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Your Personal Exams Guide

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CDS I 2024 General Knowledge Previous Year Paper (21- April-2024)

Total Time: 2 Hour **Total Marks:** 100

Instructions

Sl No.	Section Name	No. of Question	Maximum Marks
1	English	120	100

1.) A total of 120 minutes is allotted for the examination.

2.) The server will set your clock for you. In the top right corner of your screen, a countdown timer will display the remaining time for you to complete the exam. Once the timer reaches zero, the examination will end automatically. The paper need not be submitted when your timer reaches zero.

3.) There will, however, be sectional timing for this exam. You will have to complete each section within the specified time limit. Before moving on to the next section, you must complete the current one within the time limits.

English

1. Consider the following statements about the Jorwe culture of the Deccan: **(+0.833, -0.277)**

   1. It covers, practically, the whole of modern Maharashtra except the coastal Konkan district.

   2. The Pravara-Godavari valleys seem to have been the nuclear zone.

   3. The large sites of this culture yield evidence of shifting agriculture.

   Which of the statements given above is/are correct?

   a. 1 only

   b. 1 and 2 only

   c. 2 and 3 only

   d. 1, 2 and 3

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2. Consider the following statements regarding weightage of different articles in Wholesale Price Index (WPI): **(+0.833, -0.277)**

   1. Fuel and power have higher weightage in WPI than that of primary articles.

   2. Weightage of manufactured products in WPI is higher than that of fuel and power.

   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

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3. Which of the following were objectives of the G20 Summit, 2023 under India's Presidency? **(+0.833, -0.277)**

1. Green development

2. Accelerating progress on SDGs

3. Women-led development

Select the correct answer using the code given below.

a. 1 and 2 only

b. 2 and 3 only

c. 1, 2 and 3

d. 1 and 3 only

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4. Consider the following statements about Rana Kumbha of Mewar: **(+0.833, -0.277)**

1. He wrote a commentary on Jayadeva's Gitagovinda.

2. He wrote four dramas in which he is said to have made use of four provincial languages.

3. He erected Kirtistambha in Chitor in commemoration of his victory over Gujarat.

Which of the statements given above is/are correct?

a. 1, 2 and 3

b. 2 and 3 only

c. 1 and 2 only

d. 3 only

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5. Consider the following statements about Madurai, the capital city of the Pandya kingdom: **(+0.833, -0.277)**

1. It has been described in Maduraikkanchi as a large grand city, enclosed by walls on three sides and the Vaigai river on the fourth side.

2. The Arthashastra mentions it as a centre of fine cotton textiles.

3. Other literary sources describe it as a major craft centre.

Which of the statements given above is/are correct?

a. 1 only

b. 1 and 2 only

c. 2 and 3 only

d. 1, 2 and 3

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6. If India enters into Free Trade Agreements (FTAs) with other nations, then the growth of exports of India would depend upon which of the following? **(+0.833, -0.277)**

1. Extent of tariff reduction vis-à-vis MFN tariffs

2. Extent of relaxation in terms of rules of origin

3. Extent of relaxation in sanitary and phytosanitary measures

4. Level of infrastructure in India

5. Income in nations with which India enters into FTAs

Select the correct answer using the code given below.

a. 1, 2, 3, 4 and 5

b. 1, 2 and 4 only

c. 2, 3 and 5 only

d. 1, 3 and 4 only

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7. The causal organism of dengue fever is a mosquito-borne virus which belongs to which one among the following categories? **(+0.833, -0.277)**

a. Flavi-ribo virus

b. Adenovirus

c. Vaccinia virus

d. Nipah virus

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8. Who among the following Chola kings encouraged the the Sailendra ruler of Sri Vijaya to build a Buddhist Vihara in Negapatnam? **(+0.833, -0.277)**

a. Parantaka I

b. Rajaraja I

c. Rajendra I

d. Kulottunga I

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9. Consider the following statements about Sawai Jai Singh's astronomical work: **(+0.833, -0.277)**

1. He learnt of the accuracy of European observations, and obtained de La Hire's tables from which he reproduced a refraction table.

