



All India Civil Services Coaching Centre

(Under the aegis of Government of Tamil Nadu)

Answer Key Explanation

Test 15 – GS Paper I

Maximum Questions: 100

Maximum Marks: 200

1. Correct Option: (d)

Explanation:

- All statements are correct
- Territorial Extent of Central and State Legislation
- The Constitution defines the territorial limits of the legislative powers vested in the Centre and the states in the following way:
- The Parliament can make laws for the whole or any part of the territory of India.
- The territory of India includes the states, the union territories, and any other area for the time being included in the territory of India.
- A state legislature can make laws for the whole or any part of the state.
- The laws made by a state legislature are not applicable outside the state, except when there is a sufficient nexus between the state and the object.
- The Parliament alone can make 'extraterritorial legislation'. Thus, the laws of the Parliament are also applicable to the Indian citizens and their property in any part of the world.
- However, the Constitution places certain restrictions on the plenary territorial jurisdiction of the Parliament.
- In other words, the laws of Parliament are not applicable in the following areas:
 - o The President can make regulations for the peace, progress and good government of the four Union Territories—the Andaman and Nicobar Islands, Lakshadweep, Dadra and Nagar Haveli and Daman and Diu. A regulation so made has the same force and effect as an act of

Parliament. It may also repeal or amend any act of Parliament in relation to these union territories.

- o The governor is empowered to direct that an act of Parliament does not apply to a scheduled area in the state or apply with specified modifications and exceptions.
- o The Governor of Assam may likewise direct that an act of Parliament does not apply to a tribal area (autonomous district) in the state or apply with specified modifications and exceptions.
- o The President enjoys the same power with respect to tribal areas (autonomous districts) in Meghalaya, Tripura and Mizoram.

2. Correct Option: (a)

Explanation:

- Statement 3 is incorrect: The electoral college of the President has been expanded to the elected members of the legislative assemblies of the UTs of Delhi and Puducherry since the enforcement of the Constitution of India by 70th Constitutional Amendment Act of 1992.
- Statement 4 is incorrect: The members of the RS are not directly elected by the citizens of the India but they are part of the electoral college for the election of the President of India.

Electoral college of the President's Election:

The President is elected not directly by the people but by members of electoral college consisting of:

- the elected members of both the Houses of Parliament;
- the elected members of the legislative assemblies of the states; and

- the elected members of the legislative assemblies of the Union Territories of Delhi and Puducherry (This provision is added by 70th Constitutional Amendment Act of 1992).
 - Not all the members of the Electoral college for the election of President are directly elected by citizens of the India as MPs of Rajya Sabha and MLAs of State Legislative council are elected indirectly.
- Impeachment of the President:**
- o The President can be removed from office by a process of impeachment for 'violation of the Constitution'. However, the Constitution does not define the meaning of the phrase 'violation of the Constitution'.
 - o The impeachment charges can be initiated by either House of Parliament.
 - o These charges should be signed by one-fourth members of the House (that framed the charges), and a 14 days' notice should be given to the President.
 - o After the impeachment resolution is passed by a majority of two-thirds of the total membership of that House, it is sent to the other House, which should investigate the charges.
- The President has the right to appear and to be represented at such investigation. If the other House also sustains the charges and passes the impeachment resolution by a majority of two-thirds of the total membership, then the President stands removed from his office from the date on which the resolution is so passed.
 - The majority of two-thirds of the total membership of the house is the strongest majority among all the different majorities the Parliament uses. For LS it is 363 and for RS it is 167.

3. Correct Option: (a)

Explanation:

- Statement 2 is incorrect: These are issued by brokers and Foreign Institutional Investors (FII) who are registered with SEBI.

Participatory notes

- Participatory notes also called P-Notes are offshore derivative instruments with Indian shares as underlying assets.
- These instruments are used for making investments in the stock markets.
- They are used outside India for making investments in shares listed in the Indian stock market, hence called offshore derivative instruments.
- Participatory notes are issued by brokers and Foreign Institutional Investors (FII) registered with SEBI.
- While the FIIs have to report all such investments each quarter to SEBI, they need not disclose the identity of the actual investors.
- Hence they provide anonymity to the entity/ investor of participatory note.
- Any dividends or capital gains arising out of the investments are passed back to the investors by brokers and FIIs.

4. Correct Option: (c)

Explanation:

- Statement 2 is incorrect: The price of domestically produced natural gas is decided by the government. It will not be sold on the gas exchange.

India Gas Exchange (IGX)

- IGX is a digital trading platform that will allow buyers and sellers of natural gas to trade both in the spot market and in the forward market for imported natural gas.
- It will allow trade across three hubs — Dahej and Hazira in Gujarat, and Kakinada in Andhra Pradesh.
- Imported Liquefied Natural Gas (LNG) will be regasified and sold to buyers through the exchange, removing the requirement for buyers and sellers to find each other.
- The price of domestically produced natural gas is decided by the government. It will not be sold on the gas exchange.
- Liquefied natural gas (LNG) traded on the platform is a natural gas that has been cooled to a liquid state at about -260° Fahrenheit, for shipping and storage.

- The volume of natural gas in its liquid state is about 600 times smaller than its volume in its gaseous state in a natural gas pipeline.

5. Correct Option: (d)

Explanation:

- Statement 2 is incorrect: Surface drains carrying municipal sewage is a point source of pollution.

Non-point sources of pollution in rivers

- These are non-measurable sources of pollution such as run-off from agricultural fields carrying chemicals and fertilizers, run-off from solid waste dumps and areas used for open defecation, dumping of unburnt/half-burnt dead bodies and animal carcasses, dhobi ghats, cattle wallowing, etc.

These can also include:

- Excess fertilizers, herbicides and insecticides from agricultural lands and residential areas.
- Oil, grease and toxic chemicals from urban runoff and energy production.
- Sediment from improperly managed construction sites, crop and forest lands, and eroding stream banks.
- Point sources: These are organized sources of pollution where the pollution load can be measured, e.g. surface drains carrying municipal sewage or industrial effluents, sewage pumping stations and sewerage systems, trade effluents from industries, etc.
- Pollution loads due to untreated sewage is one of the main reasons threatening the ecological health of rivers.
- Most of the urban lakes in the country are also facing similar challenges.
- Out of the total measurable pollution in the rivers from various point sources, around 75% is contributed by municipal sewage from towns located along the banks of rivers and remaining 25% by industrial effluents.

6. Correct Option: (b)

Explanation:

- Statement 1 is incorrect: Heavy sand mining in riverbeds would increase the salinity in the river

Sand mining in riverbeds

- Sand Mining is an activity referring to the process of the actual removal of sand from the foreshore including rivers, streams and lakes.
- Sand is mined from beaches and inland dunes and dredged from ocean beds and river beds.
- A related process is the mining of mineral sands, such as mineral deposits like diamond, gold and silver.
- These minerals typically occur combined with ordinary sand. The sand is dug up, the valuable minerals are separated in water by using their different density, and the remaining ordinary sand is re-deposited.
- Possible consequences of heavy sand mining in riverbeds
 - o Increased salinity in the river
 - o Pollution of groundwater
 - o Lowering of the water table

7. Correct Option: (d)

Explanation:

- Statement 1 is incorrect: Sudharak was edited under G.K. Gokhale
- Statement 2 is incorrect: Voice of India was edited under Dadabhai Naoroji

Role of press

- As a result of the spread of modern western education and thought during the 19th century, large number of Indians used press as the chief instrument to criticize official policies; put forward Indian point of view; ask people to unite and work for national welfare and popularize ideas of self-government, democracy, industrialization, etc.
- Press also enabled nationalist workers living in different parts of the country to exchange views with one another.
- Some prominent nationalist newspapers of the period were the Hindu and Swadesamitran under the editorship

of G. Subramaniya Iyer, Kesari and Mahratta under B.G. Tilak, Bengalee under Surendranath Banerjee, Amrita Bazar Patrika under Sisir Kumar Ghosh and Motilal Ghosh, Sudhakar under G.K. Gokhale, Indian Mirror under N.N. Sen, Voice of India under Dadabhai Naoroji, Paridasak by Bipin Chandra Pal; Hindustani and Advocate under G.P. Varma and Tribune and Akhbar-i-Am in Punjab, Indu Prakash, Dyan Prakash, Kal and Gujarati in Bombay, and Som Prakash, Banganivasi and Sadharani in Bengal.

8. Correct Option: (b)

Explanation:

- Pair (b) is correctly matched:

A. Anushilan Samiti	2. Promotha Mitter
B. Mitra Mela	3. Savarkar brothers
C. The Sociologist	1. Shyamji Krishnavarma
D. Yugantar	4. Barindra Kumar Ghosh

Revolutionary activities

- The first revolutionary groups were organized in 1902 in Midnapore (under jnanendranath Basu) and in Calcutta (the Anushilan Samiti founded by Promotha Mitter, and including jatindranath Banerjee, Barindra Kumar Ghosh and others.) But their activities were limited to giving physical and moral training to the members and remained insignificant till 1907-08.
- In April 1906, an inner circle within Anushilan (Barindra Kumar Ghosh, Bhupendranath Dutta) started the weekly Yugantar Shyamji Krishnavarma had started in London in 1905 an Indian Home Rule Society— 'India House'—as a centre for Indian students, a scholarship scheme to bring radical youth from India, and a journal The Sociologist.
- In 1899, Mitra Mela, a secret society, was organized by Savarkar and his brother. In 1904, Mitra Mela merged with Abhinav Bharat

9. Correct option: (a)

Explanation:

- Statement 2 is incorrect: The temperate cyclones occur mostly in winter, late autumn and spring.

Temperate Cyclones:

- The cyclones developing in the mid and high latitude, beyond the tropics are called the Temperate Cyclones or Extra Tropical Cyclones or Mid-Latitude Cyclones or Frontal Cyclones or Wave Cyclones.
- The origin and development temperate cyclone is best explained by the Norwegian model. It is very popularly known as polar front theory.
- According to this theory, the warm-humid air masses from the tropics meet the drycold air masses from the poles and thus a polar front is formed.
- Temperate Cyclones is intense frontogenesis involving mainly occlusion type front.
- Individual frontal cyclones exist for about 3 to 10 days moving in a generally west to east direction.
- The temperate cyclones occur mostly in winter, late autumn and spring. They are generally associated with rainstorms and cloudy weather.

10. Correct Option: (b)

Explanation:

- Option (b) is correct
- The countries that lie entirely to the south of the equator are Peru, Bolivia, Uruguay and Tanzania.

Countries through which equator passes:

- The equator passes through 13 countries - Ecuador, Colombia, Brazil, Sao Tome & Principe, Gabon, Republic of the Congo, Democratic Republic of the Congo, Uganda, Kenya, Somalia, Maldives, Indonesia and Kiribati.

11. Correct Option: (b)

Explanation:

- Statement 1 is incorrect: Prithvi class is a nuclear-capable surface to surface missiles.

Prithvi - II missile

- Recently India conducted a successful night test-fire of its indigenously developed Prithvi missile from the Integrated Test Range (ITR) at Chandipur, Odisha.
- It is a nuclear-capable surface-to-surface missile.
- It has a strike range of 350 km and is capable of carrying 500 to 1,000 kg of warheads.
- It is a ballistic missile powered by liquid propulsion twin engines.
- A ballistic missile is a rocket-propelled self-guided strategic-weapons system that follows a ballistic trajectory to deliver a payload from its launch site to a predetermined target.
- Prithvi class was the first missile developed by India's Defence Research Development Organisation (DRDO) under the Integrated Guided Missile Development Programme.

12. Correct Option: (c)

Explanation:

- Both statements are correct

Cat Que virus (CQV)

- Recently Cat Que virus (CQV) was reported in China and Vietnam in the past and was found in India as well.
- CQV belongs to the Simbu serogroup and infects both humans and economically important livestock species.
- CQV comes under the category of Arthropod-borne viruses.
- Arthropod-borne viruses spread to people by the bite of infected arthropods (insects) such as mosquitoes and ticks.
- The presence of the Cat Que virus has been largely reported in Culex mosquitoes in China and pigs in Vietnam.

- This virus is known to cause encephalitis like symptoms similar to Japanese encephalitis (JE).
- It is known to be transmitted by certain culicine mosquito species that are also known to transmit the Japanese encephalitis (JE) virus.

13. Correct Option: (b)

Explanation:

- Statement 2 is incorrect: As of end November 2021, India was the fourth largest foreign exchange reserves holder in the world after China, Japan, and Switzerland.

India's external Sector performance

- Despite all the disruptions caused by the global pandemic, India's balance of payments remained in surplus throughout the last two years. This allowed the Reserve Bank of India to keep accumulating foreign exchange reserves, which stands at US\$634 billion on 31st December 2021). This is equivalent to 13.2 months of imports and higher than the country's external debt.
- As of end-November 2021, India was the fourth largest foreign exchange reserves holder in the world after China, Japan, and Switzerland.
- A sizeable accretion in reserves led to an improvement in external vulnerability indicators such as foreign exchange reserves to total external debt, short-term debt to foreign exchange reserves, etc.

14. Correct Option: (d)

Explanation:

- Option (d) is correct

Digital Payments Index of RBI

- The Digital Payments Index of RBI, captures the extent of digitization of payments across the country. The index captures (i) Payment Enablers (weight 25%), (ii) Payment Infrastructure – Demand-side factors (10%), (iii) Payment Infrastructure – Supply-side factors (15%), (iv) Payment Performance (45%) and (v) Consumer Centricity (5%).

- The Digital Payments Index increased from 100 in March 2018 (base period) to 304.06 in September 2021.

15. Correct Option: (a)

Explanation:

- Statement 3 is incorrect: Article 11 empowers the Parliament to regulate the right of citizenship by law. The term state has broader meaning, it may include State legislature as well.

Citizenship:

- The Constitution deals with the citizenship from Articles 5 to 11 under Part II. However, it contains neither any permanent nor any elaborate provisions in this regard.
- It does not deal with the problem of acquisition or loss of citizenship subsequent to its commencement. It empowers the Parliament to enact a law to provide for such matters and any other matter relating to citizenship.
- Accordingly, the Parliament has enacted the Citizenship Act (1955), which has been amended from time to time.

Article	Matter
5	Citizenship at the commencement of the Constitution
6	Rights of citizenship of certain persons who have migrated to India from Pakistan
7	Rights of citizenship of certain migrants to Pakistan
8	Rights of citizenship of certain persons of Indian origin residing outside India
9	Persons voluntarily acquiring citizenship of a foreign State not to be citizens
10	Continuance of the rights of citizenship
11	Parliament to regulate the right of citizenship by law (Article 11 empower the Parliament to regulate the right of citizenship by law. The term state has broader meaning, it may include State legislature as well.)

- **Single Citizenship:** A unitary bias In spite of a dual polity, the Constitution of India, like that of Canada, adopted the system of single citizenship.
- There is only Indian Citizenship and no separate state citizenship.
- All citizens irrespective of the state in which they are born or reside enjoy the same rights all over the country.

Fundamental Rights and Citizen of India:

- Some FRs are only exclusive for the Citizen of India while some are available to both citizens and foreigners (except enemy aliens).
- In a way all the Fundamental Rights enshrined in the part III of the constitution of India are the rights for the citizen of India.

Citizenship Amendment Act 2019:

- The Act amends the Citizenship Act 1955 to provide that the Hindus, Sikhs, Buddhists, Jains, Parsis and Christians from Afghanistan, Bangladesh and Pakistan, who entered India on or before December 31, 2014, will not be treated as illegal migrants.
 - In order to get this benefit, they must have also been exempted from the Foreigners Act, 1946 and the Passport (Entry into India) Act, 1920 by the central government.
 - The 1920 Act mandates foreigners to carry passport, while the 1946 Act regulates the entry and departure of foreigners in India.
- Citizenship by registration or naturalization:**
- The Act allows a person to apply for citizenship by registration or naturalization if the person meets certain qualifications.
 - For instance, if a person resides in India for a year and if one of his parents is a former Indian citizen, he may apply for citizenship by registration.
 - To obtain citizenship by naturalization, one of the qualifications is that the person must have resided in India or have been in the service of the central government for

at least 11 years before applying for citizenship.

