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1. Geography

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1. Consider the following statements:

1. The rocks formed by the solidification on the cooling of molten magma, are called igneous rocks.
2. Granite is extrusive igneous rock.
3. Basalt is an example of intrusive igneous rocks.
4. The Deccan Plateau is made up of basalt rocks.

Which of the above statements are incorrect?

- A. 2 and 3 only
- B. 3 and 4 only
- C. 2 and 4 only
- D. 1, 2 and 3 only

Answer: A

Explanation

- The word igneous is derived from the Latin word Ignis which means fire. The rocks formed by the solidification on the cooling of molten magma, are called igneous rocks.
- Depending on where the molten magma cools, they are of the following types:
 - ✓ Intrusive Rocks
 - ♣ When the molten magma cools deep inside the earth's crust, intrusive igneous rocks are formed. Granite is intrusive igneous rock.

♣ Diorite and pegmatite are examples of intrusive igneous rocks.

✓ Extrusive Rocks

♣ When the molten magma (lava) comes on the earth's surface. It rapidly cools down and becomes solid.

♣ Rocks formed in such a manner on the crust are called extrusive igneous rocks.

- Basalt is an example of extrusive igneous rocks. The Deccan Plateau is made up of basalt rocks.
- Andesite, dacite, obsidian, pumice, rhyolite and scoria are examples of extrusive igneous rocks.

2. Consider the following statements:

1. The insolation received by the Earth is in short waveforms.
2. The Earth after being heated itself radiates energy in the atmosphere in the long waveform.
3. In northern India, during the summer season, local winds called "loo" are the outcome of the convection process in the atmosphere.

Which of the above statements is/are correct?

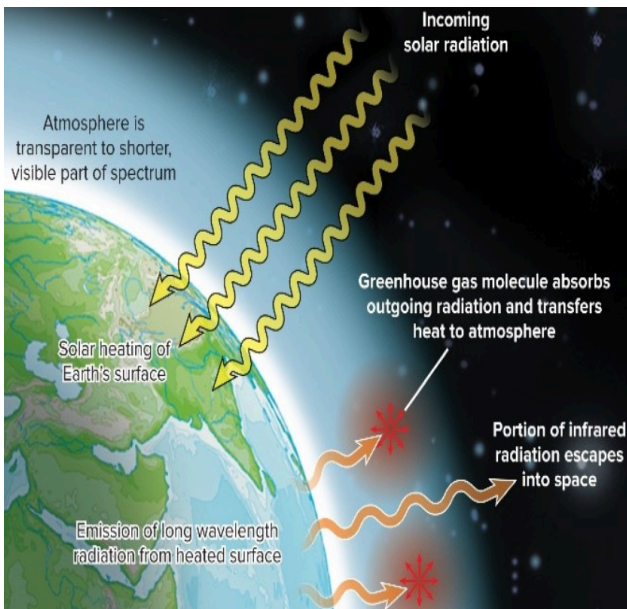
- A. 1 and 2 only

- B. 2 only
- C. 2 and 3
- D. 1 and 3 only

Answer: A

Explanation

- The insolation received by the earth is in short waveform and it heats up its surface.
- The Earth after being heated itself becomes the radiating body and it radiates energy in the atmosphere in the long waveform.
- The transfer of heat through the horizontal movement of air is called advection.
- In middle latitudes, most of the diurnal variations in weather are caused by advection alone.
- Even the local winds called “loo” in India are due to Advection only.



3. Consider the following pairs:

Strait	Area
1. Bosphorus Strait	Join: Black Sea and Marmara Sea
2. Bab-el-Mandeb Strait	Join: Red Sea & Gulf of Aden
3. Gibraltar Strait	Join: Mediterranean Sea & Atlantic Ocean
4. Palk Strait	Join: Palk Bay & Bay of Bengal

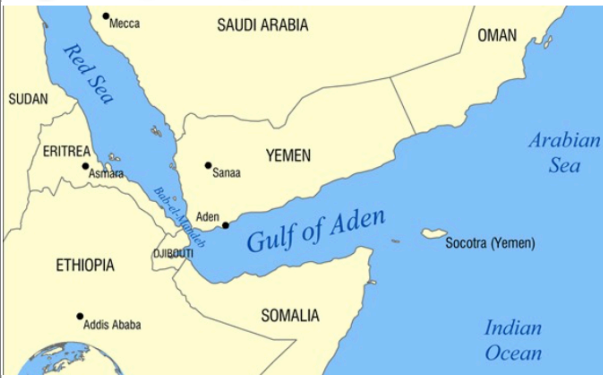
Which of the above pairs are correct?