2. His astronomers also developed a telescope of their own to observe the lunar phases of Venus.

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

---

10. Which one of the following is an amphoteric oxide? **(+0.833, -0.277)**

a. MgO

b. P_4O_{10}

c. Na_2O

d. Al_2O_3

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11. From which among the following are blood clotting factors released? **(+0.833, -0.277)**

a. RBCs

b. Eosinophils

c. Platelets

d. Monocytes

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12. Who among the following was not a court poet of king Krishnadevaraya? **(+0.833, -0.277)**

a. Timmana

b. Dhurjati

c. Mallana

d. Siddheshvara

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13. Man Kautuhal, a work on music, was prepared under the aegis of **(+0.833, -0.277)**

a. Raja Man Singh of Gwalior

b. Tansen

c. Meera Bai

d. Amir Khusrau

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14. The correct order of octane number of butane, pentane, hexane and cyclohexane is **(+0.833, -0.277)**

a. butane > cyclohexane > pentane > hexane

b. butane > pentane > cyclohexane > hexane

c. butane > pentane > hexane > cyclohexane

d. cyclohexane > butane > pentane > hexane

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15. Pulse is felt due to the rhythmic contraction and relaxation of the **(+0.833, -0.277)**

a. chambers of heart

b. valves present in veins

c. aorta and main arteries

d. valves of heart

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16. The royal portraits of Simhavishnu and Mahendravarman are found in which cave temple at Mamallapuram? **(+0.833, -0.277)**

a. Varaha Cave

b. Ramanuja Cave

c. Adivaraha Cave

d. Trimurti Cave

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17. Consider the following statements regarding the Sugamya Bharat Abhiyan: **(+0.833, -0.277)**

1. This programme is initiated by the Department of Empowerment of Persons with Disabilities, Ministry of Social Justice and Empowerment.

2. It aims to develop an inclusive society for persons with disabilities.

3. It has provisions of pension for persons with disabilities.

Which of the statements given above is/are correct?

a. 1, 2 and 3

b. 1 and 2 only

c. 2 and 3 only

d. 1 only

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18. Which one of the following is the correct order of reactivity of Mg, Al, Zn and Fe with HCl? **(+0.833, -0.277)**

a. Mg > Al > Zn > Fe

b. Mg > Al > Fe > Zn

c. Zn > Fe > Mg > Al

d. Fe > Al > Zn > Mg

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19. When eggs are heated, the transparent liquid portion around yolk turns solid and turbid white. This happens due to the thermal denaturation of **(+0.833, -0.277)**

a. fats

b. proteins

c. ribose sugar

d. carbohydrates

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20. How many of the following statements about Bhakti poet Namdev is/are correct? **(+0.833, -0.277)**

1. He seems to have played a part in transmitting the southern Bhakti to northern India.

2. He was a rigorous monotheist and opposed caste distinctions.

3. He was a devout follower of Kabir.

Select the correct answer.

a. 1

b. 2

c. 3

d. None

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21. Which one among the following was not a part of the action programme of the Non-Cooperation Movement? **(+0.833, -0.277)**

a. The Congress organisation was to reach down to the village and the Mohalla level

b. Boycott of government affiliated schools and colleges

c. Taking control of the law and order machinery of the State by the Congress Working Committee

d. Surrender of titles and honours given by the government

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22. Methanol is toxic because **(+0.833, -0.277)**

a. methanol coagulates the protoplasm

b. methanol gets oxidised to methanal in liver which coagulates the protoplasm

c. methanol gets oxidised to acetic acid in liver which coagulates the protoplasm

d. methanol gets oxidised to CO in liver which coagulates the

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23. Which of the following statements is/are correct? **(+0.833, -0.277)**

1. GDP deflator captures the average price of an unchanging basket of commodities that constitutes the GDP of the country.