- The Amendment act creates an exception for Hindus, Sikhs, Buddhists, Jains, Parsis and Christians from Afghanistan, Bangladesh and Pakistan, with regard to this qualification. For these groups of persons, the 11 years' requirement will be reduced to five years.
- On acquiring citizenship: (i) such persons will be deemed to be citizens of India from the date of their entry into India, and (ii) all legal proceedings against them in respect of their illegal migration or citizenship will be closed.

16. Correct Option: (c)

Explanation:

- Statement 1 is incorrect: The Anti-Defection Law was passed in 1985 through the 52nd amendment to the Constitution.
- Statement 2 is incorrect: After the Kihoto Hollohan case (1992) the Supreme Court declared that the decision of the presiding officer is not final and can be questioned in any court. It is subject to judicial review on the grounds of malafide, perversity, etc.

Disqualification under the tenth schedule

- The Anti-Defection Law was passed in 1985 through the 52nd amendment to the Constitution. It added the Tenth Schedule to the Indian Constitution. The main intent of the law was to combat "the evil of political defections".
- According to it, a member of a House belonging to any political party becomes disqualified for being a member of the House, if:
 - o he voluntarily gives up his membership of such political party; or
 - o he votes or abstains from voting in such House contrary to any direction issued by his political party without obtaining prior permission of such party and such act has not been condoned by the party within 15 days.

Exceptions to the Disqualification on the Ground of Defection

- If a member goes out of his party as a result of a merger of the party with another party.
- A merger takes place when two-thirds of the members of the party have agreed to such merger.
- If a member, after being elected as the presiding officer of the House, voluntarily gives up the membership of his party or rejoins it after he ceases to hold that office.
- This exemption has been provided in view of the dignity and impartiality of the office. Powers of Speaker with regard to Anti-Defection Law
- Any question regarding disqualification arising out of defection is to be decided by the presiding officer of the House.
- After the Kihoto Hollohan case (1992) the Supreme Court declared that the decision of the presiding officer is not final and can be questioned in any court. It is subject to judicial review on the grounds of malafide, perversity, etc.

17. Correct Option: (a)

Explanation:

- Statement 2 is incorrect: Revenue earned by USA Embassy in India is counted in USA's GDP.
- Statement 3 is incorrect: The car's contribution in GDP has already been counted in the year it was manufactured.
- Statement 4 is incorrect: Only the goods and services produced in the Domestic Territory of India are counted in GDP calculation.

Gross Domestic Product

- It is the money value of all the final goods and services produced within the domestic territory of a country during an accounting year.

Intermediate Goods and Final Goods

- Intermediate Goods: Intermediate goods are those goods which are meant either for reprocessing or for resale. Goods

used in the production process during an accounting year are known as intermediate goods. These are non-durable goods and services used by the producers such as raw materials, oil, electricity, coal, fuel etc. and services of hired engineers and technicians etc.

- Goods which are purchased for resale are also treated as intermediate goods. For example, Rice, wheat, sugar etc. purchased by a retailer/whole seller.

Final Goods:

- Goods which are used either for final consumption by the consumers or for investment by the producers are known as final goods. These goods do not pass-through production process and are not used for resale. For example, bread, butter, biscuits etc. used by the consumer.
- Whether a good is a final good or an intermediate good depends on its use. For example; milk used by a sweet maker is an intermediate good but when it is used by the consumer it becomes a final good.
- Intermediate goods are not included in the calculation of national income. Only final goods are included in the calculation of national income because value of intermediate goods is included in the value of final goods. If it is included in national income it will lead to the problem of double counting.

Domestic Territory

Domestic territory of a country includes the following:

- Political frontiers of the country including its territorial waters.
- Ships, and aircrafts operated by the normal residents of the country between two or more countries for example, Air India's services between different countries.
- Fishing vessels, oil and natural gas rigs and floating platforms operated by the residents of the country in the international waters or engaged in

extraction in areas where the country has exclusive rights of operation.

- Embassies, consulates and military establishments of the country located in other countries, for example, Indian embassy in U.S.A., Japan etc.
- It excludes all embassies, consulates and military establishments of other countries and offices of international organisations located in India.

18. Correct Option: (c)

Explanation:

- Statement 2 is incorrect: Primary Deficit reflects the borrowing requirements of the government for financing the expenditure excluding interest payments

Revenue Deficit

- It refers to the excess of total revenue expenditure of the government over its total revenue receipts. Revenue deficit = Total Revenue expenditure – Total Revenue receipts.
Revenue deficit = Total Revenue expenditure – (Tax Revenue + Non-Tax Revenue)

Fiscal Deficit

- Fiscal deficit is defined as excess of total expenditure over total receipts excluding borrowings during a fiscal year. Fiscal deficit = Total budget expenditure – Total budget receipts excluding borrowings
Fiscal Deficit = (Revenue expenditure + Capital expenditure) – (Revenue Receipts + Capital receipts excluding borrowings)
Fiscal deficit shows the borrowing requirements of the govt. during the budget year. Fiscal deficit reflects the borrowing requirements of the govt. for financing the expenditure including interest payments.
Fiscal deficit = Total borrowing requirement of the government
- Fiscal deficit indicates the additional amount of financial resources needed to meet government expenditure. Two, it is an indicator of the increase in future

liabilities of the government on interest payment and loan repayment. The government has to pay back the borrowed amount with interest in future.

- Consequently, the government has to either borrow more from the people or tax people more in future to pay interest and loan amount.

Primary Deficit

- Primary deficit is defined as fiscal deficit minus interest payments on previous borrowings.
- Primary deficit shows the borrowing requirements of the govt. for meeting expenditure excluding interest payment.
Gross Primary deficit = Fiscal deficit – Interest payments

19. Correct Option: (d)

Explanation:

- Statement 2 is incorrect: The Egyptian vulture is listed as 'endangered'.
- Statement 3 is incorrect: The Himalayan, bearded and cinereous vultures are 'near threatened'.

Vulture Action Plan 2020-25

- Recently, the Ministry of Environment, Forests and Climate Change (MoEFCC) launched a Vulture Action Plan 2020-25 for the conservation of vultures in the country.
- While the ministry has been carrying out a conservation project for vultures since 2006, the plan is to now extend the project to 2025 to not just halt the decline but to actively increase the vulture numbers in India.
- The cause of the decline was established as diclofenac, a veterinary nonsteroidal anti-inflammatory drug (NSAID) in 2004, which is used to treat pain and inflammatory diseases such as gout in carcasses that vultures would feed off.
- There are nine recorded species of vultures in India — the Oriental white-backed, long-billed, slender-billed, Himalayan, redheaded, Egyptian, bearded, cinereous and the Eurasian Griffon. Between the 1990s and 2007, numbers of

three presently critically-endangered species – the Oriental white-backed, long-billed and slender-billed vultures — crashed massively with 99 per cent of the species having been wiped out.

- The number of redheaded vultures, also critically-endangered now, declined by 91% while the Egyptian vultures by 80%. The Egyptian vulture is listed as 'endangered' while the Himalayan, bearded and cinereous vultures are 'near threatened'.

20. Correct Option: (c)

Explanation:

- Statement 1 is incorrect: Black carbon is formed through the incomplete combustion of fossil fuels
- Statement 2 is incorrect: Black carbon is a short-lived climate pollutant

Carbon types

- Light-absorbing organic carbon (OC), also termed brown carbon (BrC).
- It coexists with black carbon when released in the atmosphere.
- Black carbon is primarily released by high temperature combustion and brown carbon is emitted mainly by biomass combustion.
- These two are the two most important light absorbing substances in the atmosphere.
- The climate and radiative transfer are highly impacted by the absorptive properties of these substances
- Simulation models suggest that brown carbon contributes about 19% of the total atmospheric absorption by aerosols, while 72% is attributed to black carbon and 9% is due to the coating effect of sulfate and organic aerosols on black carbon.
- It seems that brown carbon can play an important role in photochemistry and the hydrologic cycle, especially over regions dominated by biomass combustion.
- Therefore, brown carbon needs to be considered in global climate change simulations for a more accurate understanding.

21. Correct Option: (c)

Explanation:

- Statement 3 is incorrect: The Moderates demanded reallocation of military expenditure. It should be evenly shared by the British Government

Moderates

- The Moderates never visualised a clinical separation from the British Empire. They wanted only limited self-government within the imperial framework.
- The early nationalists, led by Dadabhai Naoroji, R.C. Dutt, Dinshaw Wacha and others, carefully analysed the political economy of British rule in India and put forward the —drain theory|| to explain British exploitation of India.
- To rectify the Drain of Wealth, Moderates wanted:
 - o Reduction of expenditure and taxes, reallocation of military charges extension of Permanent Settlement to Ryotwari and Mahalwari areas.
 - o The Moderates campaign on Administrative reforms include,
 - o Indianisation of government service, Call for separation of judicial from executive functions.
 - o Demand for better treatment for Indian labour abroad in other British colonies,
 - o The Moderates also demanded that the military expenditure should be evenly shared by the British Government.
 - o Indians should be taken into the army as volunteers, and more and more of them should be appointed in higher ranks.

22. Correct Option: (a)

Explanation:

- Option (a) is correct

Wavell plan

- Although the war in Europe came to an end in May 1945, the Japanese threat still remained. The Conservative Government in Britain led by Churchill was keen to

reach a solution on the constitutional question in India.

- The viceroy, Lord Wavell was permitted to start negotiations with Indian leaders. Congress leaders were released from jails in June 1945.
- The idea was to reconstruct the governor general's executive council pending the preparation of a new constitution. For this purpose, a conference was convened by the viceroy, Lord Wavell, at Shimla in June 1945.
- The main proposals of the Wavell Plan were as follows.
- With the exception of the governor general and the commander-in-chief, all members of the executive council were to be Indians.
- Caste Hindus and Muslims were to have equal representation.
- The reconstructed council was to function as an interim government within the framework of the 1935 Act (i.e. not responsible to the Central Assembly).
- Governor- general was to exercise his veto on the advice of ministers.
- Representatives of different parties were, to submit a joint list to the viceroy for nominations to the executive

23. Correct Option: (d)

Explanation:

- Option (d) is correct

Rainfed Agriculture

- Rainfed agriculture is a type of farming that relies majorly on rainfall for water.
- Any rain dependent area that receives more than 750 mm is classified as a Rainfed area.
- It comprises arid and semi-arid ecosystems, dry lands stretching from Gujarat in the west till Eastern Madhya Pradesh; and from Rajasthan till the southern tip of India.
- In India, Rainfed agriculture occupies 67 percent of the net sown area, contributing 44 percent of food grains and supporting 40 percent of the population.

- Conditions of Rainfed Agriculture in India
 - o Climate - Mostly complex climatic deficiencies, manifested as water scarcity; it is mostly semi-arid and dry sub-humid climate with a short and occasionally intense wet season followed by long dry season.
 - o Rainfall - ranging from 400 mm to 1600 mm per annum.
- Therefore, it is observed that India has enormous prevalence of rainfed agriculture.
 - Examples of rainfed crops in India include - Cotton, Soya, Rubber, Maize, Sesame, groundnuts, millet, coffee, sugarcane, etc.

24. Correct Option: (a)

Explanation:

- Statement 2 is incorrect: The Bering Sea is part of the North Pacific Ocean.
- Statement 4 is incorrect: The North Sea is part of the Atlantic Ocean.

The Arctic Ocean

- Arctic Ocean, smallest of the world's oceans, centring approximately on the North Pole.
- It is almost completely encircled by the landmasses of North America, Eurasia, and Greenland.
- The natural resources of the Arctic are the mineral and animal resources within the Arctic Circle that can provide utility or economic benefit to humans.
- Living resources: These are primarily the abundant fisheries.
- Mineral resources: They include major reserves of oil and natural gas, large quantities of minerals including iron ore, copper, nickel, zinc phosphates and diamonds.
- Fresh water: It is a critical renewable resource that can be obtained. Several of the world's largest rivers flow into the Arctic Ocean. This offers the opportunity for two possible developments.
- Recently, India has unveiled a new draft 'Arctic' policy that, among other things,

commits to expanding scientific research, "sustainable tourism" and mineral oil and gas exploration in the Arctic region.

- India has an Observer status in the Arctic Council.



25. Correct Option: (c)

Explanation:

- Statement 1 is incorrect: It takes lot of precaution to separate the elemental Hydrogen, hence it's time consuming. So, they are very expensive at present technology.
- Statement 2 is incorrect: The hydrogen gas is highly inflammable and lightweight. Therefore, they are very difficult to store.
- Hydrogen-powered fuel cells have two or three times the efficiency of traditional combustion technologies. For example, a conventional coal-based power plant usually generates electricity between 33 to 35 per cent efficiency. Hydrogen fuel cells are capable of generating electricity of up to 65 per cent efficiency.

Advantages of Hydrogen Fuel Cells:

- It doesn't produce harmful emissions. When hydrogen is burned, it doesn't emit harmful substances. Basically, it reacts to oxygen and the energy it releases can be used to generate electricity used to drive an electric motor.
- It doesn't generate carbon dioxide.
- Environmentally friendly: Hydrogen is a non-toxic substance which is rare for a fuel source. Others such as nuclear energy, coal and gasoline are either toxic or found in places that have hazardous environments.
- It can be used as fuel in rockets: Hydrogen is both powerful and efficient.
- It is enough to provide power for powerful machines such as spaceships.
- It is renewable.

Disadvantages of Hydrogen Fuel Cells:

- Expensive: It takes a lot of time to separate the elemental Hydrogen, owing to precautionary measures
- Difficult to store.
- Hydrogen gas is highly flammable.

26. Correct Option: (b)

Explanation:

- Statement 2 is incorrect: This technique is used in cases when mothers carry genes of mitochondrial diseases.

Mitochondrial replacement therapy(MRT):

- Mitochondrial replacement therapy (MRT, sometimes called mitochondrial donation) is the replacement of mitochondria in one or more cells to prevent or ameliorate disease.
- MRT originated as a special form of in vitro fertilisation in which baby's mitochondrial DNA comes from a third party.
- This technique is used in cases when mothers carry genes for mitochondrial diseases.
- The therapy is approved for use in the United Kingdom.
- Recently, the birth of the world's first "three-parent baby," a child who carries genetic information from three different people, was recently announced.

- The baby's zygote was generated using the MRT.
- The baby was created via an IVF (in vitro fertilization) procedure that involved three people: the mother, the father and a woman who donated eggs. This specialized IVF procedure is called spindle nuclear transfer.
- Scientists took DNA from the nucleus of the mother's egg cell and inserted that genetic material into an egg cell from the donor.
- The nucleus of the donor egg had been removed, but the egg still contained a bit of DNA from the donor woman: That is, it contained genetic material from the mitochondria, or the cell's energy powerhouses, which have their own DNA.
- The egg was then fertilized with sperm from the father.

27. Correct Option: (c)

Explanation:

- Statement 2 is incorrect: Asset monetisation, based on the philosophy of Creation through Monetisation, is aimed at tapping private sector investment for new infrastructure creation.

National Monetisation Pipeline

- NITI Aayog has developed the pipeline, in consultation with infrastructure line ministries, based on the mandate for 'Asset Monetisation' under Union Budget 2021- 22.
- NMP estimates aggregate monetisation potential of Rs 6.0 lakh crores through core assets of the Central Government, over a four-year period, from FY 2022 to FY 2025.
- Asset monetisation, based on the philosophy of Creation through Monetisation, is aimed at tapping private sector investment for new infrastructure creation.
- This is necessary for creating employment opportunities, thereby enabling high economic growth and seamlessly integrating the rural and semiurban areas for overall public welfare.

