leokoderma
- 4. Athlete's foot

Which of the above given disease is/are caused by fungus?

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

ANS: C

Explanation: Fungal diseases kill more than 1.5 million and affect over a billion people. However, they are still a neglected topic by public health authorities even though most deaths from fungal diseases are avoidable. Serious fungal infections occur as a consequence of other health problems including asthma, AIDS, cancer, organ transplantation and corticosteroid therapies. Early accurate diagnosis allows prompt antifungal therapy; however this is often delayed or unavailable leading to death, serious chronic illness or blindness.

Fungi can cause many different types of illnesses, including:

- Asthma or allergies.

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- Rashes or infections on the skin and nails
- Lung infections (pneumonia), with symptoms similar to the flu or tuberculosis
- Bloodstream infections
- Meningitis

TABLE 28-2 Summary of Human Fungal Diseases

Disease	Symptoms	Fungus	Route of transmission
Athlete's foot	fluid-filled blisters, scaly skin, itching	<i>Trichophyton</i> species (Ascomycete) or <i>Epidermophyton</i> species	contact with skin lesions or contaminated floors
Ringworm	ring-shaped skin lesions	<i>Microsporum</i> , <i>Trichophyton</i> (Ascomycetes)	contact with skin lesions, contaminated floors, or contaminated objects
Vaginal yeast infection	burning sensation, itching, discharge	<i>Candida</i>	contact with fecal material, diabetes; antibiotic treatments increase susceptibility
Tinea cruris (jock itch)	intense itching, ring-shaped lesions	<i>Microsporum</i> , <i>Trichophyton</i> (Ascomycetes)	contact with skin lesions, contaminated floors, or contaminated objects
Histoplasmosis	fever, chills, headache, body aches, chest pains, nonproductive cough	<i>Histoplasma capsulatum</i> (Ascomycete)	inhalation of airborne conidia

Source: ForumIAS

Q.3) How does silver iodide help in the creation of artificial rain?

- It is used as catalyst to bring together hydrogen and oxygen to form water
- It is used to provide freezing nuclei in cloud seeding
- It is used to lower water vapour at high altitude
- It helps in the ways as mentioned in option B and C

ANS: D

Explanation: Rainfall occurs when supercooled droplets of water – those that are still liquid but are at a temperature below the usual freezing point of zero centigrade – form ice crystals. Now too heavy to remain suspended in the air, these then fall, often melting on their way down to form rain.

Even in dry areas the air usually contains some water. This can be made to come together and form ice crystals by seeding the atmosphere with chemicals such as silver iodide or dry ice.

They work to promote rainfall by inducing nucleation – what little water is in the air condenses around the newly introduced particles and crystallises to form ice.

The 'seeds' can be delivered by plane or simply by spraying from the ground.

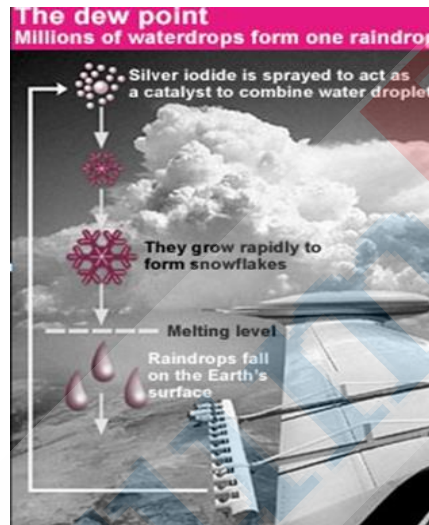
The process of condensation of the droplets is very important. It takes place as the air temperature drops; with that, the capacity of air to hold water vapour is reduced. If cooling continues, a point comes where the amount of water that the air can hold reaches its maximum capacity. This temperature is called the dew point. At this point, water vapour begins to condense into tiny droplets.

The condensation process can be of two types -- 'warm rain' and 'cold rain'. The latter happens in tropical regions; the process is so called because precipitation falls from clouds where the

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temperature is more than 0c. Rain is formed in the 'warm clouds' when larger water droplets collide with and absorb smaller ones. Substances capable of absorbing moisture from the atmosphere -- such as common salt -- are used for inducing 'warm rain'.

The 'cold rain' process occurs when the temperature, in all or some parts of a cloud, is less than 0c. These clouds are usually composed of both ice crystals and water droplets. The crystals grow rapidly, drawing moisture from the surrounding water droplets, until their weight causes them to fall. While falling, the crystals may melt and join with small liquid water droplets; they may then form into raindrops in a manner similar to the 'warm rain' process. If the crystals do not melt, they may grow into large snowflakes by agglomeration and reach the ground as snow. Silver iodide or dry ice (solid carbon dioxide) is used to supply naturally deficient clouds with the proper concentration of ice crystals to increase rainfall through the 'cold rain' process.