- A. 1, 2 and 3 only
- B. 2 and 4 only
- C. 1 and 3 only
- D. 1, 2, 3 and 4

Answer: D

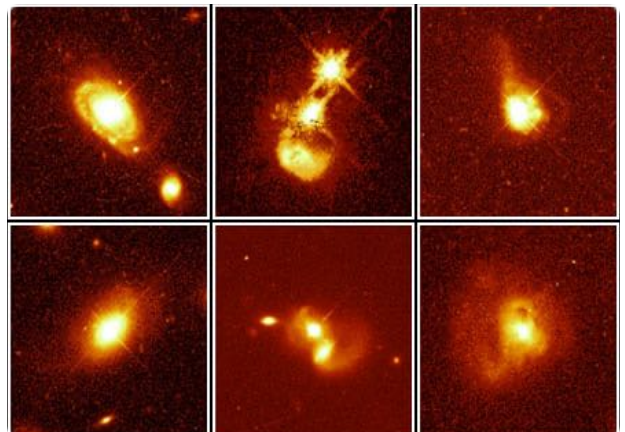
Explanation





- Quasars are very luminous objects in faraway galaxies that emit jets at radio frequencies. The word quasar is short for "quasistellar radio source".
- Most quasars are larger than our solar system. A quasar is approximately 1 kiloparsec in width.
- They're now known as young galaxies, located at vast distances from us, with their numbers increasing towards the edge of the visible universe.
- They're highly active, emitting staggering amounts of radiation across the entire electromagnetic spectrum.

1 Kiloparsec = 3, 260 light year



4. Consider the following statements about Quasars:

1. Quasars are very luminous objects in faraway galaxies that emit jets at radio frequencies.
2. Most quasars are smaller than our solar system.
3. They are only found in galaxies that have supermassive blackholes which power these bright discs.

Which of the above statements is/are correct?

- A. 1 and 3 only
- B. 2 and 3 only
- C. 2 only
- D. 1, 2 and 3

Answer: A

Explanation

5. Which of the following statements is/ are incorrect with respect to Peaty - Marshy Soils?

1. These are soils with a large amount of organic matter and considerable amount of soluble salts.
2. They are black, heavy and highly acidic.
3. They are under paddy cultivation throughout the year.

Select the correct code

- A. 1 and 2 only
- B. 2 only
- C. 3 only
- D. 1 and 3 only

Answer: C

Explanation

Peaty - Marshy Soils

- These are soils with large amount of organic matter and considerable amount of soluble salts.
- The most humid regions have this type of soil.
- They are black, heavy and highly acidic. They are deficient in potash and phosphate.
- Most of the peaty soils are under water during the rainy season but as soon the rains cease, they are put under paddy cultivation.
- They are found in Kerala, Orissa, West Bengal (Sundarbans) and along the South-East coast of Tamil Nadu.

2. History & Culture

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1. With reference to Congress Socialist Party, consider the following statements:

1. It advocated the boycott of British goods and evasion of taxes.
2. It wanted to establish the dictatorship of the proletariat.
3. It advocated a separate electorate for minorities and oppressed classes.

Which of the statements given above is/ are correct?

- A. 1 and 2 only
- B. 3 only
- C. 1, 2 and 3
- D. None

Answer: D

Explanation

- The Congress Socialist Party (CSP) was a socialist group within the Indian National Congress.
- It was founded in 1934 by Jayaprakash Narayan and Acharya Narendra Dev.
- Influenced by Marxism-Leninism.
- The members ranged from the advocates of arms struggle to nonviolent resistance.
- The CSP advocated decentralized socialism in which co- operatives, trade unions, independent farmers, and local authorities would hold a substantial share of the economic power.

- Their demands included abolition of capitalism, the zamindari system, and princely states.

2. What was the reason for Mahatma Gandhi to organize a satyagraha on behalf of the peasants of Kheda?

1. The Administration did not suspend the land revenue collection in spite of a drought.
2. The Administration proposed to introduce Permanent Settlement in Gujarat.

Which of the statements given above is/ are correct?

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. Neither 1 nor 2

Answer: A

Explanation

- The Kheda peasant struggle is also known as no-tax peasant struggle. It was a satyagraha launched in March 1919 under the leadership of Gandhiji, Sardar Vallabhbhai Patel, Indulal Yajnik, N.M. Joshi, Shankerlal Pareekh and several others.
- Main Reasons:

- ✓ The government reassessed the Kheda land and the cultivated crops. On the basis of land data, collected in this way, the revenue was increased.
- ✓ The peasants had suffered a famine and this had resulted in a large-scale failure of crops.
- ✓ The government, however, did not accept the failure of crops and insisted on the full realisation of land tax.



- C. 2 and 3 only
- D. None of the above

Answer: D

Explanation

- Although the Moghul Emperor Babur is popularly credited with the introduction of the artillery in land warfare in India, evidence is now available that it was the Bahmani Kings who first used artillery-in the Deccan in their wars against the Vijaynagar kingdom.
- Tobacco cultivation in India was introduced by Portuguese in 1605.
- Initially tobacco was grown in Kaira and Mehsana districts of Gujarat and later spread to other areas of the country.
- Attempt to improve Indian tobacco has begun with the establishment of the Calcutta Botanical gardens in Howrah in 1787.