- It aims to unlock value in brownfield projects by engaging the private sector, transferring to them revenue rights and not ownership in the projects, and using the funds so generated for infrastructure creation across the country.
- The NMP has been announced to provide a clear framework for monetisation and give potential investors a ready list of assets to generate investment interest.
- The government has stressed that these are brownfield assets, which have been “derisked” from execution risks, and therefore should encourage private investment.
- Structuring the monetisation transactions, providing a balance risk profile of assets, and effective execution of the NMP will be key challenges.
- The NMP will run co-terminus with the National Infrastructure Pipeline of Rs 100 lakh crore announced in December 2019.
- The estimated amount to be raised through monetisation is around 14% of the proposed outlay for the Centre of Rs 43 lakh crore under NIP.
- The assets on the NMP list include:
 - o 26,700 km of roads, railway stations, train operations and tracks, 2,8608 Ckt km worth of power transmission lines, 6 GW of hydroelectric and solar power assets, 2.86 lakh km of fibre assets and 14,917 towers in the telecom sector, 8,154 km of natural gas pipelines and 3,930 km of petroleum product pipelines. In the roads sector, the government has already monetised 1,400 km of national highways worth Rs 17,000 crore.
- Another five assets have been monetised through a Power Grid InvIT raising Rs 7,700 crore.
- Also, 15 railway stations, 25 airports and the stake of central government in existing airports and 160 coal mining projects, 31 projects in 9 major ports, 210 lakh MT of warehousing assets, 2 national stadia and 2 regional centres, will be up for monetisation.

- Redevelopment of various government colonies and hospitality assets including ITDC hotels is expected to generate Rs 15,000 crore.

28. Correct Option: (a)

Explanation:

- Option (a) is correct

Blended finance

- Blended finance is the use of catalytic capital from public or philanthropic sources to increase private sector investment in sustainable development.
- Blended finance is a structuring approach that allows organizations with different objectives to invest alongside each other while achieving their own objectives (whether financial return, social impact, or a blend of both).
- The main investment barriers for private investors addressed by blended finance are high perceived and real risk and poor returns for the risk relative to comparable investments.
- Blended finance creates investable opportunities in developing countries which leads to more development impact.
- Key Characteristics of Blended Finance In essence, blendedfinance can be characterized by three main features:
 - o Leverage: The systematic and strategic use of development finance and philanthropic funds to mobilise and engage private capital at scale.
 - o Impact: Investments that deliver measurable social, environmental and economic impact.
 - o Returns: Market-based risk-adjusted returns for private investors that meets business goals and fiduciary duties.

29. Correct Option: (c)

Explanation:

- Statement 1 is incorrect: The Finance Commission is a constitutional body.
- Statement 2 is incorrect: The members of the Finance Commission are appointed by the President.

- Statement 4 is incorrect: The Prime Minister is not the chairman of the Finance Commission.

Finance Commission

- Article 280 provides for the establishment of the Finance Commission. It is constituted by the President every five years or at an earlier time as he considers necessary.
- It is composed of a Chairman and four other members, appointed by the President and hold office for such period as specified by the President in his order. They are eligible to be reappointed.
- Parliament decides the qualification and manner in which the members are to be selected. Hence it enacted THE FINANCE COMMISSION (MISCELLANEOUS PROVISIONS) ACT, 1951
- Chairman- He should be a person with experience in public affairs;
- 4 other members- They should be from amongst the following:
 - o A judge of the high court/ qualified to be so;
 - o Person with specialised knowledge of finance and accounts;
 - o Person with wide experience in financial matters and administration;
 - o Person with special knowledge of economics.

Functions

- Distribution of net tax proceeds between the Centre and the states, and the allocation of the same between states
- Principles governing the grants-in-aid to the states by the Centre out of the consolidated fund of India.
- Measures to extend the consolidated fund of the state to boost the resources of the panchayats and the municipalities of the state on the basis of the recommendations made by the State Finance Commission.
- Any matter in the interest of sound finance may be referred to the Commission by the President.
- Its role is quasi-judicial and its recommendations are advisory and nonbinding in nature.

30. Correct Option: (c)

Explanation:

- Statement 1 is incorrect: It is a department under Ministry of Defence.

Additional Charges of the Prime Minister

- The Prime Minister has traditionally held the additional charges of Departments of Space and Atomic Energy and Ministry of Personnel, Grievances and Pensions.
- In June 2012, Prime Minister Manmohan Singh was also handed the reins of the Finance Ministry after the resignation of Finance Minister Pranab Mukherjee.
- Ministry of Personnel, Grievances and Pensions has three departments:
 - o Department of Personnel & Training (DOPT)
 - o Department of Pensions & Pensioners' Welfare (DOP&PW)
 - o Department of Administrative Reforms & Public Grievances (DARPG)

31. Correct Option: (b)

Explanation:

- Statement 1 is incorrect: The objective of OMO is to regulate the money supply in the economy

Open Market Operation

- Open Market Operations is the sale and purchase of government securities and treasury bills by RBI. The objective of OMO is to regulate the money supply in the economy. RBI carries out the OMO through commercial banks and does not directly deal with the public.
- The use of open market operations as a monetary policy tool ultimately helps the RBI pursue its dual mandate—maximizing employment, promoting stable prices—by influencing the supply of reserves in the banking system, which leads to interest rate changes.
- Open market purchases raise bond prices, and open market sales lower bond prices.
- When the RBI buys bonds, bond prices go up, which in turn reduces interest rates.

Open market purchases increase the money supply, which makes money less valuable and reduces the interest rate in the money market

- RBI employs two kinds of OMOs:
 - o Outright Purchase (PEMO) – this is permanent and involves the outright selling or buying of government securities.
 - o Repurchase Agreement (REPO) – this is short-term and are subject to repurchase.

32. Correct Option: (c)

Explanation:

- Both statements are correct

Impact of depreciation of Indian Rupee

- Depreciation means that more local currency is needed to purchase imports and exporters get more local currency when they convert the export proceeds (the foreign exchange that they get for their exports).
- In other words: imports become more expensive; importers lose money while exporters earn more money.
- This discourages imports and encourage exports and, in turn, may reduce trade deficits.
- A depreciating rupee could put inflationary pressure on the domestic economy. The rising price of crude oil results in the rise in prices of petroleum and diesel which in turn increases the cost of transportation of goods that also include many food items.
- Net impact of depreciation of currency depends on types of goods and services imported and exported by the country. If imports are essential then import does not decrease with same rate as depreciation of currency leading to inflation.

33. Correct Option: (b)

Explanation:

- Eliminating 4, Option (b) is correct

Biodiversity of India: snow leopard

- Snow leopards live in the mountainous regions of central and southern Asia. In India, their geographical range

encompasses a large part of the western Himalayas including the states of Jammu and Kashmir, Himachal Pradesh, Uttarakhand and Sikkim and Arunachal Pradesh in the eastern Himalayas. The last three states form part of the Eastern Himalayas – a priority global region of WWF and the Living Himalayas Network Initiative.

- The snow leopard is listed as Vulnerable on the IUCN-World Conservation Union's Red List of the Threatened Species. In addition, the snow leopard, like all big cats, is listed on Appendix I of the Convention on International Trade of Endangered Species (CITES), which makes trading of animal body parts (i.e., fur, bones and meat) illegal signatory countries.
- It is also protected several national laws in its range countries.
- Recently, India has launched its first ever census of the rare and elusive snow leopard population.
- India has identified three large landscapes, namely, Hemis-Spiti across Ladakh and Himachal Pradesh; Nanda Devi – Gangotri in Uttarakhand; and Khangchendzonga – Tawang across Sikkim and Arunachal Pradesh.

34. Correct Option: (c)

Explanation:

- Both the statements are correct

Harmful environmental effects

- Fly ash is a by-product from burning pulverized coal in electric power generating plants.
- Fly ash contains trace concentrations of heavy metals and other substances that are known to be detrimental to health.
- Ash that is stored or deposited outdoors can eventually leach toxic compounds into underground water aquifers.
- Fly ash contains crystalline silica which is known to cause lung disease, in particular silicosis.

35. Correct Option: (c)

Explanation:

- Option (c) is correct

Medieval India

- A crop rate (called ray) was drawn up, during the reign of Sher Shah, laying down the state's share of the different types of crops.
- This could then be converted into cash on the basis of the prevailing market rates in different areas. The share of the state was one-third of the produce.
- Nasaq was a rough calculation of the amount payable by the peasant on the basis of what he had been paying in the past. It is also called kankut, or estimation.

36. Correct Option: (a)**Explanation:**

- Statement 1 is incorrect: Subhash Chandra Bose was twice elected as President of the Indian National Congress. (1938- Haripur and 1939-Tripuri)
- Statement 2 is incorrect: All India Forward Bloc was a faction within the Congress in Bengal, not separate from the congress.

Subhash Chandra Bose

- Chandra Bose was twice elected President of the Indian National Congress, (1938- Haripur and 1939-Tripuri) the country's most important political force for freedom from the Raj or British rule.
- Owing to political differences, he resigned from the Congress Presidency in 1939 and organised the All India Forward Bloc, a faction within the Congress in Bengal.
- The purpose was to consolidate the political left and major support base in his home state Bengal.
- In Calcutta, Bose organised mass protests and was arrested. He was later put under house arrest from where he escaped. He went to Germany via Afghanistan.
- However, in 1943 Bose lost hope that Germany could be of any help in gaining India's independence. He then turned to Asia where he finally came at the helm of the Indian National Army (INA).

- INA found support among expatriate Indians and under its aegis Bose formed the Azad Hind government which came to produce its own currency, postage stamps, court and civil code. It was recognised by Axis states.

37. Correct Option: (d)**Explanation:**

- Statement 1 is incorrect: Low-pressure centers are called cyclones, and the associated wind movement is said to be cyclonic.
- Statement 2 is incorrect: High-pressure center is known as an anticyclone, and the flow of air associated with it is described as being anticyclonic.
- Statement 3 is incorrect: Air descends in anticyclones and rises in cyclones.

Cyclones and Anticyclones

- Low-pressure centers are called cyclones, and the associated wind movement is said to be cyclonic.
- The air circulates in an anticlockwise direction in the Northern hemisphere and clockwise in the Southern hemisphere.
- Cyclones are usually accompanied by violent storms and bad weather.
- There are two types of cyclones: Tropical cyclones and Extra Tropical cyclones (Temperate cyclones)
- Tropical cyclones develop in the region between the Tropics of Capricorn and Cancer.
- Extra tropical cyclones occur in temperate zones and high latitude regions, though they are known to originate in the Polar Regions.
- Tropical cyclones are violent storms and move over to the coastal areas bringing about large scale destruction caused by violent winds, very heavy rainfall and storm surges and are the most devastating natural calamities in the world.
- Tropical cyclones originate and intensify over warm tropical oceans. The conditions favourable for the formation and intensification of tropical storms are:
 - o Large sea surface with temperature

higher than 27°C.

- o Presence of the Coriolis force.
- o Small variations in the vertical wind speed.
- o A pre-existing weak low- pressure area or low-level-cyclonic circulation.
- o Upper divergence above the sea level system
- Anticyclones are areas of high pressure. The sinking air spreads out when it reaches the ground, producing a divergence at the surface.
- Aloft, air rushes in to fill the void, creating a convergence aloft.
- Anticyclones produce a stable atmosphere.
- Anticyclones, or highs, are also referred to as blocking highs because they tend to force areas of low pressure to travel around them.
- Anticyclones are associated with fair weather. As the air sinks, it warms and dries. This produces clear skies and increases the air's ability to transmit radiant energy.
- In the summer, this means high temperatures due to solar heating of the surface. During the winter, this means low temperatures due to the radiation of heat from the surface into space.

38. Correct Option: (d)

Explanation:

- All statements are correct

Precipitation

- The process of continuous condensation in free air helps the condensed particles to grow in size.
- When the resistance of the air fails to hold them against the force of gravity, they fall on to the earth's surface. So, after the condensation of water vapour, the release of moisture is known as precipitation.
- This may take place in liquid or solid form.
- The precipitation in the form of water is called rainfall, when the temperature is lower than the 0°C, precipitation takes

place in the form of fine flakes of snow and is called snowfall.

- Moisture is released in the form of hexagonal crystals.
- These crystals form flakes of snow.
- Besides rain and snow, other forms of precipitation are sleet and hail, though the latter are limited in occurrence and are sporadic in both time and space..
- Sleet is frozen raindrops and refrozen melted snow-water. When a layer of air with the temperature above freezing point overlies a subfreezing layer near the ground, precipitation takes place in the form of sleet.
- Raindrops, which leave the warmer air, encounter the colder air below. As a result, they solidify and reach the ground as small pellets of ice not bigger than the raindrops from which they are formed.
- Sometimes, drops of rain after being released by the clouds become solidified into small rounded solid pieces of ice and which reach the surface of the earth are called hailstones. These are formed by the rainwater passing through the colder layers.
- Hailstones have several concentric layers of ice one over the other.

Types of rain:

- **Convictional**

Rain:

o The, air on being heated, becomes light and rises up in convection currents. As it rises, it expands and loses heat and consequently, condensation takes place and cumulous clouds are formed. With thunder and lightening, heavy rainfall takes place but this does not last long.

o Such rain is common in the summer or in the hotter part of the day. It is very common in the equatorial regions and interior parts of the continents, particularly in the northern hemisphere.

- **Orographic**

Rain:

o When the saturated air mass comes across a mountain, it is forced to ascend and as it rises, it expands; the temperature falls, and the moisture is

condensed.

o The chief characteristic of this sort of rain is that the windward slopes receive greater rainfall. After giving rain on the windward side, when these winds reach the other slope, they descend, and their temperature rises. Then their capacity to take in moisture increases and hence, these leeward slopes remain rainless and dry.

o The area situated on the leeward side, which gets less rainfall is known as the rain-shadow area. It is also known as the relief rain.

• **Cyclonic**

Rain:

o Cyclonic activity causes cyclonic rain and it occurs along the fronts of the cyclone in case of extra tropical cyclone while in tropical cyclone it is associated with heavy rainfall along with thunder storm.

39. Correct Option: (d)

Explanation:

- All statements are correct

Graveyard Orbit

- A graveyard orbit also called a junk orbit or disposal orbit, is an orbit that lies away from common operational orbits.
- One significant graveyard orbit is a super synchronous orbit well above the geosynchronous orbit. Satellites are typically moved into such orbits at the end of their operational life to reduce the probability of colliding with operational spacecraft and generating space debris.
- A super synchronous orbit is either an orbit with a period greater than that of a synchronous orbit or just an orbit whose apogee is higher than that of a synchronous orbit.
- Most natural satellites in the Solar System are in super synchronous orbits. The Moon is in a super synchronous orbit of Earth, orbiting more slowly than the 24-hour rotational period of Earth.
- The inner of the two Martian moons, Phobos, is in a subsynchronous orbit of

Mars with an orbital period of only 0.32 days. The outer moon Deimos is in super synchronous orbit around Mars.

- The Mars Orbiter Mission—currently orbiting Mars — is placed into highly elliptical super synchronous orbit around Mars.

40. Correct Option: (b)

Explanation:

- Statement 1 is incorrect: Barcode is 1 dimensional on the other hand QR code is 2 Dimensional.
- Statement 3 is incorrect: The UPI is based on the QR Code as it stores more information than the Barcode and is easy to process.