Source: NCERT

Q.4) “Tianhe-2, Titan, Mira and Piz Daint” are the examples of which of the following?

- a) Supercomputers
- b) Stars in Milky Way Galaxy
- c) Nearby Galaxies
- d) Comets

ANS: A

Explanation: A supercomputer is a computer with a high level of performance as compared to a general-purpose computer. The performance of a supercomputer is commonly measured in floating-point operations per second (FLOPS) instead of million instructions per second (MIPS). Since 2017, there are supercomputers which can perform over a hundred quadrillion FLOPS (petaFLOPS). Since November 2017, all of the world's fastest 500 supercomputers run Linux-based operating systems.

Tianhe-2, a supercomputer developed by China's National University of Defense Technology, retains its position as the world's No. 1 system with a performance of 33.86 petaflop/s (quadrillions of calculations per second) on the Linpack benchmark. It was built by China's National University of Defense Technology (NUDT) in collaboration with the Chinese IT firm Inspur.

Source: ForumIAS

Q.5) Consider the following statements with respect to Earth System Science Organization (ESSO):

1. The Earth System Science Organization (ESSO), New Delhi, operates as an executive arm of the Ministry of Earth Sciences (MoES) for its policies and programmes.
2. The ESSO was established in October, 2009
3. ESSO as a virtual organization, bringing all meteorological and ocean development activities under one umbrella.

Which of the statements given above is/are not correct?

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

ANS: B

Explanation: The Earth System Science Organization (ESSO), New Delhi, operates as an executive arm of the Ministry of Earth Sciences (MoES) for its policies and programmes. The ESSO provides overall direction for the centers/units and review the implementation of the programs. The ESSO was established in October, 2007 as a virtual organization, bringing all meteorological and ocean development activities under one umbrella, recognizing the importance of strong coupling among various components of the earth viz. atmosphere, oceans, cryo-sphere and geo-sphere. It has four major branches of earth sciences, viz. (i) Ocean Science & Technology (ii) Atmospheric and Climate Science and (iii) Geosciences and Technology and (iv) Polar Science and Cryosphere. The sole purpose of the Endeavour was to address holistically various aspects relating to earth processes for understanding the variability of earth system.

Source: ForumIAS

Q.6) Berne Convention of 1886 related to which of the following?

- a) Primary Health Care
- b) Environmental Protection
- c) Global peace
- d) Intellectual property rights

ANS: D

Explanation: The Berne Convention, adopted in 1886, deals with the protection of works and the rights of their authors. It provides creators such as authors, musicians, poets, painters etc. with the means to control how their works are used, by whom, and on what terms. It is based on three basic principles and contains a series of provisions determining the minimum protection to be granted, as well as special provisions available to developing countries that want to make use of them.

Source: ForumIAS

Q.7) Consider the following statements with respect to National Informatics Centre (NIC):

1. National Informatics Centre (NIC) was established in 1976
2. NIC, through its ICT Network, "NICNET", has institutional linkages with the Central Government, State governments and 720 district administrations of India

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

ANS: C

Explanation: National Informatics Centre (NIC) was established in 1976, and has rich experience in providing ICT and e-Governance support to the Government for the last 4 decades and bridge the digital divide. It has emerged as a promoter of digital opportunities for sustainable development. NIC spearheaded "Informatics-Led-Development" by implementing ICT applications in social and public administration and facilitates electronic delivery of services to the government (G2G), business (G2B), citizen (G2C) and government employee (G2E). NIC, through its ICT Network, "NICNET", has institutional linkages with all the Ministries /Departments of the Central Government, 37 State Governments/ Union Territories, and about 720+ District Administrations of India.

Source: ForumIAS

Q.8) Consider the following statements with respect to Gas-Hydrates:

1. Hydrates formed when a gas such as methane gets trapped in well-defined cages of water molecules forming crystalline solids
2. Natural gas hydrates occur on continental margins and shelves worldwide from Polar Regions to the tropics

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

ANS: C

Explanation: They are formed when a gas such as methane gets trapped in well-defined cages of water molecules forming crystalline solids. It is a solid ice-like form of water that contains gas molecules in its molecular cavities. Natural gas hydrates occur on continental margins and shelves worldwide from Polar Regions to the tropics. Gas hydrate reservoirs are generally associated with biologically rich cold seep ecosystems at the seafloor. Cold seeps are locations where hydro-carbon rich fluid seeps up from below the sea floor, often as methane or hydrogen sulfide.