3. Consider the following :

- 1. Assessment of land revenue on the basis of nature of the soil and the quality of crops.**
- 2. Use of mobile cannons in warfare.**
- 3. Cultivation of tobacco and red chillies.**

Which of the above was/were introduced into India by the English?

- A. 1 only
- B. 1 and 2 only

4. With reference to the period of colonial rule in India, "Home Charges" formed an important part of drain of wealth from India. Which of the following funds constituted "Home Charges"?

- 1. Funds used to support the India Office in London.**
- 2. Funds used to pay salaries and pensions of British personnel engaged in India.**
- 3. Funds used for waging wars outside India by the British.**

Select the correct answer using the codes given below:

- A. 1 only
- B. 1 and 2 only
- C. 2 and 3 only
- D. 1, 2 and 3

Answer: D

Explanation

- Home Charges' referred to the expenditure incurred in England by the Secretary of State on behalf of India.
- The Home Charges were annually remitted to England
 - ✓ to pay interest on money expended in India on railways and irrigation works and for other purposes of the Government
 - ✓ to pay for stores
 - ✓ charges for effective and non-effective services of British troops on the Indian establishment
 - ✓ furlough and retired pay of Civil and Military -Officers and servants of the Government and other expenditures.
- Another component of Home Charges consisted of purchases made abroad for government stores in India.

5. What was the purpose with which Sir William Wedderburn and W. S. Caine had set up the Indian Parliamentary Committee in 1893?

- A. To agitate for Indian political reforms in the House of Commons
- B. To campaign for the entry of Indians into the Imperial Judiciary
- C. To facilitate a discussion on India's Independence in the British Parliament
- D. To agitate for the entry of eminent Indians into the British Parliament.

Answer: A

Explanation

- Sir William Wedderburn
 - ✓ He was appointed Acting Judicial Commissioner in Sind and Judge of the Sadar Court in 1874.
 - ✓!During his service in India, Wedderburn's attention was focussed on famine, the poverty of the Indian peasantry, the problem of agricultural indebtedness and the question of reviving the ancient village system.
 - ✓ He entered Parliament in 1893 as a Liberal member and sought to voice India's grievances in the House. He formed the Indian Parliamentary Committee with which he was associated as Chairman from 1893 to 1900.
 - ✓ The objective of the committee was to agitate for Indian political reforms in the House of Commons.

3. Polity & Governance

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1. With reference to new rules under the Foreign Contribution Regulation Act (FCRA), 2010, consider the following statements:

1. Farmers and students who are not aligned to any political party can receive foreign funds.
2. Any organization that wants to register itself under FCRA must be in existence for 15 years before applying.
3. As per provisions of FCRA, 2010, the provisions of the act shall apply to Indian Citizens only living in India.

Which of the statements given above is/ are correct?

- A. 1 only
- B. 2 and 3 only
- C. 1 and 2 only
- D. 1, 2 and 3

Answer: A

Explanation

- **Relevance:** Ten international organisations have been added to the Prior Reference Category under the Foreign Contribution Regulation Act.
- This implies that when a foreign donor wants to transfer money to a recipient association in India (which is in the PRC), the donor will require the prior clearance of the Ministry of Home Affairs (MHA).

- Under the new rules of FCRA, 2010, norms have been relaxed for farmers, students, religious and other groups who are not directly aligned to any political party to receive foreign funds.
- Any organization that wants to register itself under FCRA shall be in existence for three years and should have spent a minimum amount of 15 lakh on its core activities for the benefit of society during the last three financial years.

Additional Info

- FCRA, 2010 has been enacted by the Parliament
 - ✓ to consolidate the law to regulate the acceptance and utilization of foreign contribution or foreign hospitality by certain individuals or associations or companies and
 - ✓ to prohibit acceptance and utilization of foreign contribution or foreign hospitality for any activities detrimental to national interest and for matters connected therewith or incidental thereto.
- As per Section 1(2) of FCRA, 2010, the provisions of the act shall apply to:
 - ✓ Whole of India
 - ✓ Citizens of India outside India; and
 - ✓ Associate Branches or subsidiaries, outside India, of companies or bodies corporate, registered or incorporated in India

2. A deadlock between the Lok Sabha and the Rajya Sabha calls for a joint sitting of the Parliament during the passage of:

1. Ordinary Legislation
2. Money Bill
3. Constitutional Amendment Bill

Select the correct answer using the code given below:

- A. 1 only
- B. 2 and 3 only
- C. 1 and 3 only
- D. 1, 2 and 3

Answer: A

Explanation

- Joint sitting is extraordinary machinery provided by the Constitution to resolve a deadlock between the two Houses over the passage of a bill.
- The provision of joint sitting is applicable to ordinary bills or financial bills only and not to money bills or Constitutional amendment bills.
- In the case of a money bill, the Lok Sabha has overriding powers, while a Constitutional amendment bill must be passed by each House separately.
- The Speaker of Lok Sabha presides over a joint sitting of the two Houses and the Deputy Speaker in his absence.
- If the Deputy Speaker is also absent from a joint sitting, the Deputy Chairman of Rajya Sabha presides.