Barcode and QR code

- A barcode is a visual representation of machine-readable information about the product on which it is pested.
- The barcode contains important information like the manufacturer's name, type of item, price and so on, which can only be read by dedicated barcode reader machines.
- It can store data only in horizontal direction, thus it is also dubbed as linear or 1D (1-dimensional).
- QR Code is much like Barcode which is also used to store data in machinereadable format containing information about the product on which it is pested.
- The QR code can be deciphered by a camera, smartphone etc and does not require any dedicated reader machine.
- The QR code is two-dimensional and it contains information both in vertical and horizontal directions thus enabling it to store more data.
- A QR code can be read in 360 degrees, from any direction, thus eliminating any interference and negative effects from backgrounds.
- QR code generally has an error margin of 7-30%, which means that even if the QR code is tampered to an extent it can be deciphered easily. Due to this reason QR codes are extensively used by the sellers.

- A QR code is capable of carrying 100 times more information than a barcode.
- The NPCI designed UPI uses QR Code by the Name of BHARAT QR for its payment activities making it more reliable and easy to use.

41. Correct Option: (b)

Explanation:

- Statement 1 is incorrect: Ministry of Food Processing Industries (MoFPI) extended the Operation Greens Scheme from Tomato, Onion and Potato (TOP) to all fruits & vegetables (TOTAL) as part of Aatmanirbhar Bharat Abhiyan.

Operation Greens – Top to Total Scheme

- Under Operation Greens Scheme: TOP to TOTAL, 50% transportation subsidy is made available for air transportation for 41 notified fruits and vegetables from North-Eastern and Himalayan States to any place in India.
- Airlines will provide the transport subsidy directly to the supplier/ consignor/ consignee / agent by way of charging only 50% of the actual contracted freight charges and will claim the balance 50% from MoFPI as subsidy.
- In relaxation of other conditions for Operation Greens – TOP to TOTAL Scheme for transportation through airlines from eligible airports, all consignment of notified fruits and vegetables irrespective of quantity and price would be eligible for 50% freight subsidy.
- The transportation subsidy was earlier extended under Operation Greens Scheme for Kisan Rail Scheme. Railways charge only 50% of freight charges on the notified fruits and vegetables..
- Eligible airports: All the airports in Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim (Bagdogra), and Tripura from North-East, and Himachal Pradesh, Uttarakhand, and Union Territories of Jammu & Kashmir and Ladakh among the Hilly States.

- Operation Greens Scheme, being implemented by MoFPI has been extended from tomato, onion and potato (TOP) crops to other notified horticulture crops for providing subsidy for their transportation and storage from surplus production area to major consumption centres.
- The objective of intervention is to protect the growers of fruits and vegetables from making distress sale due to lockdown and reduce the post -harvest losses.
- NAFED will be the Nodal Agency to implement price stabilization measures.

42. Correct Option: (c)

Explanation:

- Option (c) is correct

Internet of Military Things (IoMT)

- The future of military combat is going high-tech as scientists create an Internet of Things for combat gear embedded with biometric wearables to help soldiers identify the enemy, perform better in battle, and access devices and weapons systems using speedy edge computing.
- The United States Army Research Lab recently awarded \$25 million to the Alliance for Internet of Battlefield Things Research on Evolving Intelligent Goal-driven Networks (IoBT REIGN) to develop new predictive battlefield analytics.
- Researchers say one key element of healthy IoBT/IoMT is a robust edge architecture that uses biometrics, environmental sensors, and other connected devices to send and receive data quickly, allowing military personnel to respond to potentially dangerous situations on the battlefield.
- This is one of the most recent avenues that world military powers aspire to explore. Many difficulties need to be resolved before such technologies can become part of the military in the battle.
- Many researchers opine that “Integrating signals from a diverse and dynamic set of sensors, including static ground sensors

and soldiers worn sensors, represents one among the several critical challenges facing the implementation of IoT solutions on a battlefield.”

- On the Internet of Military Things (IoMT) or Internet of Battlefield Things (IoBT), the sensing and computing devices worn by soldiers and embedded in their combat suits, helmets, weapons systems, and other equipment are capable of acquiring a variety of static and dynamic biometrics such as their face, iris, periocular space, fingerprints, heart rate, gait, gestures, and facial expressions.
- “Such devices may also be capable of collecting operational context data. These data collectively can be used to perform context-adaptive authentication in-the-wild and continuous monitoring of soldier’s psychophysical condition in a dedicated edge computing architecture,” write researchers Aniello Castiglione and Michele Nappi of the University of Salerno, Kim-Kwan Raymond Choo of the University of Texas, San Antonio, and Stefano Ricciardi of the University of Molise.

43. Correct Option: (d).

Explanation:

- All statements are correct
- The Indian Parliament is not a sovereign body in the sense in which the British Parliament is a sovereign body. Unlike the British Parliament, the authority and jurisdiction of the Indian Parliament are defined, limited and restrained.
- The factors that limit the sovereignty of Indian Parliament are:
 - o Written Nature of the Constitution
 - o The Constitution is the fundamental law of the land in our country. Therefore, the Parliament has to operate within the set procedure prescribed by the Constitution. This is the main factor that limit the sovereignty of the Indian Parliament.
- In Britain, on the other hand, the Constitution is neither written nor there is

anything like a fundamental law of the land.

Federal System of Government

- India has a federal form of government with division of powers between the Union and the states . Both have to operate within the spheres allotted to them.
- As the division of power is there ,therefore the law-making authority of the Parliament gets confined to the subjects enumerated in the Union List and Concurrent List and does not extend to the subjects enumerated in the State List (except in five abnormal circumstances and that too for a short period).
- Britain, on the other hand, has a unitary system of government and hence, all the powers are vested in the Centre.

System of Judicial Review

- The independent Judiciary system with the power of judicial review also restricts the supremacy of our Parliament. Both the Supreme Court and high courts have the power to declare any law enacted by the Parliament as void and ultra vires (unconstitutional), if they violate any of the provisions of the Constitution.
- On the other hand, there is no system of judicial review in Britain.

Fundamental Rights

- The authority of the Parliament is also restricted by the incorporation of a code of justiciable fundamental rights under Part III of the Constitution. Article 13 prohibits the State from making a law that either takes away totally or abrogates in part a fundamental right. Hence, a Parliamentary law that contravenes the fundamental rights shall be void.

44. Correct Option: (b)

Explanation:

- Statement 1 is incorrect: Judicial review is the power of the judiciary to examine the constitutionality of legislative enactments and executive orders of both the Central and State governments.

- Statement 4 is incorrect: In I.R. Coelho case (2007), the Supreme Court ruled that there could not be any blanket immunity from judicial review of laws included in the Ninth Schedule as judicial review is a basic feature of the constitution.

Judicial Review

- Judicial review is the power of the judiciary to examine the constitutionality of legislative enactments and executive orders of both the Central and State governments.
- On examination, if they are found to be violative of the Constitution (ultra vires), they can be declared as illegal, unconstitutional and invalid (null and void) by the judiciary. Consequently, they cannot be enforced by the Government.
- The phrase 'Judicial Review' has nowhere been used in the Constitution.
- However Article 13 (laws inconsistent or in derogation of any fundamental rights shall be void) expressly provides for the doctrine of judicial review. This power has been conferred on Supreme Court (Article 32) and the High Court (Article 226) that can declare a law unconstitutional and invalid on the ground of contravention of any of the Fundamental Rights.
- Article 31B saves the acts and regulations included in the Ninth Schedule from being challenged and invalidated on the ground of contravention of any of the Fundamental Rights. Article 31B along with the Ninth Schedule was added by the 1st Constitutional Amendment Act of 1951.
- In I.R. Coelho case (2007), the Supreme Court ruled that there could not be any blanket immunity from judicial review of laws included in the Ninth Schedule as judicial review is a basic feature of the constitution.
- The court said that the laws placed under the Ninth Schedule after April 24, 1973, are open to challenge in court if they violated Fundamental Rights guaranteed

under the Articles 14, 15, 19 and 21 or the 'basic structure' of the Constitution.

45. Correct Option: (d)

Explanation:

- All statements are correct List of sectors in which FDI is prohibited
- Lottery Business including Government/Private lottery, online lotteries etc.
- Gambling and betting including casinos.
- Foreign technology collaboration in any form including licensing for franchise, trademark, brand name, management contract is also prohibited for Lottery Business and Gambling and Betting activities
 - o Chit Funds
 - o Trading in Transferable Development Rights (TDR)
 - o Manufacturing of Cigars, cheroots, cigarillos, and cigarettes (tobacco or tobacco substitutes)
 - o Nidhi Company
- Real Estate Business or Construction of Farm Houses:
 - o Real estate business shall not include the development of town shops, construction of residential/ commercial premises, roads or bridges and Real Estate Investment Trusts (REITs) registered and regulated under the SEBI (REITs) Regulations, 2014.
- Sectors not open to private sector investments:
 - o Atomic energy
 - o Railway operations other than permitted activities mentioned under the consolidated FDI Policy.

46. Correct Option: (b)

Explanation:

- Statement 1 is incorrect: Externality is not included in Direct taxes.
- Statement 3 is incorrect: The Direct taxes are elastic in nature. But this is the merit of Direct tax not its demerits.

Demerits of Direct taxes

- Externality not counted: Academic Books Company vs Film star promoting cigars [30% Tax on both].
- Hardship not counted: Working Carpenter [5%] vs sleeping landlord [5%] High level of direct tax leads to low profit and less foreign investment.
- Narrow base because large staff required if we try to collect Income taxes even from poor people.
- Prone to litigation & loopholes, tax evasion, avoidance.

47. Correct Option: (c)

Explanation:

- Both statements are correct

Environment Impact Assessment

- EIA is a tool to anticipate the likely environmental impacts that may arise out of the proposed developmental activities and suggest mitigation measures and strategies.
- EIA was introduced in India in 1978, with respect to river valley projects.
- Later the EIA legislation was enhanced to include other developmental sections.
- EIA comes under Notification on Environmental Impact Assessment (EIA) of developmental projects 1994 under the provisions of Environment (Protection) Act, 1986.
- Projects like Hydel and Nuclear power plants require clearance from the Central Government.
- The EIA process looks into Water, Air, Noise, Land and biological environment.

Steps in EIA process:

- Screening: The project plan is screened for scale of investment, location and type of development and if the project needs statutory clearance.
- Scoping: The project's potential impacts, zone of impacts, mitigation possibilities and need for monitoring.
- Collection of baseline data: Baseline data is the environmental status of the study area.
- Impact prediction: Positive and negative, reversible and irreversible and temporary

and permanent impacts need to be predicted which presupposes a good understanding of the project by the assessment agency.

- Mitigation measures and EIA report: The EIA report should include the actions and steps for preventing, minimizing or by passing the impacts or else the level of compensation for probable environmental damage or loss.
- Public hearing: On completion of the EIA report, public and environmental groups living close to the project site may be informed and consulted.
- Decision making: Impact Assessment Authority along with the experts consult the project-in-charge along with the consultant to take the final decision, keeping in mind EIA and EMP (Environment Management Plan).
- Monitoring and implementation of environmental management plan: The various phases of implementation of the project are monitored.
- Assessment of Alternatives, Delineation of Mitigation Measures and Environmental Impact Assessment Report: For every project, possible alternatives should be identified, and environmental attributes compared. Alternatives should cover both project location and process technologies. Once alternatives have been reviewed, a mitigation plan should be drawn up for the selected option and is supplemented with an Environmental Management Plan (EMP) to guide the proponent towards environmental improvements.
- Risk assessment: Inventory analysis and hazard probability and index also form part of EIA procedures.

48. Correct Option: (d)

Explanation:

- Option (d) is correct

Endemic species

- Endangered and Endemic species of wild animals found only in India are:
 - o Asiatic Lion in Gir Forest National Park,
 - o Sangai deer at Keibul Lamjao National Park,
 - o Nilgiri Tahr and Lion Tailed Macaque at Western Ghats of India.
 - o Pygmy Hog is the critically endangered species of squid and now only found in Assam.
- Other Endemic species include:
 - o Bronze back Vine Snake, Western Ghats
 - o Nilgiri Blue Robin, Nilgiri Hills
 - o Malabar Civet, Western Ghats
 - o Anaimalai Gliding Frog, Anaimalai Hills
 - o Namdapha Flying Squirrel, Arunachal Pradesh
 - o Indian Giant Squirrel
 - o Bonnet Macaque

49. Correct Option: (a)

Explanation:

- Statement 1 is incorrect: It is based on the Nagara style of temple architecture.
- Statement 2 is incorrect: Lingaraj Temple was built in 11th century AD.

Lingaraj temple

- The Odisha government has decided to give a facelift to the 11th century Lingaraj Temple, akin to its pre-350-year structural status.
- The temple architecture of Odisha corresponds to altogether a different category for their unique representations called Kalinga style of temple architecture. This style broadly comes under the Nagara style.
- Lingaraj Temple, built in 11th century AD, is dedicated to Lord Shiva and is considered as the largest temple of the city Bhubaneswar.
- It is believed to have been built by the Somvanshi King Yayati I.
- The main tower of this temple measures 180-feet in height.

- It is built in red stone and is a classic example of Kalinga style of architecture.
- The temple is divided into four sections—Garbh Griha (sanctum sanctorum), Yajna Shala (the hall for prayers), Bhoga Mandap (the hall of offering) and the Natya Shala (hall of dance).
- The sprawling temple complex has one hundred and fifty subsidiary shrines.
- Lingaraj is referred to as ‘Swayambhu’ – self-originated Shivling.
- Another important aspect of the temple is that it signifies the syncretisation of Shaivism and Vaishnavism sects in Odisha.
- Perhaps the rising cult of Lord Jagannath (considered an incarnation of Lord Vishnu) which coincided with the completion of the Lingaraj Temple had a role to play.
- The presiding deity in the Temple is known as Hari-Hara; Hari denotes Lord Vishnu and Hara meaning Lord Shiva.
- The temple is out of bounds for non-Hindus.
- The other attraction of the temple is the Bindusagar Lake, located in the north side of the temple.
- On the western banks of Bindusagar, lies the garden of Ekamra Van named after the Hindu mythological texts where Bhubaneswar the capital city of Odisha was referred as Ekamra Van or a forest of a single mango tree.

50. Correct Option: (c)

Explanation:

- Option (c) is correct

Embroidery Crafts

- Kasuti: This is typical of the Dharward region of Karnataka. Kasuti is delicate single thread embroidery done on handloom saris. It is done in two styles called gavanti and murgi and has a wide range of motifs consisting of temples, peacocks, elephants, flowering trees and geometric forms spread across the sari.
- Kathi: This rural art of Gujarat is attributed to the nomadic tribes of the kathi. The

work is distinguished by a very unusual technique in which chain stitch embroidery is combined with appliqué work and enhanced by small mirror-like insertions. The embroidery is characterised in particular by its wealth of forms and motifs. Many of the kathi embroideries depict Hindu themes.

- Pichwai: These are colourful embroidered cloth-hangings typical of Nathdwara in Rajasthan.
- Rabari Art: This is a typical embroidery work of the nomadic Rabari tribes of the Kutch region. The embroidered motifs are generally camels, royal fans, elephants, scorpions and women bearing water.

51. Correct Option: (c)

Explanation:

- Option 1 and 4 are incorrect: Aretes and Bergschrund are glacier erosional landforms.

Glacier Landforms

- Different landforms are formed by the depositional and erosional activity of glaciers.

The depositional landform glacier activity includes:

- Moraines are long ridges of deposits of glacial till.
- Terminal moraines are long ridges of debris deposited at the end of the glaciers.
- Lateral moraines form along the sides parallel to the glacial valleys.
- Eskers are long, narrow sinuous ridges composed of sand and gravel which mark the sites of the former sub-glacial meltwater streams.
- Drumlins are oval, elongated low hills formed in the direction of ice flow. They are commonly described as having a 'basket of eggs' topography'.
- Glacial till is an unsorted glacial deposit comprising a range of eroded material forming gently undulating drift plains.

