Q.1) Consider the following pairs:

1. Isohels/Isohals : : Imaginary lines on a map passing through places of same duration of sunshine.
2. Isohypse : : Imaginery lines passing through places having the same height from the sea level.
3. Isohytes : : Lines joining the places on the earth's surface having equal rainfall.
4. Isonephs : : Imaginery lines passing through places having same mean cloudiness over a certain period.

Which of the pairs given above is/are correct?

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

Q.1) Solution (d)

Isotherm is a line on a map connecting points having the same temperature at a given time or on average over a given period.

Isobar is a line on a map connecting points having the same atmospheric pressure at a given time or on average over a given period.

Isohyte is a line on a map joining the places on the earth's surface having equal rainfall.

Isobath is an imaginary line or a line on a map or chart that connects all points having the same depth below a water surface (as of an ocean, sea, or lake)

Isohel/Isohal is an imaginary line on a map passing through places of same duration of sunshine.

Isohypse is an imaginary line passing through places having the same height from the sea level.

Isonephs is an imaginary line passing through places having same mean cloudiness over a certain period.

Isohaline is a line on a map joining points of equal salinity in an aquatic system.

Q.2) With reference to different instruments used to measure atmospheric conditions, consider the following statements:

1. Instruments used to measure direction of the wind is anemometer.
2. Instruments used to measure relative humidity is hygrometer.
3. Instruments used to measure wind speed is wind vane.

Choose correct codes from the options given below:

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

Q.2) Solution (b)

A weather vane, wind vane, or weathercock is an instrument for showing the direction of the wind. They are typically used as an architectural ornament to the highest point of a building.

A hygrometer is an instrument used for measuring the moisture content in the atmosphere or relative humidity.

An anemometer is a device used for measuring the speed of wind, and is also a common weather station instrument.

Q.3) Which among the following are benefits of Atmosphere?

1. It protects from harmful radiation
2. It contains living gases
3. Acts as Green house, allows long-wave radiation and traps short-wave radiation
4. Acts as medium for fast air transport
5. Storehouse for water vapour and leads to precipitation

Choose the appropriate code:

a) 2, 3 and 5 only
b) 1, 2, 3 and 5 only
c) 1, 2, 4 and 5 only
d) All of the above

Q.3) Solution (c)

Atmosphere contains living gases like oxygen for man and animal, and carbon dioxide for plants (important for survival)
It protects the earth from the harmful radiation from the sun. It acts as Green house by allowing short-wave radiation (from Sun) and trapping long-wave terrestrial radiation (from Earth's surface)

Q.4) Consider the following statements:

1. Aurora Australis is the phenomenon of beams of many coloured lights in the Southern Hemisphere.
2. Aurora Borealis is the phenomenon of beams of many coloured lights in the Northern Hemisphere.
3. Auroras are caused when energetic electrically charged particles released from the sun that enter the earth's atmosphere collide with gas atoms.

Which of the statements given above is/are correct?

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

Q.4) Solution (d)

The Aurora is an incredible light show caused by collisions between electrically charged particles released from the sun that enter the earth's atmosphere and collide with gases such as oxygen and nitrogen. The lights are seen around the magnetic poles of the northern and southern hemispheres.

Bottom line: When charged particles from the sun strike atoms in Earth's atmosphere, they cause electrons in the atoms to move to a higher-energy state. When the electrons drop back to a lower energy state, they release a photon: light. This process creates the beautiful aurora.

Q.5) Consider the following statements related to Cyclones and Anti-cyclones:

1. Cyclone rotates anti-clockwise in Northern hemisphere and anti-cyclone rotates clockwise in Northern Hemisphere.
2. Cyclones are characterized by fine weather where as Anti-cyclones are characterized by dull weather.
3. In Cyclone winds blow inward into the region of low pressure, whereas in Anti-cyclone winds blow outwards.

Choose correct codes from the below given options:

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

Q.5) Solution (a)

Cyclones and Anti-cyclones, they both describe the action of air movement, though in different directions. In the Northern hemisphere, cylcones (low pressure areas) have air rotating in an anticlockwise direction. Conversely, anticyclones (high pressure areas), have air rotating around them in a clockwise manner.

Major differences:

Cyclones

(i) It is an area of low pressure surrounded by high pressure.
(ii) Winds converge at the eye (central low pressure) of the cyclone, wind moves in a spiral motion.
(iii) Stormy conditions prevail.
(iv) Winds blow in an anti-clock-wise direction in the Northern hemisphere and vice-versa in the Southern hemisphere.