3. Which of the following is/are among the Fundamental Duties laid down in the Indian Constitution?

1. To safeguard public property and to abjure violence.
2. To uphold and protect the sovereignty, unity and integrity of India.
3. To exercise the Right to vote in an election.
4. To pay the taxes regularly.

Select the correct answer using the code given below:

- A. 2 and 3 only
- B. 1 and 2 only
- C. 1, 2 and 3 only
- D. 1, 3 and 4 only

Answer: B

Explanation

- In 1976, the fundamental duties of citizens were added to the Constitution. In 2002, one more Fundamental Duty was added.

List of Fundamental Duties

- According to Article 51 A, it shall be the duty of every citizen of India:
 - ✓ to abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem;
 - ✓ to cherish and follow the noble ideals that inspired the national struggle for freedom;

- ✓ to uphold and protect the sovereignty, unity and integrity of India;
- ✓ to defend the country and render national service when called upon to do so;
- ✓ to promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities and to renounce practices derogatory to the dignity of women;
- ✓ to value and preserve the rich heritage of the country's composite culture;
- ✓ to protect and improve the natural environment, including forests, lakes, rivers and wildlife and to have compassion for living creatures;
- ✓ to develop scientific temper, humanism and the spirit of inquiry and reforms
- ✓ to safeguard public property and to abjure violence;
- ✓ to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievement; and
- ✓ to provide opportunities for education to his child or ward between the age of six and fourteen years. This duty was added by the 86th Constitutional Amendment Act, 2002.

4. Consider the following statements with reference to the special provisions for the State of Manipur:

- 1. Article 371-B of the Constitution provides for the special provisions for the State of Manipur.**
- 2. The Governor is authorized to provide for the creation of a committee of the Manipur Assembly consisting of the members elected from the Hill Areas of the State.**

Which of the statements given above is/ are correct?

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. Neither 1 nor 2

Answer: D

Explanation

- Article 371-C of the Constitution provides for the special provisions for the State of Manipur.
- The President is authorized to provide for the creation of a committee of the Manipur Legislative Assembly consisting of the members elected from the Hill Areas of the State.
- The President can also direct that the Governor shall have special responsibility to secure the proper functioning of that committee.
- The Governor should submit an annual report to the President regarding the administration of the Hill Areas.

- The Central Government can give directions to the State Government as to the administration of the Hill Areas.
5. **With reference to the Right to freedom of religion, consider the following statements:**
1. **The State should not spend the public money collected by way of tax for the promotion or maintenance of any particular religion.**
 2. **Article 25 covers not only religious beliefs but also religious practices, which is only available to citizens.**
 3. **Article 25 guarantees the rights of individuals, while Article 26 guarantees the rights of religious denominations.**

Which of the following statements given above is/are correct?

- A. 1 and 2 only
- B. 2 only
- C. 1 and 3 only
- D. 1, 2 and 3

Answer: C

Explanation

- Article 25 covers not only religious beliefs (doctrines) but also religious practices (rituals). Moreover, these rights are available to all persons—citizens as well as non-citizens.
- Article 25 guarantees the rights of individuals, while Article 26 guarantees the rights of religious denominations or their sections.

4. Economy

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1. Consider the following statements with regard to disinvestment in India:

1. The Disinvestment Commission was set up in 1996 on the recommendation of Narasimham Committee.
2. Token disinvestment means that the private sector will hold majority stake and decision-making power in the PSUs.
3. Currently only two industrial sectors are reserved for the public sector – atomic energy and railway operations.

Which of the statements above is/are incorrect?

- A. 1 only
- B. 3 only
- C. 2 and 3 only
- D. 1 and 2 only

Answer: D

Explanation

- The disinvestment commission was set up in 1996 on the recommendation of the Rangarajan.
- ✓ C. Rangarajan Committee on Disinvestment of the Public- Sector Enterprises (1991) was set up by the government, which submitted its report in 1993.
- ✓ On the basis of its recommendations, the Disinvestment Commission was set up in 1996 as an advisory body to the government.

- Under token disinvestment, majority stakes are held by the government and it maintains the ownership.

✓ Token Disinvestment: Also known as 'minority sale', it means the government sells less than 50% of the total stake of its equity of public enterprise. Therefore, the government maintains the control and management of the enterprise.

- Supplementary notes: Disinvestment refers to dilution of government stake in public enterprise, done with the objective to improve public finances, introduce competition and market discipline, and encourage wider share of ownership.