Erosional landforms of glacier activity include:

- Cirque is a deep, long and wide troughs with very steep concave to vertically dropping high walls at its head as well as sides. These are found at the heads of glacial valleys.
- Aretes are pyramidal peaks formed when 2 cirques cut back on the opposite side of the mountain forming a knife-edged ridge.
- The bergschrund is a deep vertical crack formed at the head of the glacier when it begins to leave the snowfield of a cirque.

52. Correct Option: (c)

Explanation:

- Statement 2 is incorrect: The reason for variation in relief is endogenic force.
- Statement 3 is incorrect: Gradation is caused by exogenic force.

Geomorphic Process

- The endogenic and exogenic forces causing physical stresses and chemical actions on earth materials and bringing about changes in the configuration of the surface of the earth are known as geomorphic processes
- The earth's surface is being continuously subjected to by external forces originating within the earth's atmosphere and by internal forces from within the earth.
- The external forces are known as exogenic forces and the internal forces are known as endogenic forces.
- The actions of exogenic forces result in wearing down (degradation) of relief/elevations and filling up (aggradation) of basins/ depressions, on the earth's surface..
- The phenomenon of wearing down of relief variations of the surface of the earth through erosion is known as gradation.
- The endogenic forces continuously elevate or build up parts of the earth's surface and hence the exogenic processes fail to even out the relief variations of the surface of the earth. So, variations remain as long as

the opposing actions of exogenic and endogenic forces continue.

- In general terms, the endogenic forces are mainly land building forces and the exogenic processes are mainly land wearing forces.

53. Correct Option: (a)

Explanation:

- Option (a) is correct

NanoSniffer

- NanoSniff Technologies, an IIT Bombay incubated startup has developed a NanoSniffer which is the world's first Micro Sensor based Explosive Trace Detector (ETD).
- It is fully made in India in terms of research, development & manufacturing.
- NanoSniffer is capable of detecting explosives in less than 10 seconds with identifying and categorizing explosives into different classes. It can detect all classes of military, conventional and homemade explosives.
- It gives visible & audible alerts with a sunlight-readable colour display.

54. Correct Option: (c)

Explanation:

- Both statements are correct
- Stardust 1.0 was launched from Loring Commerce Centre in Maine, US, a former military base, becoming the first commercial space launch powered by biofuel, which is non-toxic for the environment as opposed to traditionally used rocket fuels.
- Stardust 1.0 is a launch vehicle suited for student and budget payloads. The rocket is 20 feet tall and has a mass of roughly 250 kg. The rocket can carry a maximum payload mass of 8 kg and during its first launch carried three payloads. According to a report in Politico, the payloads included a cubesat prototype built by high school students, a metal alloy designed to lessen vibrations, which is developed by Kellogg's Research Labs and a cubesat from software company Rocket Insights.

- The rocket is manufactured by bluShift, an aerospace company based in Maine that is developing rockets that are powered by bio-derived fuels.
- These rockets will help to launch small satellites called cubesats into space in a way that is relatively cheaper than using traditional rocket fuel and is less toxic for the environment.

55. Correct

Option:

(c)

Explanation:

- Option (c) is correct

Mass jailing of under trials

- The United Nations Rules for the Treatment of Women Prisoners and Noncustodial Measures for Women Offenders (the Bangkok Rules) were adopted by the General Assembly in 2010.
- These state that "non-custodial means should be preferred for pregnant women during the pre-trial phase".
- The main reason for "overcrowding" in our prisons is due to the mass incarceration of pre-trial prisoners.
- The penal policy of the state has not focused on de-criminalization. Instead, it has resulted in a shocking 31.8 per cent increase in the incarceration of the number of undertrial prisoners and increase in imprisonment of detenues by 40.1 per cent from 2015 to 2020 (as of December 31, 2020).
- The prison statistics of 2020 show that more than 70 per cent of such undertrial prisoners are from marginalized classes, castes, religions and genders.
- In Contagion of Covid-19 Virus in Prisons, the Supreme Court of India held that "the requirement of decongestion is a matter concerning health and right to life of both the prison inmates and the police personnel working" but the highpowered committees (HPCs) in each state to decongest prisons did not adopt classification based on the right to life or health nor were these gender-sensitive.
- Most HPCs treated decongestion as an administrative issue.

- The 2020 Prison Statistics report reveals that as compared to 2019, “the release of convicts has declined by 41.2 per cent and the release of undertrials has declined by 19.6 per cent” in 2020.
- Second, as compared to 2019, the number of undertrial prisoners increased by 11.7 per cent and the number of detenues increased by 11.4 per cent in 2020.
- The pandemic saw the creation of new dockets which were mainly related to violations of “lockdown law” under section 188 of the IPC (disobedience to order duly promulgated by public servant).
- In 2019, there were 29,469 cases registered under this section. In 2020, this increased to a staggering 6,12,179 cases. Other laws were also used, including local laws, leading to 16,43,690 more cases being registered in 2020 as compared to 2019.
- No amnesty has been announced for these offences nor has the misuse of the “epidemic laws” seen judicial review.
- As prisons instituted a lockdown on public accountability, the rates of custodial deaths have increased by 7.0 per cent in 2020. So-called unnatural deaths, which include suicides, accidents, and murders in prisons, increased by 18.1 per cent.

Why in News?

- During the pandemic, the mass incarceration of undertrials led to a humanitarian crisis in overcrowded prisons. Prison officials struggled to prevent mass contagion among inmates and staff, even as thousands fell ill and many died.
- Prisons instituted their own lockdown rules by quarantining “fresh” admissions, creating quarantine zones, suspending jail manuals and prohibiting visitors.
- There is no lockdown on the entry of more undertrial prisoners while their rate of exit from prisons has decreased since the onset of the pandemic.
- The issue needs public health & gender sensitive approach, as overcrowded

prisons have felt devastating impact of the Omicron variant.

56. Correct Option: (d)

Explanation:

- Statement 3 is incorrect: The consumers can exchange a maximum of five LED bulbs.

Gram Ujala Scheme

- State-run Energy Efficiency Services Ltd’s (EESL) wholly-owned subsidiary Convergence Energy Services Ltd (CESL) launched the Gram Ujala programme under which high quality energy efficient LED bulbs will be given for Rs 10 per piece in certain villages of five states in the first phase.
- In the first phase of this programme, 15 million LED bulbs will be distributed across villages of Aarah (Bihar), Varanasi (Uttar Pradesh), Vijaywada (Andhra Pradesh), Nagpur (Maharashtra), and villages in western Gujarat.
- The programme will be financed entirely through carbon credits and will be the first such programme in India.
- Under the programme, 7 watt and 12-watt LED bulbs with three years of warranty will be given to rural consumers on submission of working incandescent bulbs.
- The Gram Ujala programme will be implemented in villages of the five districts only and consumers can exchange a maximum of five LED bulbs.
- These rural households will also have metres installed in their houses to account for usage.
- The programme will have a significant impact on India’s climate change action energy savings of 2025 million KWh/year and CO2 reductions of 1.65 million tonnes CO2/year.
- Carbon credits will be prepared under the Shine Programme of Activities with an option for verifying under the Voluntary Carbon Standard, depending on the needs of buyers.

- Carbon credit buyers will also be sought through an open process based on initial discussions with the market. The balance cost and margin on the LED cost will be recouped through the carbon credits earned.

57. Correct Option: (c)

Explanation:

- Statement 1 is incorrect: The members of the DRSCs are nominated by the individual houses from the MPs.
- Statement 2 is incorrect: A minister cannot become a member of DRSCs

Departmental Parliamentary Committees

- There are 24 Department-related Standing Committees (DRSCs). Each of these committees have 31 members – 21 from Lok Sabha and 10 from Rajya Sabha.
- The 17 Departmentally Related Standing Committees were formally constituted with effect from April, 1993.
- After experiencing the working of the DRSC system for over a decade, the system was restructured in July, 2004 wherein the number of DRSCs was increased from 17 to 24.
- These members are to be nominated by the Speaker of Lok Sabha or the Chairman of Rajya Sabha respectively. The term of office of these committees does not exceed one year.
- A minister is not eligible to be nominated as a member of any standing committee.
- These committees are serviced either by Lok Sabha secretariat or the Rajya Sabha secretariat depending on who has appointed the chairman of that committee.

58. Correct Option: (c)

Explanation:

- Statement 1 is incorrect: The procedures established by law were borrowed from Japan.

- Statement 3 is incorrect: The procedures for amendment of constitution were borrowed from South Africa.

Borrowing features of Indian Constitution

- Thus, borrowing provisions have helped the Constitution to build upon the collective learning of humankind.
- Following are the provisions which have been sourced from different legal systems:
 - **The Government of India Act of 1935:** This was an Act passed by the Parliament of Britain. It provided a framework for the government of India and was passed in the response to demands of the Indian leaders for democracy. The Constitution borrows from it the Federal Scheme of government, Office of Governor, the system of the judiciary (establishing a supreme court), Public Service Commissions, and the Emergency provisions.
 - **British Constitution:** Parliamentary system, Bicameralism, Rule of Law (Article 14), Legislative procedure, Single citizenship, Cabinet System, System Writs (Article 32 & 226), the rule of law.
 - **US Constitution:** Fundamental Rights (Part III), Post of Vice President, Judicial Review, Impeachment of the President, Removal of Judges of Supreme Court and High Court (Article 124).
 - **Irish Constitution:** Directive Principles of State Policy (Part IV), the nomination of members to Rajya Sabha, and method of election of President.
 - **Australian Constitution:** Freedom of trade and commerce, Concurrent List, joint sitting of the two Houses of Parliament.
 - **Soviet Constitution:** The Soviet Constitution is known for its socialism. India, being a welfare state, did borrow the principles like Fundamental duties and the ideals of social, economic

and political justice (Found in the Preamble).

- **French Constitution:** Republic character of Constitution. The ideals of liberty, equality and fraternity in the Preamble.

59. Correct Option: (a)

Explanation:

- Statement 2 is incorrect: The price and yield of bonds are inversely related to each other.

Gilt bonds

- Recently RBI proposed to allow retail investors to buy government debt, also known as “gilt bonds”, thus making India the first Asian country to do so and among a handful globally.
- Till now, direct access to such debt was limited to institutional players such as banks, primary dealers etc.
- It is aimed at deepening the government securities (G-sec) market and supporting the government’s expanding borrowing programme.
- G-secs are debt instruments issued by the government and are considered the safest form of investment since the debt payer is the sovereign body i.e. government.
- When the Reserve Bank of India (RBI) starts reducing rates, the demand for government securities issued earlier goes up because they carry a higher interest rate.
- With the rising demand, their price goes up and yields fall.
- Hence there is inverse relationship between price and yield of these G-sec or gilt bonds.
- On opposite, when RBI pauses on rates or starts hiking policy rates, new bonds will carry a higher interest rate, demand for older bonds drops or traders sell them.
- It leads to drop in their prices and yields going up.

60. Correct Option: (d)

Explanation:

- All statements are correct

Money Market

- Money market basically refers to a section of the financial market where financial instruments with high liquidity and short-term maturities are traded.
- Money market has become a component of the financial market for buying and selling of securities of short-term maturities, of one year or less, such as treasury bills and commercial papers.
- In India, this market is regulated by both RBI (the Reserve bank of India) and SEBI (the Security and Exchange Board of India).
- A call market is a type of market in which each transaction takes place at predetermined time intervals. Bid and ask orders are aggregated and transacted at specified times, as opposed to one at a time continuously.
- The exchange determines the market clearing price based on the number of securities offered by sellers and bid on by buyers.

61. Correct Option: (d)

Explanation:

- All statements are correct

Dryland Farming

- Cultivation of crops in areas receiving rainfall above 750 mm is known as dryland farming. Dry spell during crop duration occurs, but crop failures are less frequent. Semi-arid regions are included under this category.
- Major dry farming crops are millets such as jwar, bajra, ragi, oilseeds like mustard, rapeseed, and pulse crops like pigeon pea, gram and lentil.

Characteristics of dryland farming:

- Uncertain, ill-distributed and limited annual rainfall; Occurrence of extensive climatic hazards like drought, flood etc;
- Undulating soil surface;
- Occurrence of extensive and large holdings;
- Practice of extensive agriculture i.e. prevalence of mono cropping etc;

- Relatively large size of fields, similarity in types of crops raised by almost all the farmers of a particular region;
- Very low crop yield; Poor market facility for the produce;
- Poor economy of the farmers; and Poor health of cattle as well as farmers.

62. Correct Option: (b)

Explanation:

- Statement 2 is incorrect: Listed as 'vulnerable' on International Union for Conservation of Nature's Red List, the species has a high probability of becoming endangered unless circumstances threatening its survival and reproduction improve.

Fishing Cat Conservation Alliance

- Recently, the Fishing Cat Conservation Alliance started a worldwide campaign to raise awareness for conservation of fishing cats.
- The Fishing Cat Conservation Alliance is a team of conservationists, researchers and enthusiasts working to achieve functioning floodplains and coastal ecosystems that ensure survival of the fishing cat.
- Unlike most felines, fishing cats love water and are known for their expert hunting skills in aquatic habitats.
- Fishing cats have a patchy distribution along the Eastern Ghats. They abound in estuarine floodplains, tidal mangrove forests and also inland freshwater habitats. Apart from Sundarbans in West Bengal and Bangladesh, fishing cats inhabit the Chilika lagoon and surrounding wetlands in Odisha, Coringa and Krishna mangroves in Andhra Pradesh.
- The conservation threats to fishing cats in the Eastern Ghats are mainly habitat loss [wetland degradation and conversion for aquaculture and other commercial projects], sand mining along river banks, agricultural intensification resulting in loss of riverine buffer and conflict with

humans in certain areas resulting in targeted hunting and retaliatory killings.

- The highly elusive fishing cat, a lesser known feline species, is facing several threats due to its depleting habitat.
- Listed as 'vulnerable' on International Union for Conservation of Nature's Red List, the species has a high probability of becoming endangered unless circumstances threatening its survival and reproduction improve.

63. Correct Option: (a)

Explanation:

- Option (a) is correct

Uttaramerur Inscription

- Uthiramerur is a panchayat town in the Kancheepuram district in the Indian state of Tamil Nadu. It is noted for its temple inscriptions that describe a self-governance system existing around 7th to 9th century CE.
- The inscriptions from Uttaramerur belong to the Chola Dynasty of the 10th century AD.
- The temple inscriptions of Uthiramerur are notable for their historical descriptions of the rural self-governance. They indicate that Uthiramerur had two village assemblies: Sabha and Ur. The Sabha was an exclusively Brahmin (priestly class) assembly, while the Ur was made up of people belonging to all the classes.
- The sabha had separate committees to look after irrigation works, gardens, temples, etc.

64. Correct Option (b)

Explanation:

- Statement 2 is incorrect: Congress did not attend the conference.
- Statement 3 is incorrect: Civil disobedience movement continued after it.

First Round Table Conference

- The Viceroy of India, Lord Irwin, and the Prime Minister of Britain, Ramsay MacDonald, agreed that a round table conference should be held, as the

recommendations of the Simon Commission report were clearly inadequate.

- The first Round Table Conference was held in London between November 1930 and January 1931.
- This was the first conference arranged between the British and the Indians as equals.
- Congress and some prominent business leaders refused to attend, but many other groups of Indians were represented at the conference.
- The Muslim League sent Aga Khan III, Maulana Mohammad Ali Jauhar, Muhammad Shafi, Muhammad Ali Jinnah, Muhammad Zafarullah Khan, A.K. Fazlul Huq, Hafiz Ghulam Hussain Hidayat Ullah, Dr. Shafa'at Ahmad Khan, Raja Sher Muhammad Khan of Domeli and A.H. Ghuznavi.
- Nothing much was achieved at the conference. It was generally agreed that India was to develop into a federation, there were to safeguard regarding defence and finance, while other departments were to be transferred.
- But little was done to implement these recommendations and civil disobedience continued in India.
- The British government realized that the participation of the Indian National Congress was necessary for any discussion on the future of constitutional government in India.