Anticyclones

(i) It is an area of high pressure surrounded by low pressure.
(ii) Winds diverge from the cen-tral high pressure to the sur-rounding low pressure.
(iii) Light cool winds blow.
(iv) Winds blow in a clockwise di-rection in the Northern hemi-sphere and vice-versa in the Southern hemisphere.

Q.6) Consider the following statements:

1. Mesosphere lies above the stratosphere and temperature increases with increase in altitude.
2. Troposphere extends up to 18km at equator and 8 km at pole.
3. The temperature at tropopause over the equator is less than that the temperature of tropopause over the pole.

Which of the above statements are correct?

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

Q.6) Solution (b)

The mesosphere lies above the stratosphere, which extends up to a height of 80 km. In this layer, once again, temperature starts decreasing with the increase in altitude and reaches up to minus 100°C at the height of 80 km. The upper limit of mesosphere is known as the *mesopause*.

The troposphere is the lowermost layer of the atmosphere. Its average height is 13 km and extends roughly to a height of 8 km near the poles and about 18 km at the equator.

The zone separating the tropsophere from stratosphere is known as the *tropopause*. The air temperature at the tropopause is about minus 800C over the equator and about minus 45^{o}C over the poles. The temperature here is nearly constant, and hence, it is called the tropopause. *The stratosphere* is found above the tropopause and extends up to a height of 50 km.

Q.7) Amongst the following gases, which one has the highest concentration in the atmosphere?

a) Argon
b) Carbon dioxide
c) Hydrogen
d) Methane

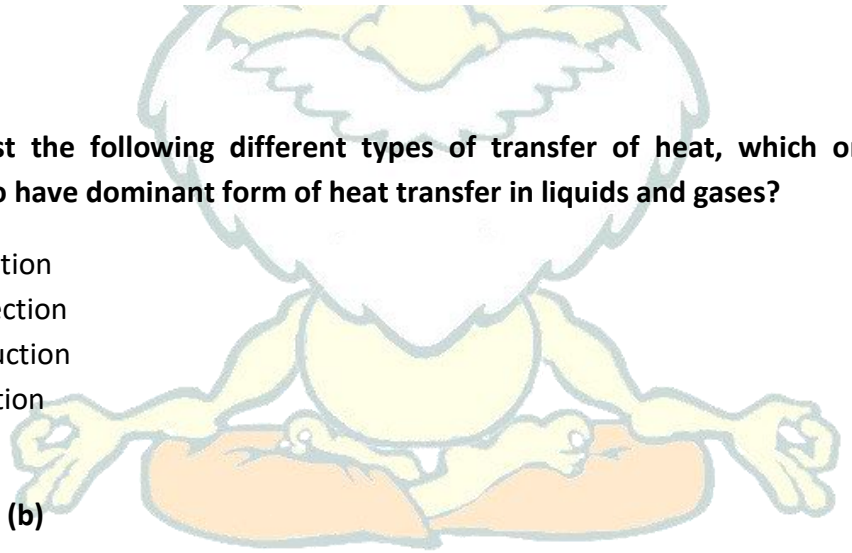
Q.7) Solution (a)

Argon is the 3rd largest gas in the atmosphere with 0.93% volume.

TABLE 1. Major Components of the Earth's Atmosphere

GAS	CONCENTRATION	
Nitrogen, N_2	78.1% by volume	
Oxygen, O_2	20.9% by volume	
Argon, A	0.9% by volume	
Water Vapor, H_2O	0-4%, variable	**Greenhouse Gas**
Methane, CH_4	1,750 ppb	"
Carbon Dioxide, CO_2	350 ppm	"
Nitrous oxide, N_2O	280 ppb	"
Carbon Monoxide, CO	150 ppb	"
Ozone, O_3	4-65 ppb	"

(ppm = parts per million, ppb = parts per billion)



Q.8) Amongst the following different types of transfer of heat, which one is usually considered to have dominant form of heat transfer in liquids and gases?

a) Advection
b) Convection
c) Conduction
d) Radiation

Q.8) Solution (b)