2. GDP deflator can be used to measure the real GDP of the economy but not the inflation rate.

Select the correct answer using the code given below.

a. 1 only

b. 2 only

c. Both 1 and 2

d. Neither 1 nor 2

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24. How many of the following statements regarding medicine and related practices in medieval India is/are correct? **(+0.833, -0.277)**

1. Indian medicine of the Graeco- Arabic tradition (Tibb-i-Yunani) was almost identical in its practice with contemporary Persian medicine.

2. Harvey's discovery of the circulation of blood was explained to a scholarly noble by European traveller Francois Bernier.

3. The practice of smallpox inoculation was described in contemporary Yunani Ayurvedic texts.

Select the correct answer.

a. 1

b. 2

c. 3

d. None

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25. Consider the following statements about the Mauryan State and the forest people: **(+0.833, -0.277)**

1. The forest people were subjected to new forms of political and economic dominance and the necessity to subordinate and assimilate them led to a change in the earlier attitude of excluding these people from imperial territory.

2. The State recognised that the forest produce was the sole monopoly of the forest people.

3. The State was concerned with the conservation of forests and to this end the burning of forests was prohibited.

4. The forest people could be harnessed to serve the State and could be used as troops, spies and assassins.

How many of the above statements is/are correct?

a. 1

b. 2

c. 3

d. 4

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26. Vinegar is **(+0.833, -0.277)**

a. 5-8% solution of acetic acid in water

b. 5-8% solution of carbonic acid in water

c. 5-8% solution of ethanol in water

d. 10-15% solution of propionic acid in water

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27. Which of the following statements is/are correct? **(+0.833, -0.277)**

1. A price index captures the change in the average price of a constant basket of commodities.

2. If the price index takes values 100, 110 and 121 in three consecutive years respectively, then the inflation rates in the 2^{nd} and 3^{rd} years are 10% and 21% respectively.

Select the correct answer using the code given below.

a. 1 only

b. 2 only

c. Both 1 and 2

d. Neither 1 nor 2

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28. Which of the following statements about Virashaivism is/are correct? **(+0.833, -0.277)**

1. The Virashaivism traces its origin to the five great religious teachers- Renuka, Daruka, Ghantakarna, Dhenukarna and Vishvakarna.

2. The Virashaiva philosophy is called Shaktivishishtadvaita- the non-duality of God.

3. Ashtavarana are the eight rules of the Virashaivism to be observed by the followers.

Select the correct answer using the code given below.

a. 1 and 2 only

b. 1, 2 and 3

c. 1 and 3 only

d. 3 only

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29. At which of the following places was diamond mining carried out during the Delhi Sultanate period? **(+0.833, -0.277)**

a. Awadh

b. Khambhat

c. Panna

d. Lakhnauti

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30. Which one of the following is related to global dimming? **(+0.833, -0.277)**

a. Fall of atmospheric pressure due to increased particulates

b. Raise of atmospheric pressure due to increased particulates

c. Raise of temperature due to increased particulates

d. Fall of temperature due to increased particulates

31. Which of the following statements is/are correct? **(+0.833, -0.277)**

1. Most of India's reserves is held in the form of foreign currency.

2. There is no cost of holding foreign currency as reserves by a nation.

Select the correct answer using the code given below.

a. 1 only

b. 2 only

c. Both 1 and 2

d. Neither 1 nor 2

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32. Who propounded Kashmir Shaivism? **(+0.833, -0.277)**

a. Vasugupta

b. Abhinavagupta

c. Ramakantha

d. Ranganathacharya

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33. Which one of the following statements is true for James Webb Space Telescope launched in December 2021? **(+0.833, -0.277)**

a. It orbits the Sun, about 15 lakh km away from the Earth.

b. It orbits the Earth, about 15 lakh km away.

c. It is stationary in space nearly 10 lakh km away from the Earth.

d. It revolves around the Moon nearly 3.5 lakh km away from the Earth.

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34. Which one of the following is known as cetane? **(+0.833, -0.277)**

a. Hexadecane

b. Heptadecane

c. Octadecane

d. Nonadecane

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35. Which one of the following statements is not correct? **(+0.833, -0.277)**

a. The market mechanism over- produces a good that generates positive externality.

b. A cap and trade of pollution permits can be used by the government to achieve the social optimum.

c. The optimal amount of subsidy in the case of an activity that produces a positive externality is the difference between the social benefit and the private benefit at the optimum.

d. Tragedy of Commons is an example of negative externality.