- Strategic Disinvestment: It is also known as Majority sale. Under this, the sale of share is more than 50%. The control and management of the business enterprise is transferred to private enterprise, thereby resulting in privatization.

- Currently, only two industrial sectors are reserved for the public sector – atomic energy and railway operations.

2. Consider the following statements with respect to contract farming practices:

1. The choice of crop to be grown is decided by the farmer.
2. The land is owned by the farmer in contract farming without any change in its ownership.

3. The company buy the product from the farmer at market price.

Which of the above statements is/ are correct?

- A. 1 only
- B. 2 only
- C. 2 and 3 only
- D. 1, 2 and 3

Answer: B

Explanation

- Contract farming is more commonly seen in production of flowers, cotton and oilseeds, and fruits like grapes, figs, pomegranates, etc.
- It is emerging as a preferred mechanism through which agri-businesses can directly engage with farmers.
- The company provides the technical aid and inputs to the farmer in contract.
- The land is owned by the farmer in contract farming without any change in its ownership as per The Farmers (Empowerment and Protection) Agreement on Price Assurance and Farm Services Act, 2020.
- In contract farming, the farmers enter into a contract with the companies to grow certain crops, which the companies then buy from them at a predetermined price.
- The company identifies the crop to be grown and according to the terms of contract provides the seeds, inputs and technical know-how. It also provides for the working capital.

3. Consider the following statements with respect to Digital Lending:

1. Digital lending holds significance in financial inclusion.
2. It is more time saving but it increases informal borrowings.
3. Digital lending can be operated by banks or NBFCs.
4. Peer to peer lending is a type of digital lending.

Which of the above statements are correct?

- A. A. 2 and 3 only
- B. 2, 3 and 4 only
- C. 1, 3 and 4 only
- D. 1, 2 and 4 only

Answer: C

Explanation

- Digital lending is the process of offering loans which are applied for, disbursed, and managed through digital channels. Lenders use digitized data to inform credit decisions and build customer engagement.
- It consists of lending through web platforms or mobile apps, by taking advantage of technology for authentication and credit assessment.
- Digital lending has led to financial inclusion, meeting the huge unmet credit need, particularly in the micro-enterprise and low-income consumer segment in India.

- RBI can regulate the digital lending processes and has issued Master Direction: Non-Banking Financial Company - Peer to Peer Lending Platform (Reserve Bank) Directions, 2017.
- It is more time saving and helps in reducing informal borrowings.
- These digital lending can be operated by banks or NBFCs.
- The banks and banking function of NBFCs are regulated by RBI. Peer to peer lending is a type of digital lending.
- As per Non-Banking Financial Company - Peer to Peer Lending Platform (Reserve Bank) Directions, 2017, no NBFC-P2P shall commence or carry on the business of a Peer to Peer Lending Platform without obtaining a Certificate of Registration from the Bank.
- Every company seeking registration with the Bank as an NBFC-P2P shall have a net owned fund of not less than rupees twenty million or such higher amount as the Bank may specify.
- They cannot raise deposits as defined by or under Section 45I(bb) of the Reserve Bank of India Act, 1934 or the Companies Act, 2013.
- They cannot lend on its own. They should store and process all data relating to its activities and participants on hardware located within India.

4. Consider the following statements regarding 'Additional Tier 1 bonds':

- 1. They are part of capital under Basel III norms.**
- 2. They are perpetual in nature and have no maturity period.**
- 3. They cannot be written down in case of bank failure.**

Which of the above statements is/are correct?

- A. 2 only
- B. 3 only
- C. 1 and 2 only
- D. 1, 2 and 3

Answer: C

Explanation

- Additional Tier 1 Bonds (AT-1) bonds have several unusual features lurking in their fine print, which make them very different from normal bonds.
- These bonds are perpetual and carry no maturity date. Instead, they carry call options that allow banks to redeem them after five or 10 years.
- But banks are not obliged to use this call (redeem) option and can opt to pay only interest on these bonds for eternity.
- Bank's issuing AT-1 bonds can skip interest payments for a particular year or even reduce the bonds' face value without getting into hot water with their investors, provided their capital ratios fall below certain threshold levels.
- These thresholds are specified in their offer terms.

- If the RBI feels that a bank is tottering on the brink (called point of non-viability) and needs a rescue, it can simply ask the bank to cancel its outstanding AT-1 bonds without consulting its investors.
- AT-1 bonds are risky but people invest as it offers higher interest rate. In case of Yes Bank crisis, AT-1 bonds worth Rs. 8415 were written down in March 2020. (This means now investors will not get any interest or principal in future).
- Under Basel III norms, banks need to have 11.5% capital requirement in which 9.5% is Tier 1 capital and 2% is Tier 2 capital.

✓ Out of 9.5% Tier 1 capital, Additional Tier 1 capital (AT-1 bonds) can be 1.5%.