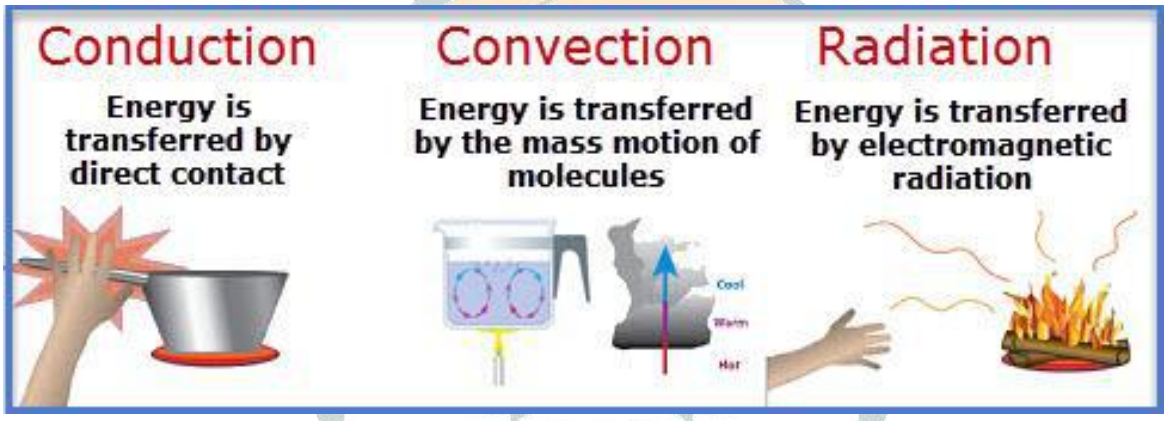
Convection is the transfer of heat by the mass movement of a fluid (such as water and air) in the vertical direction (up and down). Convection occurs naturally in the atmosphere and convection is one process by which clouds can form. Convection is usually the dominant form of heat transfer in liquids and gases. Hence, option (b) is the correct answer.

The transfer of heat or matter by the flow of a fluid, especially horizontally in the atmosphere or the sea is called *advection*.

Conduction is the transfer of heat from molecule to molecule within a substance. Molecules must be in direct contact with each other.

All things with a temperature above absolute zero emit radiation. Radiation allows heat to be transferred through wave energy. These waves are called electromagnetic waves.

Radiation is a method of heat transfer that does not rely upon any contact between the heat source and the heated object as is the case with conduction and convection. Heat can be transmitted through empty space by thermal radiation often called infrared radiation. This is a type of electromagnetic radiation. No mass is exchanged and no medium is required in the process of radiation. Examples of radiation is the heat from the sun, or heat released from the filament of a light bulb.



Q.9) Geostopic winds are high altitude winds which flows parallel to the isobars. Which of the following statements are correct about Geostopic winds?

1. The net force on geostopic winds is zero.
2. The friction does not act on geostropic winds.
3. The winds blow with varying speed.

Select the code from below:

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

Q.9) Solution (a)

The velocity and direction of the wind are the net result of the wind generating forces. The winds in the upper atmosphere, 2 - 3 km above the surface, are free from frictional effect of the surface and are controlled mainly by the pressure gradient and the Coriolis force. When isobars are straight and when there is no friction, the pressure gradient force is balanced by the Coriolis force and the resultant wind blows parallel to the isobar. This wind is known as the geostrophic wind. Since, these winds blow with a uniform speed, statement (3) is wrong. Hence (a) is the correct answer.

Q.10) In which of the following situations, condensation can take place?

1. When the temperature of the air is reduced to dew point with its volume remaining constant.
2. When both the volume and the temperature are reduced.
3. When moisture is added to the air through evaporation.

Select the code from below:

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

Q.10) Solution (d)

Condensation is influenced by the volume of air, temperature, pressure and humidity. Condensation takes place:

(i) when the temperature of the air is reduced to dew point with its volume remaining constant;
(ii) when both the volume and the temperature are reduced;
(iii) when moisture is added to the air through evaporation.

However, the most favourable condition for condensation is the decrease in air temperature.

Q.11) The Saragasso Sea is a vast patch of Atlantic ocean characterized by an abundance of floating brown seaweed called 'Sargassum'. This is formed due to the deposit of marine plants and refuse carried by the