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36. Which one among the following is not under the jurisdiction of the Protection of Human Rights Act, 1993? **(+0.833, -0.277)**

a. The National Human Rights Commission

b. The State Human Rights Commission

c. The Human Rights Courts

d. The Human Rights Council

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37. Which of the following particles are subatomic particles? **(+0.833, -0.277)**

1. Electron

2. Proton

3. Neutron

4. Muon

Select the correct answer using the code given below.

a. 1 and 4 only

b. 1, 2, 3 and 4

c. 2 and 3 only

d. 1, 2 and 3 only

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38. Which one among the following countries is not part of the Arabian Peninsula? **(+0.833, -0.277)**

a. Kuwait

b. Oman

c. Jordan

d. Yemen

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39. Which one of the following statements regarding GST is not correct? (+0.833, -0.277)

a. Amendment 115 to the Constitution of India kept alcohol for human use and five petroleum products outside the ambit of GST.

b. Amendment 122 to the Constitution of India kept only alcohol for human use outside the ambit of GST.

c. Precious metals are taxed at a rate of 1% under GST.

d. Unworked diamond is taxed at a rate of 0.25%.

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40. According to B. R. Ambedkar, which one among the following Articles is the 'heart and soul' of the Constitution of India? (+0.833, -0.277)

a. Article 15

b. Article 21

c. Article 23

d. Article 32

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41. Qubit refers to a two-valued quantity used in (+0.833, -0.277)

a. classical computers

b. classical cryptography

c. quantum computers

d. lasers

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42. Which of the following statements regarding continent of Antarctica is/are correct? **(+0.833, -0.277)**

1. It has the highest average elevation as compared to all other continents.

2. Mount Vinson is the highest peak of this continent.

Select the correct answer using the code given below.

a. 1 only

b. 2 only

c. Both 1 and 2

d. Neither 1 nor 2

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43. Which of the following statements with regard to the Report of Tendulkar Committee (2009) on poverty estimates is/are correct? **(+0.833, -0.277)**

1. The Committee had used an all-India urban poverty line basket as a reference to derive both rural and urban poverty levels.

2. The Committee had anchored the poverty line to the official food calorie norms.

Select the correct answer using the code given below.

a. 1 only

b. 2 only

c. Both 1 and 2

d. Neither 1 nor 2

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44. Who among the following filed the Writ Petition that led to the famous verdict of the Supreme Court of India recognising the Right to Privacy as a Fundamental Right? **(+0.833, -0.277)**

a. Justice P. N. Bhagwati

b. Justice Rohinton Fali Nariman

c. Justice K. S. Puttaswamy

d. Justice Anil R. Dave

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45. Photo 51 refers to an image of **(+0.833, -0.277)**

a. a crater on the Moon

b. DNA molecules

c. the virus responsible for COVID-19

d. the virus responsible for common cold

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46. Which one of the following biosphere reserves is spread over three States in India? **(+0.833, -0.277)**

a. Nilgiri

b. Achanakmar-Amarkantak

c. Seshachalam

d. Agasthyamalai

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47. Which of the following components of Central Government taxes on petroleum products is/are not shareable with the States? (+0.833, -0.277)

1. Basic Excise Duty

2. Additional Excise Duty

3. Special Additional Excise Duty

Select the correct answer using the code given below.

a. 1 and 2 only

b. 1, 2 and 3

c. 3 only

d. 2 and 3 only

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48. Through the Forty Second Amendment to the Constitution of India, which of the following was/were inserted into its Preamble? (+0.833, -0.277)

1. Liberty of thought, expression and belief' was substituted by Liberty of thought, expression, belief, faith and worship'.