5. Consider the following statements:

1. Economic growth always causes rise in inflation and fall in poverty levels.
2. Optimum level of inflation attracts foreign investment.

Which of the statements above is/ are correct?

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. Neither 1 nor 2

Answer: B

Explanation

- Economic Growth refers to the increase in the value of goods and services produced in an economy over a period of time, measured in terms of increase in GDP.
- It is not always necessary that higher the economic growth, higher will be the inflation and lower the poverty.
- It also depends upon the demand and supply situation.
- Similarly, economic growth needs to be equally distributed amongst different strata to ensure reduction of poverty.
- Various factors impact economic growth, some of which are - efficiency of the human resource, development and availability of infrastructure, availability and utilization of natural resources, population, technological advancements, etc.
- If High economic growth leads to an imbalance in the demand and supply situation such that the demand is higher than the supply, then inflation will occur.
- However, if supply is higher than demand, then even though economic growth will occur, prices will fall. Therefore, it is not always necessary that economic growth will always lead to inflation.
- In the ideal scenario, higher the economic growth, lower should be the poverty. However it is more important to ensure that the benefits of high economic growth reach the lower strata.
- If it's the upper strata that gets all the benefits, then it will rather lead to widening disparity.

5. Environment

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1. Which of the following statement is/ are correct about SEABED 2030 Project?

1. It was launched at United Nations Conference in 2017.
2. It is a collaboration project between the Nippon Foundation of Japan and the general bathymetric Chart of the Ocean (GEBCO).
3. Aligned with the UN's Sustainable development Goal (SDG) 13 to conserve and sustainably use the oceans, seas and marine resources.

Select the correct code.

- A. 1 and 2 only
- B. 2 only
- C. 2 and 3 only
- D. 1, 2 and 3

Answer: A

Explanation

- Seabed 2030 is a collaborative project between the Nippon Foundation of Japan and the General Bathymetric Chart of the Oceans (GEBCO).
- It aims to bring together all available bathymetric data to produce the definitive map of the world ocean floor by 2030 and make it available to all.
- The project was launched at the United Nations (UN) Ocean Conference in June 2017 and is aligned with the UN's Sustainable Development Goal #14 to conserve and sustainably use the oceans, seas and marine resources.
- Research under Seabed 2030 project had finished mapping nearly one-fifth of the world's ocean floor.
 - ✓ Knowing the depth and shape of the seafloor (bathymetry) is fundamental for
 - ✓ understanding ocean circulation, tides, tsunami forecasting
 - ✓ fishing resources,
 - ✓ sediment transport,
 - ✓ environmental change, underwater geo-hazards,
 - ✓ infrastructure construction and maintenance,
 - ✓ cable and pipeline routing and much more.
- Despite many years of effort, less than 20 per cent of the world ocean's seafloor has been mapped.
- A co-ordinated international effort is needed to bring together all existing data sets and to identify areas for future surveys - to help us 'map the gaps'.

2. Consider the following statements anthropogenic (human- made) SO₂:

- 1. India's sulphur dioxide (SO₂) emissions recorded a significant decline of approximately 6% in 2019 compared to 2018.**
- 2. India world's 2nd largest emitter of Sulphur Dioxide.**

Which of the above statements is/are correct?

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. None of the above

Answer: A

Explanation

- India continues to occupy the top emitter's position for the fifth consecutive year, the report based on an analysis by Greenpeace India and the Centre for Research on Energy and Clean Air (CREA).
- Sulphur dioxide is a poisonous air pollutant that increases the risk of stroke, heart disease, lung cancer, and premature death.
- In 2019, India emitted 21 per cent of global anthropogenic (human-made) SO₂ emissions, nearly double that of second-ranked global emitter, Russia.
- Anthropogenic SO₂ emissions fell by approximately 6% worldwide in 2019. For only the second time on record, anthropogenic SO₂ emissions decreased in all of the top three emitter countries: India, Russia and China.

- As per the report, the biggest emission hotspots in India are thermal power stations (or clusters of power stations) at Singrauli, Neyveli, Sipat, Mundra, Korba, Bonda, Tamnar, Talcher, Jharsuguda, Kutch, Surat, Chennai, Ramagundam, Chandrapur, Visakhapatnam and Koradi.

3. Consider the following statements with respect to Bio- decomposer technique.

- 1. Bio-decomposer technique converts household waste into manure.**
- 2. This technique will decrease the use of fertilisers and increase the productivity of the farm soil.**
- 3. PUSA Bio-decomposer contains strains from fungi, which assist in producing enzymes essential to quicken the decomposition.**

Which of the above statements is/are correct?

- A. 1 and 2 only
- B. 3 only
- C. 2 and 3 only
- D. 1 and 3 only

Answer: C

Explanation

- Terming the bio-decomposer technique a "smashing success" at curbing stubble burning in the Capital, Chief Minister of Delhi appealed to the Centre to ask the neighbouring States to use the same to prevent pollution.