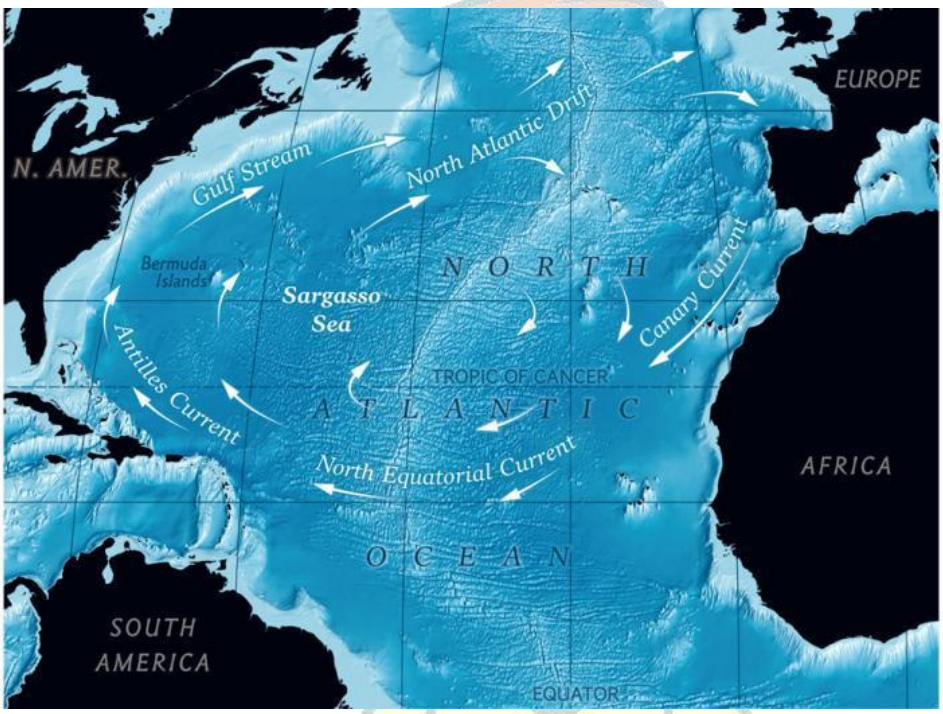
1. North Atlantic current
2. Canary current
3. North Atlantic Equatorial current

Select the correct answer using the code given below

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

Q.11) Solution (d)

Saragasso Sea is a vast patch of Atlantic ocean characterized by an abundance of floating brown seaweed called 'Sargassum'. This is formed due to the deposit of marine plants and refuse carried by all the three currents – North Atlantic current, Canary current and North Atlantic Equatorial current. (Refer fig)



Q.12) The Dardanelles Strait, a narrow strait in northern Turkey connects -

a) Aegean Sea and Mediterranean Sea
b) Sea of Marmara and Java Sea
c) Sea of Marmara and Aegean Sea
d) Aegean Sea and Java Sea

Q.12) Solution (c)

Explanation (Refer figure below)

Q.13) With reference to different types of clouds and their characteristics, consider the following statements:

1. Characteristics of Halo is associated with Cumulonimbus clouds.
2. Severe thunderstorms and hail storms are associated with Cirrostratus Clouds.
3. Altocumulus clouds appear like waves in the sky and indicate fine weather.

Choose correct codes from the options given below:

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

Q.13) Solution (c)

Cirrostratus

- Characteristics of Halo is associated with Cirrostratus Clouds. Hence, statement (1) is wrong.
- Transparent, whitish veil clouds with a fibrous (hair-like) or smooth appearance. A sheet of cirrostratus which is very extensive, nearly always ends by covering the whole sky.
- A milky veil of fog (or thin Stratus) is distinguished from a veil of Cirrostratus of a similar appearance by the halo phenomena which the sun or the moon nearly always produces in a layer of cirrostratus.

Cumulonimbus

- The thunderstorm cloud, this is a heavy and dense cloud in the form of a mountain or huge tower. The upper portion is usually smoothed, fibrous or striated and nearly always flattened in the shape of an anvil or vast plume.
- Under the base of this cloud which is often very dark, there are often low ragged clouds that may or may not merge with the base. They produce precipitation, which sometimes is in the form of virga.
- Cumulonimbus clouds also produce hail and tornadoes. Hence, severe thunderstorms and hail storms are associated with Cumulonimbus clouds and not Cirrostratus clouds, hence statement (2) is wrong.

Altocumulus

- White and/or gray patch, sheet or layered clouds, generally composed of laminae (plates), rounded masses or rolls. They may be partly fibrous or diffuse.
- When the edge or a thin semitransparent patch of altocumulus passes in front of the sun or moon a corona appears. This colored ring has red on the outside and blue inside and occurs within a few degrees of the sun or moon.
- The most common mid cloud, more than one layer of Altocumulus often appears at different levels at the same time. Many times Altocumulus will appear with other cloud types.
- Altocumulus clouds appear like waves in the sky and indicate fine weather. Hence, statement (3) is correct.