2. The expression Unity of the Nation' was substituted by Unity and Integrity of the Nation'.

Select the correct answer using the code given below.

a. 1 only

b. 2 only

c. Both 1 and 2

d. Neither 1 nor 2

49. The rest mass of Higgs boson estimated to be close to **(+0.833, -0.277)**

a. 0.5 MeV

b. 900 MeV

c. 100 GeV

d. 1000 GeV

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50. Which one of the following pairs is not correctly matched? **(+0.833, -0.277)**

a. Ramnagar Wildlife Sanctuary : Uttarakhand

b. Chakrashila Wildlife Sanctuary : Assam

c. Nahar Wildlife Sanctuary : Haryana

d. Kane Wildlife Sanctuary : Arunachal Pradesh

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51. Level of per capita GDP depends upon which of the following? **(+0.833, -0.277)**

1. Proportion of population in the working age

2. Work participation rate

3. Per worker productivity

Select the correct answer using the code given below.

a. 3 only

b. 1 and 3 only

c. 1 and 2 only

d. 1, 2 and 3

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52. As per the State List under the Seventh Schedule of the Constitution of India, the States have jurisdiction over agricultural land in connection with which of the following subjects? **(+0.833, -0.277)**

1. Taxes on agricultural income

2. Duties in respect of succession of agricultural land

3. Estate duty agricultural land in respect of Select the correct answer using the code given below.

a. 1 and 2 only

b. 2 and 3 only

c. 1 and 3 only

d. 1, 2 and 3

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53. Which one of the following correctly describes the principle of the working of an atomic clock? **(+0.833, -0.277)**

a. Vibration of a small quartz crystal

b. Simple harmonic motion of atoms inside a crystal

c. Resonant frequency in cesium (or rubidium) atom

d. Excitation and de-excitation of hydrogen atoms

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54. Which of the the following statements regarding coconut production in Lakshadweep is/are correct? **(+0.833, -0.277)**

1. Productivity per hectare is highest in India.

2. Oil content in nuts is highest in the world.

Select the correct answer using the code given below.

a. 1 only

b. 2 only

c. Both 1 and 2

d. Neither 1 nor 2

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55. Which of the following are included in M1 definition of money for the Indian economy? **(+0.833, -0.277)**

1. Reserves

2. Currency

3. Time deposits

4. Demand deposits

Select the correct answer using the code given below.

a. 1 and 3 only

b. 2 and 3

c. 2 and 4

d. 1, 3 and 4

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56. The 7^{th} edition of the Indian Ocean Conference was held at **(+0.833, -0.277)**

a. Dhaka

b. New Delhi

c. Malé

d. Perth

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57. Political analysis involves both normative and empirical approaches. Which of the following statements is/are correct about the two approaches? **(+0.833, -0.277)**

1. Knowledge acquired through the empirical approach is value-loaded.

2. Knowledge acquired through the normative approach is objectively neutral.

Select the correct answer using the code given below.

a. 1 only

b. 2 only

c. Both 1 and 2

d. Neither 1 nor 2

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58. Which of the following statements regarding barrier islands is/are correct? **(+0.833, -0.277)**

1. These are small chain of sand islands that form offshore, far from the coast.

2. Lagoons or shallower marshes separate the barrier islands from the mainland.

3. Such locations are hazardous for settlements because they are easily swept away by storms and hurricanes.

Select the correct answer using the code given below.

a. 1 only

b. 1 and 2 only

c. 2 and 3 only

d. 1, 2 and 3

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59. Which one of the following statements is not correct for National Income Accounting for India? **(+0.833, -0.277)**

a. Imports calculating are subtracted in Gross Domestic Product.

b. Net factor payments earned from abroad are included in in Gross Domestic Product.

c. Purchase and sale of second-hand goods are not included in Gross Domestic Product.

d. Inventories are included in Gross Domestic Capital Formation.