65. Correct Option: (c)

Explanation:

- Both statements are correct

Flash Drought

- A flash drought is the rapid onset or intensification of drought and is set in motion by lower-than-normal rates of precipitation (lower than normal monsoonal rate in India), accompanied by abnormally high temperatures, winds, and radiation.
- Together, these changes in weather can rapidly alter the local climate.

- What makes flash drought unique from conventional drought development is a lack of rainfall coupled with increased evapotranspiration..
- Evapotranspiration is the combination of evaporation from the land surface and transpiration from vegetation.
- Both of these processes act to transfer water from the land surface to the atmosphere.
- These processes are critical in flash drought development, as enhanced evapotranspiration with a lack of rainfall can quickly deplete soil moisture and lead to devastating impacts on agriculture and ecosystems.
- The highest frequency of flash drought occurrence were primarily found within the tropics and subtropics.
- These include a large portion of Brazil, the Sahel, the Great Rift Valley and India, with composite flash drought occurrence within the 36-year time period (1980-2015) of analysis.
- Additional areas within the tropics that had lesser, but notable flash drought occurrence included central Mexico, the Indochinese Peninsula, and northern Australia.
- In the mid-latitudes, local hotspots of flash drought occurrence (10-20 per cent) exist across the central United States, Iberian Peninsula, Asia Minor, southwestern Russia, and northeastern China.
- Flash droughts in India pose challenges for water management during the summer monsoon.
- About 10-15 per cent areas under cultivation of rice and maize were affected by flash droughts during the monsoon seasons in India between 1951 and 2018

66. Correct Option: (b)

Explanation:

- Option (b) is correct

Distribution of Lithium throughout the world and uses

- Lithium is a soft, silver-white metal within the alkali metal group on the periodic table.
- In nature, lithium occurs only in compounds due to its high reactivity.
- Chile has the largest lithium reserves worldwide by a large margin.
- Chile had an estimated 9.2 million metric tons of lithium reserves in 2020.
- Australia came in second, with reserves estimated at 4.7 million metric tons that year.
- Mineral reserves are defined as those minerals that were extractable or producible at the time of estimate.
- Australia was the top country in terms of lithium mine production in 2020, producing 40,000 metric tons of lithium that year.

Lithium and the battery metals rush

- Lithium is used primarily in batteries, glass, and ceramics, with other uses including rocket fuel and lasers.
- The global lithium battery market is projected to grow substantially in the coming years, from 30 billion U.S. dollars in 2017 to over 100 billion U.S. dollars by 2025.
- The electric vehicle market will propel the growth of the lithium market as the number of hybrid and electric vehicles powered by rechargeable lithium batteries picks up.
- By 2028 it is forecast that the top producers of lithium battery cells based on production capacity will be CATL, LG Chem, and Tesla.
- It is expected that Germany, China, Japan, and France will be leading electric vehicle-producing countries.

67. Correct Option: (a)

Explanation:

- Option (a) is correct

Kabasura Kudineer

- Kabasura Kudineer is a traditional formulation used by Siddha practitioners for effectively managing common respiratory health.

- Kabasura Kudineer was subjected to clinical trials for studying the efficacy in Covid-19 patients by Central Council for Research in Siddha (CCRS) under Ministry of Ayush and is also found useful in the treatment of mild to moderate covid-19 infection.

68. Correct Option: (b)

Explanation:

- Statement 2 is incorrect: NPNT or 'No Permission – No Take-off' is a software program that enables every Remotely Piloted Aircraft or drone (except Nano) to obtain a valid permission through Digital Sky platform before operating in India.

Digital Sky Platform

- DigitalSky is a Ministry of Civil Aviation initiative, a highly secure and scalable platform which supports technology framework such as NPNT (No permission no take-off) designed for enabling flights permission digitally and managing Unmanned Aircraft operations and traffic efficiently.
- The DigitalSky platform offers various services and workflows through a host of applications available on the web and mobile platforms. These applications provide its users a seamless experience and an ease of having a single window operation for activities such as:
 - o Obtaining various certifications and approvals for registration purposes
 - o Managing UAS / RPAS and remote pilots
 - o Preparing flight plans and obtaining flight approvals clearance
 - o Reporting and analyzing flight logs for deviations from the flight plan
 - o Providing various certifications / approvals to applications and flight plans
 - o Administration and management of various users and equipment
 - o Providing technical and customer support
 - o Functionality to report occurrences such as accidents and incidents
 - o Every UAS / RPAS (except Nano) sold in

India under the regulations published by DGCA for UAS / RPAS, must have a secure mechanism built on to the equipment to self-authenticate its permission to takeoff.

- It is made possible through a digitally signed document called a Permission Artefact (machine-readable) which when read by the equipment establishes its authenticity and permission to fly.
- This technology framework is referred to as NPNT (No Permission No Take-off).
- The framework plays an important role in ensuring various measure of safety and security of a flight by enforcing UAS / RPAS not to take-off without a digitally signed permission from DigitalSky.

69. Correct Option: (c)

Explanation:

- Statement 1 is incorrect: Instant Energy is produced.
- Statement 4 is incorrect: The general byproducts of reactions involved are environment friendly.

Artificial Photosynthesis

- Artificial photosynthesis as a chemical process that replicates natural phenomenon of photosynthesis to reduce anthropogenic carbon dioxide (CO₂) from our atmosphere thereby increasing fuel security, and providing a way to achieve sustainable global economy.
- Artificial photosynthesis is performed using artificial leaves for the efficient conversion of solar energy into H₂ and other fuels.
- It works by mimicking natural photosynthesis as done by green leaves.
- Therefore, research has been carried out to harvest solar energy and produce H₂ by artificial photosynthesis for human use.
- A team of Scientists from Jawaharlal Nehru Centre for Advanced Scientific Research, an autonomous institute of the Department of Science & Technology (DST), Government of India, undertook the scenario and developed the technology to extract excess Carbon from our atmosphere.

- The design is based on a metal-organic framework (MOF-808) leading to fabrication of an integrated catalytic system.
- It comprises if a photosensitizer (molecules that absorb light and transfer the electron from the incident light into another nearby molecule) that can harness solar power and the catalytic center can eventually reduce CO₂.

Purpose and application:

- Artificial photosynthesis (AP) is achieved by harvesting solar energy.
- It works by converting the captured carbon dioxide to carbon monoxide (CO), which can then be used as a fuel for internal combustion engines.

Advantages of Solar Fuel derived from Artificial Photosynthesis:

- Instant energy production, conversion and storage with only necessary loss of energy associated.
- The general byproducts of reactions involved are environment friendly.
- It will be a carbon-neutral source of energy, which could be used for transportation or domestic usage.

Disadvantages:

- Corrosion is involved in the process as water is used.
- May be less stable than photovoltaics over long periods of time.
- Unnecessary oxidation or photodamage may occur.
- Not commercially viable unless large scale.

70. Correct Option: (a)

Explanation:

- Option (a) is correct

Nord Stream 2 Pipeline

- It is a 1200-km long Russian undersea gas pipeline project that intends to deliver natural gas from Siberia to Germany.
- It runs from Ust-Luga in Russia to Greifswald in Germany through the Baltic Sea.
- The pipeline will double supplies of cheap natural gas from Russia to Germany from

the original 2011 Nord Stream, which runs parallel to the new project.

- Nord Stream 2 is one of the several pipelines that Russia has laid underwater in the Black Sea and Baltic Sea to replace pipelines that already run through Eastern Europe, especially through Ukraine.
- Since it was first planned, Nord Stream 2 has drawn criticism from the US, where both the Democratic and Republican parties believe that the project would increase Europe's dependence on Russia for natural gas.
- Currently, EU countries already rely on Russia for 40% of their gas needs.
- The project has also irked Ukraine, whose ties with Russia have seriously deteriorated in the aftermath of the Crimean conflict in 2014.
- There is an existing land pipeline between Russia and Europe that runs through Ukraine, which feels that once Nord Stream 2 is completed, Russia could bypass the Ukrainian pipeline, and deprive the country of lucrative transit fees.

Why in News?

- Recently, Russia's Nord Stream 2 natural gas pipeline became operational.

71. Correct Option: (b)

Explanation:

- Statement 1 is incorrect: Even non statutory bodies like LIC, ONGC etc fall within the definition of state.

Article 12 under the Indian Constitution

- According to Article 12 of the Constitution of India, the term 'State' denotes the union and state governments, the Parliament and state legislatures, and all local or other authorities within the territory of India or under the control of the Indian government.
- Article 12 defines State by consisting of the following parts of the Constitution-
 - o The Government and the Parliament of India

o The Government and the Legislature of each State.

o Local Authorities and Other Authorities.

- And the essential bodies embodied under Article 12:
 - o The President of India and Governors of states with executive powers
 - o Any department of the government like the Income Tax Department.
 - o Any institution controlled by the government like the International Institute for Population Sciences
 - o LIC and ONGC which perform tasks similar to governmental or sovereign functions.
 - o Municipalities, Panchayats, and other similar local authorities with the power to make and enforce rules, regulations, and laws.
 - o Any other organization which exercises sovereign functions.
- Article 12 is not clear about the definition of Jurisdiction. However, the school of thought is that since the judiciary has the power to make and enforce laws, it should be considered to be a State.
- However, whereas a false judgment may cause a violation of the fundamental rights of a citizen, obstructive decisions of the Courts are subjected to the tests of Article 14 of the Constitution.
- Thus, the simple regulatory power of the government over any statutory or non-statutory body is not enough for it to be deemed as a State. The concerned administrative body has to be financially, functionally and administratively and pervasively controlled by the government.

72. Correct Option: (c)

Explanation:

- Both statements are correct

Article 20(1) of the Constitution

- Article 20(1) of the Constitution says that no person shall be convicted of any offense except for violation of the law in force at the time of the commission of the act charged as an offense, nor be subjected to a penalty greater than that

which might have been inflicted under the law in force at the time of the commission of the offense.

- This protection means that a person cannot be prosecuted for an offense that was not a “crime” under the law when it was committed.
- The 2021 Bill amends the Narcotic Drugs and Psychotropic Substances Act, 1985 and seeks to rectify a drafting “anomaly” created by a 2014 amendment to the parent legislation. The 2021 amendment contains a legislative declaration about what one section refers to. It says Section 2 clause (viii a) corresponds to clause (viii b) in Section 27, since 2014, when the provision was first brought in. Section 27A of the NDPS Act, 1985, prescribes the punishment for financing illicit traffic and harboring offenders.
- In September, the government brought in an ordinance to rectify the drafting error, which Lok Sabha. “It shall be deemed to have come into force on the 1st day of May, 2014,” the Bill reads.
- During the discussion in Lok Sabha, Finance Minister Nirmala Sitharaman said retrospective application is permitted in “clarificatory amendments.” “It is not substantive, that is why, retrospective is allowed,” she said.

73. Correct Option: (b)

Explanation:

- Statement 3 is incorrect: NFT’s does not prevent people from copying the digital art.

Non-Fungible Tokens (NFT)

- A fungible asset, in economics, is something with units that can be readily interchanged - like money. If something is non-fungible, this is impossible - so it cannot be interchanged with something else.
- A non-fungible token or NFT is unique digital asset that cannot be interchanged.
- Most NFTs are part of the Ethereum blockchain. However, other blockchains can have their own versions of NFTs.

- NFTs can really be anything digital like drawings, music etc. but a lot of the current excitement is around using the tech to sell digital art.
- NFTs, can help artwork in getting “tokenized” thus creating a digital certificate of ownership that can be bought and sold.
- NFTs may also contain smart contracts that can give the artist, for example, a cut of any future sale of the token.
- However NFT’s does not prevent people from copying the digital art. For example, the Beeple’s art image has been copied and shared countless times. But the buyer of the NFT owns a “token” that proves they own the “original” work.
- WazirX, an Indian cryptocurrency exchange has recently launched a nonfungible tokens (NFT) marketplace for Indian artists and creators.
- NFTs are touted as the digital answer to collectables just like Bitcoin is hailed as the digital answer to currency.

74. Correct Option: (d)

Explanation:

- Statement 1 is incorrect: Current Account Surplus can cause an inflow of foreign exchange in the economy leading to appreciation of currency.
- Statement 2 is incorrect: Depreciation of a currency makes the exports cheaper and as exports become cheaper in the international market which increases its demands. This may lead to a reduction in trade deficits.

Currency Depreciation

- In foreign exchange market, it is a situation when domestic currency loses its value in front of a foreign currency.
- A country’s currency’s value in a floating exchange rate regime, is determined by the market forces of demand and supply.
- When the supply of currency in the market increases while its demand falls then a currency depreciates with respect to foreign currency.

Reasons for Currency Depreciation

- Declining exports leads to fall in export revenues and thus the demand for country's currency reduces and it depreciates
- Large increase in imports due to increased demand of imported goods can weaken the exchange rate due to net outflow of currency

75. Correct option: (b)

Explanation:

- Statement 3 is incorrect: The Maguri Motapung wetland — an Important Bird Area as declared by the Bombay Natural History Society — is located close to the Dibru Saikhowa National Park in Upper Assam.

Mandarin Duck

- Recently, a rare Mandarin Duck was spotted floating in the Maguri-Motapung beel (or wetland) in Assam's Tinsukia district. The Maguri-Motapung wetland — an Important Bird Area as declared by the Bombay Natural History Society — is located close to the Dibru Saikhowa National Park in Upper Assam.
- Considered the most beautiful duck in the world, the Mandarin duck, or the (*Aix galericulata*) was first identified by Swedish botanist, physician and zoologist Carl Linnaeus in 1758.
- It is a "small-exotic looking bird" native to East Asia.
- The migratory duck breeds in Russia, Korea, Japan and northeastern parts of China. It now has established populations in Western Europe and America too.
- The duck, however, rarely visits India as it does not fall in its usual migratory route.
- Its IUCN Status is Least Concern. While the duck is not a globally threatened species, spotting one is always considered significant because they only make "rare appearances."

76. Correct Option: (b)

Explanation:

- Statement 1 is incorrect: It is listed as Critically Endangered in the IUCN Red List.
- Statement 3 is incorrect: Project Godawan was launched by Rajasthan to conserve the Great Indian Bustard.

Great Indian Bustard

- Great Indian Bustard is a bustard found in Indian-Subcontinent.
- Historically, it was distributed through Western India spanning 11 states as well as parts of Pakistan.
- Its stronghold was once the Thar Desert in north-west and the Deccan plateau of the peninsula but today its population is confined mostly to Rajasthan and Gujarat with small numbers in Maharashtra, Karnataka and Andhra Pradesh.
- They generally favor flat open landscapes with minimal visual obstruction and disturbance, therefore adapt well in grasslands. (Considered flagship grassland species representing the health of grassland ecology)
- The biggest threat to this species is hunting, which is still prevalent in Pakistan. This is followed by occasional poaching outside Protected Areas, collisions with high tension electric wires, fast moving vehicles and free-ranging dogs in villages. Other threats include habitat loss and alteration as a result of widespread agricultural expansion and mechanized farming, infrastructural development such as irrigation, roads, electric poles, as well as mining and industrialization.
- It is listed in Schedule I of the Indian Wildlife (Protection) Act, 1972, in the CMS Convention and in Appendix I of CITES, as Critically Endangered on the IUCN Red List and the National Wildlife Action Plan (2002-2016).
- It has also been identified as one of the species for the recovery programme under the Integrated Development of Wildlife Habitats of the Ministry of Environment and Forests, Government of India.