Q.14) The average temperature on earth remains constant. This is because:

a) Earth retains the sun's heat and the net heat radiated by earth back to space is less than the heat received by the earth from sun.
b) The net heat radiated back by the earth is more than the heat received by the earth.
c) The net heat radiated by the earth back to space is equal to the heat received by the earth.
d) None of the above statements are correct.

Q.14) Solution (c)

The net heat balance of earth is zero. The amount of heat received by the earth is equal to the amount radiated back by the earth to the space.
Had there been a residual heat, the planet would have constantly become warmer.

Q.15) Which of the following factors control the insolation received at a place?

1. Rotation of the earth
2. Angle of inclination of sun's rays
3. Transparency of the atmosphere
4. Albedo of the surface

Select the correct code from following:

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

Q.15) Solution (a)

Albedo is the amount of radiation reflected back to the atmosphere directly from the surface. This comes into play once the insolation has struck the surface. It has no effect on the insolation received at a place. Hence, option (a) is correct answer.

Q.16) Consider the following statements about 'Paika Rebellion'

1. It was led by Bakshi Jagabandhu Bidyadhar
2. It took place when the British East India company wrested the rent-free land that had been given to the Paiks for their military service to the Kingdom of Khurda

Select the correct statements

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

Q.16) Solution (c)

Odisha is currently celebrating 200 years of what was considered among the first uprisings against British rule in India.

A valiant uprising of soldiers led by Buxi Jagabandhu (Bidyadhar Mohapatra) took place in Khurda of Odisha.

It was the Paika Revolution of 1817, headed by their redoubtable leader Jagabandhu Bidyadhar Mohapatra Bhramarbar Rai, more popularly known as Bakshi Jagabandhu of

Khurda. Jagabandhu was a jagirdar under the King of Khurda and Killa Rorang was his familial estate. "Bakshi" was a title given to military leaders, who functioned much like the mansabdars under the Mughals.

The Paikas were the traditional landed militia of Odisha. They functioned as soldiers during war and had policing duties in peacetime. There were three types of Paiks - the Paharis who were basically swordsmen, the Banuas or gunmen (matchlock men rater) and the archers classified as the Dhenkiyas.

When armies of the East India Company overran most of Odisha in 1803, the Raja of Khurda lost his primacy and the power and prestige of the Paikas went on a decline. The British were not comfortable with these aggressive, warlike new subjects and set up a commission under Walter Ewer to look into the issue.

The last lines of Ewer's report succinctly sum up what was coming for the Paikas - he concluded his report by saying "... unless the Paik community is ruined completely, British rule cannot run smoothly".

The commission recommended that the hereditary rent-free lands granted to the Paikas be taken over by the British administration and this recommendation was zealously adhered to. However, the rebellion had several other underlying causes - like the rise in the price of salt, abolition of the cowrie currency for payment of taxes and an overtly extortionist land revenue policy.

The immediate trigger for the rebellion probably came in March 1817, when a body of around 400 swordsmen from Gumsur came to Khurda and revolted openly against the Company's rule. The Paiks under Jagabandhu joined them and proceeded to Khurda.

Although initially the Company struggled to respond they managed to put down the rebellion by May 1817. Many of the Paik leaders were hung or deported. Jagabandhu would surrender in 1825 and was still a prisoner when he passed away in 1829. Peace never really returned to Odisha as local insurgencies kept flaring up, like the one in Tapanga in 1827 and Banapur in 1835.

Source: http://www.thehindu.com/news/national/paika-rebellion-of-1817/article18071125.ece

Q.17) Consider the following statements about 'Operation Clean Money'

1. It will be operated under the Prime Minister's Office

2. It involves verification of large cash deposits made under Pradhan Mantri Garib Kalyan Yojna (PMGKY)

Select the correct statements

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

Q.17) Solution (c)

Income Tax Department (ITD) has initiated Operation Clean Money, today. Initial phase of the operation involves e-verification of large cash deposits made during 9th November to 30th December 2016. Data analytics has been used for comparing the demonetisation data with information in ITD databases. In the first batch, around 18 lakh persons have been identified in whose case, cash transactions do not appear to be in line with the tax payer's profile.

ITD has enabled online verification of these transactions to reduce compliance cost for the taxpayers while optimising its resources. The information in respect of these cases is being made available in the e-filing window of the PAN holder (after log in) at the portal https://incometaxindiaefiling.gov.in. The PAN holder can view the information using the link

"Cash Transactions 2016" under "Compliance" section of the portal. The taxpayer will be able to submit online explanation without any need to visit Income Tax office.