- Bio-decomposer is a technique of converting crop stubble into compost, which is deemed a cost-effective way to deal with air pollution caused due to crop stubble burning.
 - The technology, called 'Pusa Decomposer', involves making a liquid formulation using decomposer capsules and readily available inputs, fermenting it over 8-10 days and then spraying the mixture on fields with crop stubble to ensure speedy bio-decomposition of the stubble.
 - This technique will decrease the use of fertilisers and increase the productivity of the farm soil.
- 4. Consider the following statements with respect to Conservation of Snow Leopard.**
- 1. 12 snow leopard range countries have adopted the Beijing Declaration on the Conservation of the Snow Leopard.**
 - 2. India's first Snow Leopard Conservation Centre will be opened Himachal Pradesh.**
 - 3. India is also party to the Global Snow Leopard and Ecosystem Protection (GSLEP) Programme since 2013.**

Which of the above statements is/are correct?

- A. 1 and 2 only
- B. 3 only
- C. 1 only
- D. 2 and 3 only

Answer: B

Explanation

- Leaders in the governments of all 12 snow leopard range countries have adopted the Bishkek Declaration on the Conservation of the Snow Leopard.
- Uttarakhand is getting ready to set up India's first conservation centre for snow leopards in the forests of Uttarkashi district.
- The conservation centre will be built by the Uttarakhand forest department along United Nations Development Programme (UNDP) as part of its six-year long project, SECURE Himalayas.
- The project aims at securing livelihoods, conservation, sustainable use and restoration of high range Himalayan ecosystems.
- The project also looks into conservation of snow leopards and other endangered species and their habitats, found in Himalayas. This project was started in 2017.
- India is also party to the Global Snow Leopard and Ecosystem Protection (GSLEP) Programme since 2013.
- The Government of India has identified the snow leopard as a flagship species for the high-altitude Himalayas.
- The Centre hosted the 4th Steering Committee of the GSLEP program in October 2019 at New Delhi.

- This Meeting resulted in the “New Delhi Statement” of strengthening the resolve of the snow leopard range countries towards conservation of the mountain ecosystems of Central and South Asia.
- 5. The recovery programme by Ministry of Environment, Forest and Climate Change for critically endangered species in India includes 22 wildlife species. Which of the following are among those species?**
1. Indian Bullfrog
 2. Swamp Deer
 3. Caracal
 4. Mandarin duck
 5. Nilgiri Tahr
- So far, 22 species have been identified under the recovery programme. These are the Snow Leopard, Bustard (including Floricans), Dolphin, Hangul, Nilgiri Tahr, Marine Turtles, Dugongs, Edible Nest Swiftlet, Asian Wild Buffalo, Nicobar Megapode, Manipur Brow-antlered Deer, Vultures, Malabar Civet, Indian Rhinoceros, Asiatic Lion, Swamp Deer, Jerdon’s Courser, the Northern River Terrapin, Clouded Leopard, Arabian Sea Humpback Whale, Red Panda and Caracal.
 - The National Board for Wildlife and Union Ministry of Environment, Forest and Climate Change in March included the caracal, a medium-sized wildcat found in parts of Rajasthan and Gujarat, in the list of critically endangered species.

Select the correct code.

- A. 1, 3 and 4 only
- B. 2, 4 and 5 only
- C. 2, 3 and 5 only
- D. 1, 4 and 5 only

Answer: C

Explanation

- Species Recovery Programme is one of the components of Integrated Development of Wildlife Habitats’ (IDWH).

6. Science & Technology

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1. Consider the following pairs:

Mission :: Agency

1. New Shepard :: European Space Agency
2. Ariel Space Mission :: Canadian Space Agency
3. Tianwen-1 :: JAXA
4. InSight lander :: NASA

Which of the above pairs are incorrect?

- A. 1 and 3 only
- B. 2 and 4 only
- C. 1, 2 and 3 only
- D. 2, 3 and 4 only

Answer: C

Explanation

- Named after Mercury astronaut Alan Shepard, the first American to go to space, New Shepard is Blue Origin's reusable suborbital rocket system designed to take astronauts and research payloads past the Kármán line – the internationally recognized boundary of space.
- Ariel (Atmospheric Remote-sensing Infrared Exoplanet Large-survey) of European Space Agency (ESA), which scientists are planning to launch in 2029, will perform a large-scale survey of over a thousand exoplanets over a period of four years.

- Tianwen-1 ("questions to heaven," or "questioning the heavens") is China's first Mars mission, consisting of an orbiter and a rover named Zhurong. Before Zhurong only NASA has successfully landed and operated spacecraft on Mars.
- NASA's InSight (Interior Exploration using Seismic Investigations, Geodesy and Heat Transport) is a Mars lander designed to give the Red Planet its first thorough checkup since it formed 4.5 billion years ago.