- Project Godawan was launched by Rajasthan to conserve the Great Indian Bustard. It is also the state bird of Rajasthan.

77. Correct Option: (c)

Explanation:

- Option (c) is correct: Muzaffar Ahmad, S.A.Dange, Shaukat Usmani, Nalini Gupta were jailed in the Kanpur Bolshevik conspiracy case in 1924.

Kanpur Bolshevik conspiracy case 1924

- In this case, newly emerged communists of India were execrated by the British Government. M N Roy, Muzaffar Ahamed, S A Dange, Shaukat Usmani, Nalini Gupta, Singaravelu Chettiar, Ghulam Hussain were caught by the Government and were trailed for conspiring against the Government.
- They were charged: "to deprive the King Emperor of his sovereignty of British India, by complete separation of India from imperialistic Britain by a violent revolution."
- This case was not people movement but British movement to sack the upcoming communist leaders of the time.
- But this case, brought the communists in the lime light. The newspapers covered the matter exhaustively and this was for the first time the people of India could know the communist doctrine in details.
- So, this case was responsible for introduction of Communism to the Indian Public.
- In this case, M N Roy was charged in absentia, so he was not arrested. Ghulam Hussain turned a British informer and was pardoned. Rest all people were arrested and sent to jail for 4 years.

78. Correct Option: (b)

Explanation:

- Statement 3 is incorrect: Delhi had not acquired much strategic importance during ninth century.

Tripartite Struggle

- The tripartite struggle was a struggle between Paalas, Gurjaras–Pratiharas and Rashtrakutas which took place in 9th century.

Main reason behind tripartite Struggle

- After Harshavardhan, Kannauj became the center of attraction of various powers. In fact, Harsh and Yashovarman made it a symbol of imperial power. In order to become the Chakravarti ruler of North india, it was deemed necessary to take control of Kannauj.
- Apart from being of political importance, the economic importance of Kannauj city also increased to a great extent and it was also proved to be an important reason for its attraction.
- By taking control of this, control could be established over the Ganga Ghati and the rich commercial and agricultural resources available in it. The region of Kannauj was the most fertile region of the country, being situated between the Ganges and the Yamuna. This city was also very important from the point of view of trade and commerce, because from here the trade routes went to different directions.

79. Correct Option: (c)

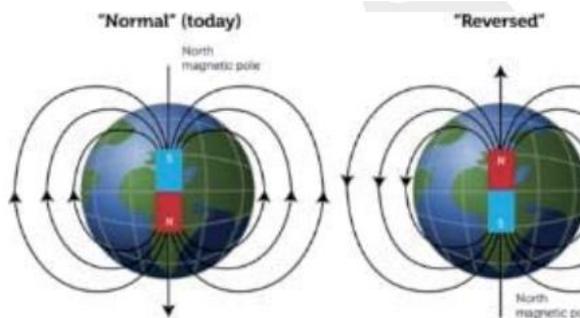
Explanation:

- Both statements are correct

Geomagnetism/ Paleomagnetism

- A magnet's North pole is thought of as the pole that is attracted by the Earth's North Magnetic Pole when the magnet is suspended so it can turn freely.
- Since opposite poles attract, the North Magnetic Pole of the Earth is the south pole of its magnetic field.
- A geomagnetic reversal or a reversal in earth's magnetic field is a change in a planet's magnetic field such that the positions of magnetic north and magnetic south are interchanged.

- Based on palaeo-magnetism (magnetism in rocks that was induced by the earth's magnetic field at the time of their formation), it is observed that over the last 20 million years, magnetic north and south have flipped roughly every 200,000 to 300,000 years.
- The reversal is not literally 'periodic' as it is on the sun, whose magnetic field reverses every 11 years.
- The time between magnetic reversals on the Earth is sometimes as short as 10,000 years and sometimes as long as 25 million years.



80. Correct Option: (c)

Explanation:

- Option (c) is correct: The above statements describe Wheat crop.

Cultivation of Kharif/ Rabi Crops - Condition for growth

- Cotton: Cotton is a plant that needs a long frost-free period, a lot of heat and plenty of sunshine. It prefers warm and humid climates. Cotton seeds will have a small germination rate, if the soil temperature is below 15°C. During active growth, the ideal air temperature is 21-37°C.
- Rice: Rice crop needs a hot and humid climate. It is best suited to regions which have high humidity, prolonged sunshine and an assured supply of water. The average temperature required throughout the life period of the crop ranges from 21 to 37°C.
- Wheat: It grows best when temperatures are warm, from 21° to 24° C, but not too hot. Wheat also needs a lot of sunshine, especially when the grains are filling. Areas with low humidity are better since many wheat diseases thrive in damp

weather. The amount of rainfall required for wheat cultivation varies between 30 cm and 100 cm.

- Maize: A temperature of 21°C- 27°C and 50-100cm rainfall is suitable for its cultivation. Alternate spells of rains and sunny weather are ideal for maize. It is a Kharif Crop but in some states like Bihar, it is grown in the rabi season also. It grows well in alluvial and red soils with good drainage

81. Correct Option: (c)

Explanation:

- Both statements are correct

Microbots

- Microbots are tiny automated machines with sizes of order less than a millimeter.
- They are basically a robot of the size of cell or say about 100 atoms.
- As a result of tiny sizes, microbot technology is seen as a disruptive technology especially in future biomedicine.

Basic Principle

- Microbots work on the same principle as that of an industrial robot.

Primary components of a robot:

- A sensor to sense the stimuli from the environment
- An actuator to perform the mechanical actions like moving, lifting, dropping etc.
- A microcontroller to enable communication between sensors and actuators
- A power source to power all the parts of a robot
- A platform which houses all these parts
- A software that instructs working of various parts

Working of microbot

- The major challenge of microbot is the tiny size.
- Actuators
- Designing actuators, capable of locomotion, of sizes of order of millimeter and less is the major challenge.

- The large robots use motors to perform this function.

Applications

- Drug delivery
- Microbots are increasingly seen as the technology of the future for drug delivery replacing the current invasive techniques. Eg: To destroy tumors in cancer, performing biopsy, destroy kidney stones, removing plaque in arteries and other surgeries.
- Neuroscience
- Microbots can be used to study nerve signals in brain.
- Pollution
- Microbots are seen as a solution to remove heavy metals such as lead, arsenic, mercury, cadmium, chromium etc. from water.
- Industrial applications
- Microbots can be used to perform cleaning operations in industrial machines, IC engines etc.
- Cleaning of batteries
- Microbots can be used to clean batteries of electronic devices thereby increasing the life of batteries.

82. Correct Option: (b)

Explanation:

- Statement 1 is incorrect: Calls made over VoWiFi provides users with a shorter call connection time along with superior call quality compared to calls made over VoLTE.

Voice over Wi-Fi (VoWiFi)

- Bharti Airtel recently introduced India's first Voice over Wi-Fi (VoWiFi). Reliance Jio also followed the suit.
- VoWiFi is a Wi-Fi-based Voice over Internet Protocol (VoIP) service, which allows users to make high definition (HD) voice calls using Wi-Fi even in places with poor or no cellular network.
- Calls made over VoWiFi provides users with a shorter call connection time along with superior call quality compared to calls made over VoLTE or any existing cellular technology.

- Users don't have to pay extra for these calls as it is using a Wi-Fi network. VoWiFi service does not need any separate app or a new number or any log-in to work.
- This is similar to a voice call using WhatsApp or any other over-the-top messaging platform, but here the call is from one number to another, and not using an app.

83. Correct Option: (a)

Explanation:

- Option (a) is correct

Excellence in Design for Greater Efficiencies (EDGE)

- An innovation of the International Finance Corporation (IFC), a member of the World Bank Group, EDGE ("Excellence in Design for Greater Efficiencies") provides market leaders with the opportunity to gain a competitive advantage by differentiating their products and adding value to the lives of their customers.
- EDGE brings speed, market intelligence and an investment focus to the next generation of green building certification in more than 170 countries.
- IFC created EDGE to respond to the need for a measurable and credible solution to prove the business case for building green and unlock financial investment.
- EDGE includes a cloud-based platform to calculate the cost of going green and utility savings. The state-of-the-art engine has a sophisticated set of city-based climate and cost data, consumption patterns and algorithms for predicting the most accurate performance results.
- It is currently funded by the UK government.

Why in News?

- International Finance Corporation (IFC) recently created EDGE as a green building certification system focused on making buildings resource efficient.

84. Correct Option: (b)

Explanation:

- Statement 1 is incorrect: The 1st amendment added three more reasonable restrictions to Article 19.

First Amendment, 1951

- The Constitution (First Amendment) Act, 1951 empowered the State to make special provisions to advance socially and economically backward classes.
- Added Ninth Schedule to protect from judicial review the land reforms and other legislation included in it. Articles 31A and 31B were added after Article 31, respectively.
- Three more reasons for restricting freedom of speech and expression have been added: public order, friendly relations with foreign states, and incitement to an offense. It also made the restrictions 'reasonable' and, therefore, in nature, justiciable.
- Issues in the cases included freedom of expression, possession of Zamindari estate, State trade monopoly, etc. These laws breach property rights, freedom of speech, and equality before the law.

85. Correct Option: (a)

Explanation:

- Statement 2 is incorrect: Supreme Court held that the declaration of martial law does not ipso facto result in the suspension of writ of habeas corpus.

Martial law

- The concept of martial law has been borrowed in India from the English common law. However, the expression 'martial law' has not been defined anywhere in the Constitution. Literally, it means 'military rule'.
- Article 34 of the Indian constitution provides for the restrictions on fundamental rights while martial law is in force in any area within the territory of India.
- It empowers the Parliament to indemnify any government servant or any other person for any act done by him in

connection with the maintenance or restoration of order in any area where martial law was in force.

- The Parliament can also validate any sentence passed, punishment inflicted, forfeiture ordered or other act done under martial law in such area.
- Martial law is a law managed by the Martial as opposed to a regular citizen government.
- Martial law might be proclaimed in a crisis or reaction to an emergency, or to control an involved area.
- Martial law, brief guideline by Martial authorities of an assigned zone in time of crisis when the civil authority is esteemed incapable to work.
- The legitimate impacts of an assertion of Martial law contrast in different locales, yet they by and large include a suspension of ordinary social equality and the expansion to the regular citizen populace of synopsis Martial equity or of martial law.
- Although temporary in theory, a condition of Martial law may in certainty proceed inconclusively. Martial law is an extreme and rare measure used to control society during war or times of common distress or disorder.
- As per the Supreme Court, the term Martial law conveys no exact significance. In any case, most assertions of Martial law have some regular highlights The Supreme Court held that the declaration of martial law does not ipso facto result in the suspension of the writ of habeas corpus.
- The declaration of a martial law under Article 34 is different from the declaration of a national emergency under Article 352.

86. Correct Option: (c)

Explanation:

- Statement 2 is incorrect: In the production method of measuring National Income we have to estimate the value added by all the firms.

- Statement 3 is incorrect: Measurement of National Income through Income method we have to add all the factors of production like rent, wages, interest, profit etc.

National Income

- National Income-The total value of final goods and services produced by the normal residents during an accounting year, after adjusting depreciation.
- It is Net National Product (NNP) at Factor Cost (FC)
- It does not include taxes, depreciation and non-factor inputs (raw materials)
- Domestic Income – Total value of final goods and services produced within a domestic territory during an accounting year, after adjusting depreciation.
- It is NDP at FC
- Both NNP and NDP can be measured at constant prices (real income) or market prices (nominal income)

Measurement of National Income

Income Method

- Estimated by adding all the factors of production (rent, wages, interest, profit) and the mixed-income of selfemployed.
- In India, one-third of people are selfemployed.
- This is the 'domestic' income, related to the production within the borders of the country

Production Method

- Estimated by adding the value added by all the firms.
- Value-added = Value of Output – Value of (non-factor) inputs
- This gives GDP at Market Price (MP) – because it includes depreciation (therefore 'gross') and taxes (therefore 'market price')

Expenditure Method

- The expenditure method to measure national income can be understood by the equation given below:

$$Y = C + I + G + (X-M),$$
 where Y = GDP at MP, C = Private Sector's Expenditure on final consumer

goods, G = Govt's expenditure on final consumer goods, I = Investment or Capital Formation, X = Exports, I = Imports, X-M = Net Exports

87. Correct Option: (a)

Explanation:

- Option (a) is correctly matched

List I	List II
A. Bonn Convention	4. Migratory species of wild animals
B. Rotterdam Convention	1. Hazardous Chemicals
C. Stockholm Convention	3. Persistent Organic Pollutants
D. Tehran Convention	2. Marine Environment of Caspian Sea

Bonn Convention

- It is also known as the Convention on the Conservation of Migratory Species (CMS) of Wild Animals.
- It was adopted in 1979 and enforced in 1983.
- It provides a global platform for the conservation and sustainable use of migratory animals and their habitats.
- Is the only global convention specializing in the conservation of migratory species, their habitats and migration routes and co-operates with a number of other international organizations, NGOs and partners in the media as well as in the corporate sector.
- India has been a party to CMS since 1983.

Rotterdam Convention

- It is an international treaty that facilitates informed decision-making by countries with regard to international trade in hazardous chemicals and pesticides.
- It was adopted in 1998 and enforced in 2004.
- It establishes a list of covered chemicals and requires parties seeking to export a chemical on that list to first establish that the intended importing country has consented to the import.

- It also requires that a party seeking to export a chemical that is not listed under the Convention but that is subject to a ban or severe restriction in its own territory must provide notice to the importing country of the proposed export. India ratified it in 2005.

Stockholm Convention

- The Stockholm Convention is a global treaty to protect human health and the environment from persistent organic pollutants (POPs).
- POPs are chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of living organisms and are toxic to humans and wildlife.
- It was adopted in 2001 in Geneva, and enforced in 2004.
- India signed the convention in 2002 and ratified it in 2006.

Tehran Convention

- The Framework Convention for the Protection of the Marine Environment of the Caspian Sea -i.e. the Tehran Convention - came into being with the understanding of the need to protect and preserve the Caspian Sea's natural resources for future generations.
- Having entered into force in 2006, the Tehran Convention is the first regional legally binding instrument signed by all five Caspian littoral states (Azerbaijan, Iran, Kazakhstan, Russia and Turkmenistan)
- Under its umbrella the Parties have developed additional Protocols on priority areas of common concern.

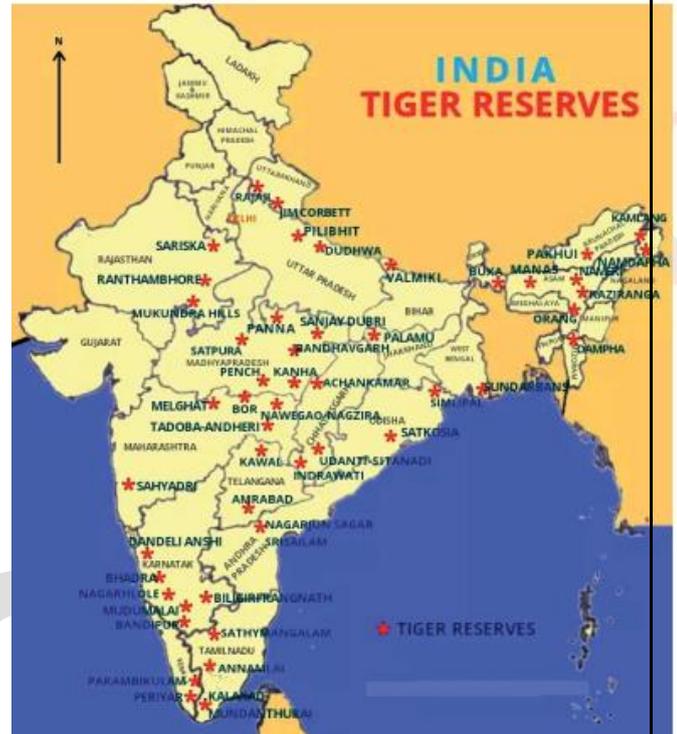
88. Correct Option: (a)

Explanation:

- Option (a) is correct

Tiger Reserves

- Pilibhit Tiger Reserve is in Uttar Pradesh, Valmiki Tiger Reserve in Bihar, Mukundra Hills Tiger Reserve in Rajasthan, and Melghat Tiger Reserve is in Maharashtra.