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60. Match List - I with List - II and select the correct answer using the code given below the Lists: **(+0.833, -0.277)**

List - I (Political idea)		List - II (Thinker)	
A.	Human beings, unlike all other objects, possess dignity	1.	Aung San Suu Kyi
B.	It is Swaraj when we learn to rule ourselves	2.	Subhas Chandra Bose
C.	Freedom implies not only emancipation from political bondage but also equal distribution of wealth	3.	Immanuel Kant
D.	For me real freedom is freedom from fear	4.	*Mahatma Gandhi*

a. A - 3, B - 2, C - 4, D - 1

b. A - 1, B - 4, C - 2, D - 3

c. A - 3, B - 4, C - 2, D - 1

d. A - 1, B - 2, C - 4, D - 3

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61. Which one amongst the following cannot be a feature of a 'totalitarian regime'? **(+0.833, -0.277)**

a. State control of the political and often personal realms of individual life

b. A monopoly of the means of mass communication

c. One-party State

d. Autonomy of civil society

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62. Identify the type of cloud on the basis of the given characteristics: **(+0.833, -0.277)**

1. High, thin, puffy white clouds of ice crystals that look like ripples

2. They appear between 20000 feet and 40000 feet above the Earth's surface

3. One of its types is called a 'mackerel sky' because the clouds resemble large fish scales, especially when they are coloured pink at sunset

Select the correct answer.

a. Altostratus

b. Cirrostratus

c. Altocumulus

d. Cirrocumulus

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63. Under normal downward sloping demand curve and fully elastic supply curve of a commodity, an exogenous decrease in demand would lead to **(+0.833, -0.277)**

a. increase in equilibrium price and quantity

b. decrease in equilibrium price and quantity

c. decrease in equilibrium quantity and no change in price

d. increase in equilibrium price and no change in quantity

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64. Who among the following is the author of the book Four Stars of Destiny: An Autobiography? **(+0.833, -0.277)**

a. Sam Manekshaw

b. K. J. S. Dhillon

c. Bipin Rawat

d. Manoj Mukund Naravane

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65. Which of the following statements are not correct? **(+0.833, -0.277)**

1. In world politics, 'hard power' can be exercised by both States and other actors involving use of threat or coercion.

2. Globalisation is necessarily economic, not cultural.

3. The term 'Washington Consensus' refers to a policy that seeks intervention in the market.

4. 'Autarky' is generally understood as economic 'self-sufficiency'.

Select the correct answer using the code given below.

a. 1 and 4 only

b. 2 and 3 only

c. 2, 3 and 4 only

d. 1, 2, 3 and 4

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66. Identify the type of drainage pattern on the basis of the given characteristics: **(+0.833, -0.277)**

1. It represents the most common pattern of streams and their tributaries

2. It occurs in areas of uniform rock type and regular slope

3. A map, or aerial photograph, shows a pattern like the veins on a leaf- smaller streams join the main stream at an acute angle

Select the correct answer.

a. Dendritic

b. Radial

c. Trellis

d. Centripetal

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67. The correct order of atomic radius of Li, Na, Be and O is **(+0.833, -0.277)**

a. Na > Li > Be > O

b. Na > Be > Li > O

c. Be > Li > Na > O

d. O > Be > Li > Na

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68. The Indian Army launched 'Operation Sarvashakti' to flush out terrorists in **(+0.833, -0.277)**

a. Myanmar

b. Manipur

c. Jammu and Kashmir

d. Chhattisgarh

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69. Consider the following statements: (+0.833, -0.277)

1. Under Part III of the Constitution of India, individuals can enforce rights guaranteed by this Part when they are violated by the action of a government authority.

2. Under Part III of the Constitution of India, individuals can enforce rights guaranteed by this Part when they are violated by not only the action of a government authority, but also by its inaction.

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

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70. Which of the following regarding gateway city is/are correct? (+0.833, -0.277)

1. City whose physical location makes it a link between one country and others, or between one region and others

2. A gateway city exercises control over a large area because it commands the entry and exit rights and powers for a particular country or region

3. Most gateway cities are ports, many of which were formerly adminis- trative centres for a colonial government

Select the correct answer using the code given below.

a. 1 only

b. 1 and 2 only

c. 2 and 3 only

d. 1, 2 and 3

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71. Which of the following catalytic systems is used for the reduction of unsaturated hydrocarbon to saturated hydrocarbon? **(+0.833, -0.277)**

a. Copper and H2

b. Iron and H2

c. Zinc and H2

d. Nickel and H2

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72. Which of the following cities were conferred with the cleanest city award under Swachh Survekshan Awards, 2023? **(+0.833, -0.277)**

a. Varanasi and Prayagraj

b. Indore and Surat

c. Prayagraj and Indore

d. Surat and Varanasi

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73. Consider the following statements: **(+0.833, -0.277)**

1. The International Covenant on Civil and Political Rights (ICCPR) provides that everyone shall have the right to recognition everywhere as a person before the law.