Source: ForumIAS

Q.9) Consider the following statements with respect to New India Space Limited (NISL):

1. NISL is a joint venture between public and private enterprise
2. It is under the administrative control of Department of Space

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

ANS: B

Explanation: The Union Government has already set up New Space India Limited (NSIL), a wholly owned Government of India undertaking/ Central Public Sector Enterprise (CPSE), under the administrative control of Department of Space (DOS) on 06th March 2019 to commercially exploit the research and development work of Indian Space Research Organization (ISRO) Centre's and constituent units of DOS.

Source: ForumIAS

Q.10) Fast Breeder Test Reactors (FBTR) located in which of the following place?

- a) Kaiga
- b) Kundankulam
- c) Kalpakkam
- d) Tarapur

ANS: C

Explanation: Indira Gandhi Centre for Atomic Research (IGCAR) has been carrying out a comprehensive R&D on sodium cooled fast breeder reactor technology for the past 30 years. A test reactor, called Fast Breeder Test Reactors (FBTR), is in operation from 1985 onwards which has provided valuable feedback. Based on this experience and also taking into account the international experience, design of a 500MWe Prototype Fast Breeder Reactor (PFBR) has been done. The design has been peer reviewed by international design agencies. Indigenously produced Mixed Uranium & Plutonium Oxide will be used as the fuel in the Prototype Fast Breeder Reactor at Kalpakkam.

Source: ForumIAS

Science and Technology

Q.1) Consider the following statements:

1. Planetary conjunction takes place when two planets appear to have come closer, while in reality, they remain far away.
2. The planetary conjunction of Mars and Venus is called as Great conjunction.

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

ANS: A

Explanation:

- Earth's two immediate neighbors Mars and Venus will come closest to each other. This event is called planetary conjunction.
- Conjunction: The conjunction is the name given to any event where planets or asteroids appear to be very close together in the sky when viewed from the Earth.
- Planetary Conjunction: Planetary conjunction takes place when two planets appear to have come closer, while in reality, they remain far away.

What is Great Conjunction?

- Astronomers use the term great conjunction to describe meetings of the two biggest planets in the solar system, Jupiter and Saturn.
- The Great Conjunction happens once in about 20 years, because of the time each of the planets takes to orbit around the Sun.

Source: ForumIAS

Q.2) Consider the following statements about Volatiles Investigating Polar Exploration Rover (VIPER) Mission:

1. It is a mobile robot launched by NASA.
2. It will be resource mapping mission on any other celestial body.

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

ANS: C

Explanation: NASA's VIPER Mission:

- NASA has announced the launch of the Volatiles Investigating Polar Exploration Rover (VIPER) Mission in 2023.
- VIPER Mission is a mobile robot to be launched by NASA in the year 2023.
- It will be the first resource mapping mission on any other celestial body.

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- Celestial Body is any natural body outside the Earth's atmosphere. Easy examples are the Moon, Sun, and the other planets of our solar system.

Source: ForumIAS

Q.3) Which of the following theory argues that light is made of photons and when light shines on a metal, each photon's energy is correlated to the electron's speed on the metal's surface?

- a) Quantum theory
- b) Wave theory
- c) Electro-magnetic wave theory
- d) Law of photoelectric effect

ANS: D

Explanation: Law of photoelectric effect:

- It argues that light is made of photons and when light shines on a metal, each photon's energy is correlated to the electron's speed on the metal's surface.
- This theory redefined the composition of light, and it is held as a revolutionary theory, for which Einstein received the Nobel Prize in 1921.

Source: ForumIAS

Q.4) The government of India launched Conference, Travel, Exhibition and Popular lectures (CTEP) to promote which of the following field?

- a) Biotechnology
- b) Nuclear technology
- c) Nanotechnology
- d) Space technology

ANS: A

Explanation:

- To popularize Biotechnology activities in India, Department of Biotechnology (DBT), Government of India provides financial assistance towards organizing Conference/ Seminar/ Symposium/ Workshop and Travel support to the researchers for presenting their papers in the conferences which are being organized outside the country.
- It also extends support for organizing DBT stalls in Exhibitions held within the country as well as outside the country. Financial supports are also provided for organising Popular Lectures.
- The collective term for these four activities is CTEP (Conference, Travel, Exhibition and Popular Lectures).

Source: ForumIAS

Q.5) Consider the following statements with respect to Satish Dhawan Space Centre (SDSC):

1. SDSC SHAR, Sriharikota, the Spaceport of India, is responsible for providing Launch Base Infrastructure for the Indian Space Programme.
2. The Centre has two launch pads from where the rocket launching operations of PSLV, GSLV and Sounding rockets are carried out.