89. Correct Option: (a)

Explanation:

- Option (a) is correct
- Astamahasthanas
- Eight important holy locations related with the life of Buddha are known as Astamahasthanas. Lumbini, Bodhgaya, Sarnath, and Kushinagara are among the four pilgrimage sites associated with Gautama Buddha's life, as are Sravasti, Sankasya, Rajgir, and Vaishali.
- Lumbini is presently in Nepal's Kapilavastu district. It is where Buddha was born. Lumbini was a component of Shakya Janapada, which was a republic during the time of Buddha's birth.
- Bodhgaya is situated in Bihar on the banks of the river Neranjana, which was previously known as Uruwela. It is well-known as the site of Buddha's enlightenment.
- Sarnath, also known as Mrigadava, Migadaya, Rishipattana, and Isipatana, where Gautama Buddha gave his first sermon, the Dhammachakraparivartan Sutra. It was a part of Kashi Janapada at the time of Buddha.
- Kushinagara is the place where Buddha died and attained Mahaparinirvana. It was

the capital of Malla janapada at the time of Buddha's death.

- Sravasti was a town in modernday Uttar Pradesh, near the city of Balrampur. It is linked to Buddha's life since he spent 24 Chaturmasas, which equates to 24 years because one year is just one Chaturmasa between Ashadha and Kartika. As a result, we may claim that Shravasti was where Buddha spent the most of his monastic life. Shravasti was the capital of the Kosala Kingdom during Buddha's time. Shravasti is also known for being the birthplace of Jaina Tirthankar Sambhavanath.
- Sankasya is currently located in the Uttar Pradesh district of Farrukhabad. Some Buddhist beliefs believe that Buddha descended from heaven after his death.
- Rajgir was the early capital of Magadh Janapada, which was controlled by Bimbisara. Buddha had first gone to Rajgir after the big departure (Mahabhinishkramana). He began seeking alms and leading an austere life there. Buddha had been offered King Bimbisara's throne, which he had declined.

90. Correct Option: (d)

Explanation:

- Option (d) is correct

Gandhi in South Africa

- From 1894-1906, Gandhi relied on sending petitions and memorials to the authorities in South Africa and in Britain hoping that once the authorities were informed of the plight of Indians, they would take sincere steps to redress their grievances as the Indians were, after all, British subjects. To unite different sections of Indians, he set up the Natal Indian Congress in 1894 and started a paper Indian Opinion in 1903.
- The second phase, which began in 1906, was characterized by the use of the method of passive resistance or civil disobedience, which Gandhi named Satyagraha.

- Satyagraha was born when Gandhi formed the Passive Resistance Association in 1906 to conduct the campaign of defying the law that made it compulsory for Indians there to carry at all times certificates of registration with their fingerprints and suffering all the penalties resulting from such defiance.
- The Tolstoy Farm was founded in 1910 and named as such by Gandhi's associate, Herman Kallenbach, after the Russian writer and moralist, whom Gandhi admired and corresponded with. Besides being an experiment in education, it was to house the families of the Satyagrahis and to give them a way to sustain themselves.
- The Tolstoy Farm was the second of its kind established by Gandhi. He had set up the Phoenix Farm in 1904 in Natal, inspired by a reading of John Ruskin's Unto This Last, a critique of capitalism, and a work that extolled the virtues of the simple life of love, labour, and the dignity of human beings.
- Gandhi's technique of Satyagraha was based on truth and non-violence. He combined some elements from Indian tradition with the Christian requirement of turning the other cheek and the philosophy of Tolstoy, who said that evil could best be countered by non-violent resistance.

91. Correct Option: (b)

Explanation:

- Option (b) is correct

Joint sitting of Parliament

- The Parliament of India is bicameral. Concurrence of both houses are required to pass any bill. However, the framers of the Constitution of India anticipated situations of deadlock between the Rajya Sabha and the Lok Sabha. Therefore, the Constitution of India provides for Joint sittings of both the Houses to break the deadlock.
- The joint sitting of the Parliament is called by the President of India (Article

108) and is presided over by the Speaker of the Lok Sabha or, in their absence, by the Deputy Speaker of the Lok Sabha, or in their absence, the Deputy Chairman of the Rajya Sabha. The Chairperson of the Rajya Sabha, who is the Vice President of India, doesn't preside over the joint session. If any of the above officers are not present than any other member of the Parliament can preside by consensus of both the House.

- Joint Sitting of Indian parliament has been called for only 3 bills:
 - o Dowry Prohibition Bill, 1961
 - o Banking Service Commission (Repeal) Bill, 1978
 - o Prevention of Terrorism Bill, 2002

92. Correct Option: (b)

Explanation:

- Statement 1 is incorrect: In India, the principle of ZBB was initiated in the Department of Science and Technology in 1983.
- Statement 3 is incorrect: Traditional method of accounting makes an incremental provisioning for projects over previous year.

Zero-Based Budgeting (ZBB)

- The concept of zero-based budgeting was introduced in the 1970s by US President Jimmy Carter.
- In India, the principle of ZBB was initiated in the Department of Science and Technology in 1983. In 1986, the Indian government adopted ZBB as a technique for determining expenditure budget.
- ZBB is an approach to budget formation where in a government prepares a budget from the ground, starting from zero rather than making an incremental provisioning for projects over previous year.
- The basic purpose of ZBB is phasing out of programmes/activities, which do not have relevance anymore. This is part of an exercise to do away with unnecessary schemes.

- As opposed to traditional budgeting, no item is automatically included in the next budget. Every program and expenditure is reviewed at the beginning of each budget cycle and must justify each line item in order to receive funding.
- It is very costly, complex and time consuming as budget is rebuilt from scratch annually, whereas simpler and faster traditional budgeting requires justification only for incremental changes.

93. Correct Option: (d)

Explanation:

Option (d) is correct
Supplementary notes:
Quit India Movement

In July 1942, the Congress Working Committee met at Wardha and resolved that it would authorize Gandhi to take charge of the non-violent mass movement. The resolution generally referred to as the 'Quit India' resolution was ratified at the Congress meeting at Gowalia Tank, Bombay, on August 8, 1942. Gandhi was named the leader of the struggle and he gave the slogan "Do or Die". The government, however, was in no mood to either negotiate with the Congress or wait for the movement to be formally launched. In the early hours of August 9, 1942, in a single sweep, all the top leaders of the Congress were arrested and taken to unknown destinations. Left without leaders, there was no restraint and violence became common. The general public attacked symbols of authority, and hoisted national flags forcibly on public buildings. Satyagrahis offered themselves up to arrest, bridges were blown up, railway tracks were removed and telegraph lines were cut. This kind of activity was most intense in eastern United Provinces and Bihar.

Students responded by going on strike in schools and colleges, participating in processions, writing and distributing illegal news sheets (patrikas) and acting

as couriers for underground networks. Workers went on strike in Ahmedabad, Bombay, Jamshedpur, Ahmadnagar and Poona.

Government officials, especially those belonging to lower levels in police and administration, participated resulting in erosion of government loyalty. Muslims helped by giving shelter to underground activists. There were no communal clashes during the movement. The Communists did not join the movement; in the wake of Russia (where the communists were in power) being attacked by Nazi Germany, the communists began to support the British war against Germany and the 'Imperialist War' became the 'People's War'. The Muslim League opposed the movement, fearing that if the British left India at that time, the minorities would be oppressed by the Hindus. The Hindu Mahasabha also did not participate in the movement. Many Indian businessmen profiting from heavy wartime spending did not support the Quit India Movement. The Princely states showed a low-key response.

94. Correct Option: (d)

Explanation:

All statements are correct
Supplementary notes:
Kakori Train Robbery and Conspiracy Case

Kakori Train Robbery was carried out by the Hindustan Republic Association (HRA) in the Kakori town of the United Provinces (now Uttar Pradesh) on 9 August 1925. It was among the many attempts made by the HRA to obtain funds for its armed struggle against the British. It included 10 HRA members—Ram Prasad Bismil, Ashfaqulla Khan, Rajendra Lahiri, Chandrashekhar Azad, Sachindra Bakshi, Keshab Chakravarty, Manmathnath Gupta, Murari Lal, Mukundi Lal and

Banwari

Lal.

However, within a month of the attack, more than two dozen HRA members had been arrested and the final judgments were pronounced on April 6, 1927. While Ram Prasad Bismil, Thakur Roshan Singh, Rajendra Nath Lahiri and Ashfaqulla Khan were given death sentences, Shachindra Nath Sanyal and Sachindra Bakshi were deported to Kala Pani (Port Blair cellular jail). The sentences triggered an outcry among the Indian people. Despite several attempts to save Ram Prasad Bismil, Thakur Roshan Singh, Rajendra Nath Lahiri and Ashfaqulla Khan, the four HRA members were executed in December 1927.

95. Correct Option: (a)

Explanation:

Statement 2 is incorrect: Sundarban Delta is a type of arcuate delta while Narmada-Tapi delta is a type of Estuarine Delta.

Supplementary notes:
Deltas Formed by Major Rivers in India

Sundarban Delta: The Sundarbans is a mangrove area in the delta formed by the confluence of Ganges, Brahmaputra and Meghna Rivers in the Bay of Bengal. It spans from the Hooghly River in India's state of West Bengal to the Baleswar River in Bangladesh. It is a type of Arcuate delta.

Such deltas are like an arc of a circle or a bow and are of lobate form in appearance wherein middle portion has maximum extent towards the sea whereas they narrow down towards their margins. Such deltas are formed when the river water is as dense as the sea water. The arcuate or semi-circular shape is also given to such deltas by sea waves and oceanic currents.

The main river is bifurcated into numerous channels known as distributaries. Such deltas are very often formed in the regions

of semi-arid climate. Narmada-Tapi Delta: Although almost all east flowing rivers in India do not form delta except Narmada and Tapi. The Sediments brought by the rivers and deposited in estuaries are removed by the sea waves and ocean currents. However, when the rate of deposition of sediments by the rivers exceeds the rate of removal by the waves and currents, a long and narrow delta is formed. This type of delta is called estuarine delta. Due to steep slope of western flank of western ghat, most of the east flowing rivers do not form delta. However, some rivers such as Narmada and Tapi form narrow deltas by filling up of estuaries due to large amount of sediments they carry with them. Hence, deltas of east flowing rivers are broader than deltas formed by west flowing rivers.

96. Correct Option: (b)

Explanation:

Option (b) is correct. Supplementary notes: Islands in the Indian Ocean. The correct order is Seychelles-Comoros-Mauritius- Reunion.



97. Correct Option: (a)

Explanation:

Statement 2 is incorrect: An end effector is a peripheral device that attaches to a robot's wrist, allowing the robot to interact

with its task. On the contrary, actuator is a device that produces a motion by converting energy and signals going into the system.

Supplementary notes:

Actuators

An actuator is a device that produces a motion

by converting energy and signals going into the system. The motion it produces can be either rotary or linear. Linear actuators, as the name implies, produce linear motion. This means that linear actuators can move forward or backwards on a set linear plane – a set distance they can travel in either direction before they must stop. Rotary actuators on the other hand produce rotary motion, meaning that the actuator revolves

on a circular plane.

Unlike the linear actuator, the rotary actuator is not limited by a set path, which means it can keep rotating in the same direction for as long as necessary.

Central Processing Unit

One of the main components of a robot is the main component in any computerdriven technology: the central processing

unit (CPU). The CPU acts as the “brain” of the robot. In other words, a CPU is the robot component that provides feedback to

outside stimuli.

All organisms function and survive by using

feedback. It's what causes us to whip our hands away after we've touched a hot stove.

The CPU in a robot takes in environmental data using sensors and then calls on its programming to perform the appropriate action.

One of the earliest examples of using feedback to control the machine dates back

to 1745 when Edmund Lee invented the automatic fantail. This device consisted of smaller vanes attached to the axle of a

larger windmill that changed the windmill's direction dependent on the Wind. This simple system may be a far cry from today's CPUs, but the core idea, functioning according to outside feedback, remains the same. CPUs function similarly to the human brain. Data comes in through sensors just as information comes to the neurons in your brain through your body's senses, then the CPU interprets and acts accordingly.

98. Correct Option: (a)

Explanation:

Option (a) is correct
Supplementary notes:

First Carnatic War (1740-48)

Carnatic was the name given by the Europeans to the Coromandel Coast and its hinterland.

The First Carnatic War was an extension of the Anglo-French War in Europe which was caused by the Austrian War of Succession.

Although France, conscious of its relatively weaker position in India, did not favour an extension of hostilities to India, the English navy under Bernet seized some French ships to provoke France.

The First Carnatic War ended in 1748 when the Treaty of Aix-La Chapelle was signed bringing the Austrian War of Succession to a conclusion.

Under the terms of this treaty, Madras was handed back to the English, and the French, in turn, got their territories in North America.

A small French army under Captain Paradise defeated the strong Indian army under Mahfuz Khan at St. Thome on the banks of the River Adyar.

This was an eye-opener for the Europeans in India: it revealed that even a small disciplined army could easily defeat a much larger Indian army.

99. Correct Option: (a)

Explanation:

Statement 2 is incorrect: The

southwestern plateau region is marked by absence of diversified mineral deposits.

Statement 4 is incorrect: The Himalayan region contains minerals like copper, cobalt, zinc, lead etc.

Supplementary notes:

Distribution of Minerals in India

Most of the major mineral resources occur to the east of a line linking Mangalore and Kanpur.

Minerals are generally concentrated in three broad belts in India. (There may be some sporadic occurrences here and there in isolated pockets). These belts are:

The North Eastern Plateau Region:

This belt covers Chhotanagpur (Jharkhand), Odisha Plateau, West Bengal and parts of Chhattisgarh. It has variety of minerals viz. iron ore coal, manganese, bauxite, mica.

The South Western Plateau Region:

This belt extends over Karnataka, Goa and contiguous Tamil Nadu uplands and Kerala. This belt is rich in ferrous metals and bauxite. It also contains high grade iron ore, manganese and limestone. This belt lacks in coal deposits except Neyveli lignite. This belt does not have as diversified mineral deposits as the north-eastern belt. Kerala has deposits of monazite and thorium, bauxite clay. Goa has iron ore deposits.

The North Western Region:

This belt extends along Aravalis in Rajasthan and part of Gujarat and minerals are associated with Dharwar system of rocks. Copper, zinc have been major minerals. Rajasthan is rich in building stones i.e. sandstone, granite, marble. Gypsum and Fuller's earth deposits are also extensive. Dolomite and limestone provide raw materials for cement industry. Gujarat is known for its petroleum deposits.

The Himalayan Belt: The Himalayan belt is another mineral belt where copper, lead, zinc, cobalt and tungsten are known to occur. They occur on both

the eastern and western parts. Assam valley has mineral oil deposits.

100. Correct Option: (b)

Explanation:

Statement 1 is incorrect: It does not share its border with Lebanon



Sea of Galilee

The Sea of Galilee is a freshwater lake in Israel well-known in Jewish, Christian and Islamic lore. Recently it has swelled up due to heavy rains in the region. It lies in northern Israel, between the occupied Golan Heights and the Galilee region. It is fed by Jordan River, which is major source of its water. It is the lowest freshwater lake in the world and second-lowest lake after Dead Sea.