2. The term 'gain of function research' has recently cropped up in the debate about the origins of the Covid-19 pandemic. Which of the following correctly defines the term?

- A. It involves deliberately altering an organism in the lab.
- B. It is the ability to detect genetic material from a specific organism.
- C. It is strength of a virus to overpower antibodies in an organism.
- D. None of the above

Answer: A

Explanation

- In virology, gain-of-function research involves deliberately altering an organism in the lab, altering a gene, or introducing a mutation in a pathogen to study its transmissibility, virulence and immunogenicity.

- It is believed that this allows researchers to study potential therapies, vaccine possibilities and ways to control the disease better in future.
- “Gain-of-function research involves manipulations that make certain pathogenic microbes more deadly or more transmissible.
- This is done by genetically engineering the virus and by allowing them to grow in different growth mediums, a technique called as serial passage.

3. DRDO developed Quantum Key Distribution (QKD) technology recently underwent trials in Hyderabad between two DRDO labs. Consider the following statements with respect to the same.

- 1. Quantum Key Distribution technology (QKD) works by using photons to transfer data.**
- 2. It is the fastest way to transfer data but security of data is still not is not guaranteed in this technology.**
- 3. A qubit is a quantum bit, the counterpart in quantum computing to the binary digit or bit of classical computing.**

Which of the above statements is/are correct?

- A. 1 only
- B. 2 and 3 only
- C. 2 only
- D. 1 and 3 only

Answer: D

Explanation

- DRDO developed Quantum Key Distribution (QKD) technology recently underwent trials in Hyderabad between two DRDO labs, Defence Research and Development Laboratory (DRDL) and Research Centre Imarat (RCI), to show secure communication.
- The Quantum Key Distribution underpins Quantum Communication technology that basically ensures unconditional data security.
- This communication is considered extremely secure as two parties produce a shared random secret key, which only they have knowledge of and can be used to encrypt or decrypt messages.
- Furthermore, this technology is also considered future-proof as it is unlikely for any future advancements in computational power to be able to break the quantum-cryptosystem.



4. Consider the following statements.

- 1. He is considered by the Indian scientific community to be the father of experimental fluid dynamics research in India.**
- 2. He succeeded Vikram Sarabhai, the founder of the Indian space programme, as Chairman of the Indian Space Research Organisation (ISRO) in 1972.**
- 3. He is credited for setting up the first supersonic wind tunnel in India at IISc.**

Which one of the following personalities is being discussed in the above statements?

- A. Dr. Krishnaswamy Kasturirangan
- B. Prof. Udipi Ramachandra Rao
- C. Prof. Satish Dhawan
- D. None of the above

Answer: C

Explanation

- Prof. Satish Dhawan (25 September 1920–3 January 2002) was an Indian rocket scientist who was born in Srinagar, India and educated in India and the United States.
- He is considered by the Indian scientific community to be the father of experimental fluid dynamics research in India and one of the most eminent researchers in the field of turbulence and boundary layers.

- He succeeded Vikram Sarabhai, the founder of the Indian space programme, as Chairman of the Indian Space Research Organisation (ISRO) in 1972.
- He was also the Chairman of the Space Commission and Secretary to the Government of India in the Department of Space.
- In the decade following his appointment he directed the Indian space programme through a period of extraordinary growth and spectacular achievement.
- Following his death in 2002, the Indian satellite launch centre at Sriharikota, Andhra Pradesh, located about 100 km north of Chennai in South India was renamed as the Prof. Satish Dhawan Space Centre.

5. Consider the following statements with respect to “novel Open Reading Frames or nORFs”.

- 1. “Novel Open Reading Frames or nORFs” is related to Genomic regions.**
- 2. Mutations in nORFs do not have physiological consequences.**
- 3. nORFs are broadly involved in diseases like Cancer.**

Which of the above statements are correct?

- A. 1 and 2 only
- B. 2 and 3 only
- C. 1 and 3 only

D. 1, 2 and 3

Answer: C

Explanation

- A team from the University of Cambridge set out to find whether new genes emerge in the genome of living organisms, and if they do, how they do so.
- In the last seven years, the team extensively studied the human genome and has now catalogued 1,94,000 novel regions. The results were published in Genome Research.
- These 'novel' genomic regions cannot be defined by current 'definition' of a gene.
- Hence, we call these novel regions - novel Open Reading Frames or as nORFs.
- It is shown that the mutations in nORFs do have physiological consequences and a majority of mutations that are often annotated as benign have to be re-interpreted.
- The team found that these regions are also broadly involved in diseases. The nORFs were seen as dysregulated in 22 cancer types.
- Dysregulated is a term which means that they could either be mutated, up-regulated, or down-regulated, or they could be uniquely present.
- The researchers also identified these nORFs in Plasmodium falciparum, the parasite which causes the deadliest form of malaria.

- This shows that there is an urgent need to redesign our existing drugs that target only the known proteins in the parasite.