Which of the following below given codes are correct?

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

ANS: A

Explanation:

- Satish Dhawan Space Centre (SDSC) SHAR, Sriharikota, the Spaceport of India, is responsible for providing Launch Base Infrastructure for the Indian Space Programme.
- This Centre has the facilities for solid propellant processing, static testing of solid motors, launch vehicle integration and launch operations, range operations comprising telemetry, tracking and command network and mission control centre.
- The Centre has two launch pads from where the rocket launching operations of PSLV and GSLV are carried out. The mandate for the centre is
 - to produce solid propellant boosters for the launch vehicle programmes of ISRO
 - to provide the infrastructure for qualifying various subsystems and solid rocket motors and carrying out the necessary tests
 - to provide launch base infrastructure for satellites and launch vehicles.
- SDSC SHAR has a separate launch pad for launching sounding rockets.
- The centre also provides the necessary launch base infrastructure for sounding rockets of ISRO and for assembly, integration and launch of sounding rockets and payloads.

Source: ISRO website

Q.6) Global Cybersecurity Index (GCI) is released by which of the following organisation?

- a) World Bank
- b) NASA
- c) International Telecommunication Union
- d) Both (a) and (b)

ANS: C

Explanation: About Global Cybersecurity Index (GCI):

- It is released by the ITU.
- It measures the commitment of countries to cybersecurity at a global level.
- India has secured the 10th rank in this index.

Source: ForumIAS

Q.7) Consider the following statements about Neurocysticercosis:

1. It cannot spread from humans to humans.
2. It is a neurologic infection caused when a human consumes meat from or comes in contact with a pig infected with tapeworm.

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

ANS: C

Explanation: About Neurocysticercosis (NCC):

- It is a zoonotic disease.
- It is a neurologic infection caused when a human consumes meat from or comes in contact with a pig infected with tapeworm.
- The eggs of the tapeworm invade the muscles of the human body to make cysts. Sometimes these cysts get into people's brains, triggering epileptic seizures, headaches, difficulty with balance and excess fluid around the brain.
- Those with NCC cannot spread the disease to other people.

Source: ForumIAS

Q.8) The ability of certain materials to generate an electric charge in response to applied mechanical stress is termed as?

- a) De Haas–van Alphen effect
- b) Haas effect
- c) Piezoelectrical Effect
- d) Raman effect

ANS: C

Explanation: About Piezoelectrical Effect:

- Piezoelectric Effect is the ability of certain materials to generate an electric charge in response to applied mechanical stress.
- The piezoelectric effect is very useful in many applications that involve the production and detection of sound, generation of high voltages, electronic frequency generation and ultra-fine focusing of optical assemblies.
- The effect is also used in igniting mechanism for cigarette lighters. Indian scientists have recently proposed an efficient way to induce piezoelectric delta phase in polymer nanoparticles.

Source: ForumIAS

Q.9) India's first Graphene Innovation Centre would be set up at which of the following place?

- a) Thrissur, Kerala
- b) Chandigarh University, Mohali
- c) Hyderabad, Telangana
- d) Pune, Maharashtra

ANS: A

Explanation: About Graphene Innovation Centre in Thrissur, Kerala:

- The Government of Kerala has announced the country's first Graphene Innovation Centre.
- Graphene is a one-atom-thick layer of carbon atoms arranged in a hexagonal lattice. It is the thinnest, most electrically and thermally conductive material in the world.
- It is also flexible, transparent and incredibly strong.
- Graphene has widespread use in bio-medical applications (like targeted drug delivery, testing kits), composites and coatings, electronics, batteries, membranes to separate materials, ultra-sensitive sensors etc.

Source: ForumIAS

Q.10) Consider the following statements about Negative Ions:

1. Negative ions are made when sunlight, radiation, air, or water break down oxygen.
2. These ions have an impact on pollutants by making them negatively charged and get them collected on surfaces.

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

ANS: C

Explanation: About Negative Ions:

- An ion is an atom, or a molecule, which has gained or lost one or more electrons;
- Negative ions are made when sunlight, radiation, air, or water break down oxygen.
- It is believed that negative ions create positive vibes and uplift the mood. These ions also have an impact on pollutants by making them negatively charged and get them collected on surfaces.

About Negative Ion Technology

- Negative ion technology embeds negative ions in personal products and is currently being advertised as a means to maintain health, balance energy, and improve well-being;
- This technology is used in certain silicone wristbands, quantum or scalar-energy pendants, sleep masks, jewellery among others;
- The minerals that produce these negative ions often include naturally occurring radioactive substances such as uranium and thorium.

Source: ForumIAS