Email and SMS will also be sent to the taxpayers for submitting online response on the e-filing portal. Taxpayers who are not yet registered on the e-filing portal (at https://incometaxindiaefiling.gov.in) should register by clicking on the 'Register Yourself' link. Registered taxpayers should verify and update their email address and mobile number on the e-filing portal to receive electronic communication.

A detailed user guide and quick reference guide is available on the portal to assist the taxpayer in submitting online response. In case of any difficulty in submitting on line response, help desk at 1800 4250 0025 may be contacted.

Data analytics will be used to select cases for verification, based on approved risk criteria. If the case is selected for verification, request for additional information and its response will also be communicated electronically. The information on the online portal will be dynamic getting updated on receipt of new information, response and data analytics.

The response of taxpayer will be assessed against available information. In case explanation of source of cash is found justified, the verification will be closed without any need to visit Income Tax Office. The verification will also be closed if the cash deposit is declared under Pradhan Mantri Garib Kalyan Yojna (PMGKY).

The taxpayers covered in this phase should submit their response on the portal within 10 days in order to avoid any notice from the ITD and enforcement actions under the Income-tax Act as also other applicable laws.

Source: http://www.thehindu.com/news/national/in-operation-clean-money-i-t-dept-to-probe-60000-people/article18012603.ece?homepage=true

Q.18) 'Bagha Nacha' is performed in which of the following states?

a) West Bengal
b) Odisha
c) Rajasthan
d) Gujarat

Q.18) Solution (b)

The biennial Thakurani Jatra festival of Berhampur, Odisha showcases the famous tiger dance or 'Bagha Nacha'.

During the 21-day-long Thakurani Jatra festival, several people, including children, get their whole body painted like a tiger as homage to Goddess Budhi Thakurani.

In Bagha Nacha (Tiger Dance), a young male paints himself as a tiger and wears a special head gear and tail while dancing to the tune of Dhampa (a musical instrument played by beating with two sticks on drums).

Source: http://www.thehindu.com/todays-paper/tp-national/tp-otherstates/odishas-famous-tiger-dance-losing-its-charm-for-many/article18211299.ece

Q.19) Feni River originates in

a) Arunachal Pradesh
b) Tripura
c) Nagaland

d) Manipur

Q.19) Solution (b)

It is a river in the Indian state of Tripura and southeastern Bangladesh. It is a trans-boundary river with an ongoing dispute about water rights. The Feni River originates in South Tripura district and flows through Sabroom town and then enters Bangladesh. Muhuri River, also called Little Feni, from Noakhali District joins it near its mouth.

Q.20) Consider the following statements about International Financial Services Centre (IFSC)

1. Special Economic Zones Act, 2005 provides for the setting up of an International Financial Services Centre (IFSC)
2. Businesses setup in IFSC comes under guidelines and regulations of Ministry of Corporate Affairs, RBI, SEBI and IRDAI

Select the correct statements

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

Q.20) Solution (c)

The SEZ Act 2005 allows setting up an IFSC in an SEZ or as an SEZ after approval from the central government.

An IFSC caters to customers outside the jurisdiction of the domestic economy. Such centres deal with flows of finance, financial products and services across borders. London, New York and Singapore can be counted as global financial centres. Many emerging IFSCs around the world, such as Shanghai and Dubai, are aspiring to play a global role in the years to come.

Gujarat International Finance Tec-City Co. Ltd is being developed as the country's first international financial services centre (IFSC).

All financial concessions prevailing as per the Special Economic Zones Act, 2005 and the Special Economic Zones Rules, 2006 will be applicable to IFSCs within the SEZs.

Businesses setup in IFSC comes under guidelines and regulations of Ministry of Corporate Affairs, RBI, SEBI and IRDAI.

Read More (Important) - http://www.indiainx.com/static/ifsc.aspx

Q.21) Which one of the following is not a site for in-situ method of conservation of flora?

a) Biosphere reserve
b) Botanical garden
c) National park
d) Wildlife sanctuary

Q.21) Solution (b)

In-situ conservation, the conservation of species in their natural habitats, is considered the most appropriate way of conserving biodiversity.

Conserving the areas where populations of species exist naturally is an underlying condition for the conservation of biodiversity. That's why protected areas form a central element of any national strategy to conserve biodiversity.

Ex-situ conservation is the preservation of components of biological diversity outside their natural habitats. This involves conservation of genetic resources, as well as wild and cultivated or species, and draws on a diverse body of techniques and facilities.

Zoos and botanical gardens are the most conventional methods of ex-situ conservation, rest all options are natural habitats so are of in situ conservation.