2. Although India agrees in principle with the ethos of ICCPR, it has not yet ratified it fully.

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

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74. Which one of the following has been an important early Chola painting discovered at the Brihadisvara Temple, Thanjavur in 1931? **(+0.833, -0.277)**

a. Buddha with Chauri-bearers on either side

b. Shiva as Yoga-Dakshinamurti

c. Yakshi Kali

d. Parshvanatha with snake-hood on a lion-throne

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75. Which one of the following has the highest ionic character? **(+0.833, -0.277)**

a. BeF3

b. SiO2

c. NC13

d. K2S

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76. Which one of the following is an indigenous assault rifle developed by DRDO? **(+0.833, -0.277)**

a. Heckler

b. T91

c. Tikka

d. Ugram

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77. Which of the following statements with respect to the right to have a legal aid is/are correct? **(+0.833, -0.277)**

1. Under the Constitution of India, it is given under the Directive Principles of State Policy.

2. It is the duty of the police to inform the nearest Legal Aid Committee immediately after the arrest of a person.

Select the correct answer using the code given below.

a. 1 only

b. 2 only

c. Both 1 and 2

d. Neither 1 nor 2

---

78. Consider the following statements about the initial development of railways in India by the British: **(+0.833, -0.277)**

1. Private financial investors for railways would get land free from the British Government in India.

2. The investors would get a return of 5 percent on their capital from the government if they ran at a loss or secured inadequate profit.

3. The railways would be jointly managed with the government.

How many of the above statements is/are correct?

a. 1

b. 2

c. 3

d. None

---

79. Which of the following statements regarding ice-cap climate is/are correct? **(+0.833, -0.277)**

1. In the Koeppen climate classifi- cation, the ice-cap climate is signified by the letters EF.

2. It is the Earth's most severe climate, where the mean monthly temperature is never above 0 degrees Celsius.

3. This climate is found in the Pir Panjal and the Great Himalayas.

Select the correct answer using the code given below.

a. 1 only

b. 1 and 2 only

c. 2 and 3 only

d. 1, 2 and 3

---

80. With which one among the following sports is Yogesh Singh, who won a Gold Medal in an Asian Championship in 2024, associated? **(+0.833, -0.277)**

a. Badminton

b. Shooting

c. Archery

d. Wrestling

---

81. Which of the following statements as per the Universal Declaration of Human Rights' is/are correct? **(+0.833, -0.277)**

1. The Declaration provides provides that everyone has a right to seek and enjoy in other country's asylum from prosecution in respect of political crimes.

2. The Declaration provides that everyone has the freedom from arbitrary deprival of nationality, except for the freedom to change nationality.

Select the correct answer using the code given below.

a. 1 only

b. 2 only

c. Both 1 and 2

d. Neither 1 nor 2

82. Which of the following industries was most affected by the 'de-industrialisation' of India in the 19th century? (+0.833, -0.277)

a. Silk manufacture

b. Cotton textiles

c. Iron and steel

d. Woolen manufacture

83. Which of the following statements regarding the Industrial Revolution is/are correct? (+0.833, -0.277)

1. It was change of a society from a rural and agricultural lifestyle to one in which most people earned their living in the industrial or secondary sector of the economy.

2. The first Industrial Revolution began in Germany in the early eighteenth century.

3. During Industrial Revolution, technological advances in iron smelting, and later steel produc-tion, were accompanied by the invention of steam engine.

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

84. Renowned classical singer Prabha Atre, who passed away recently, was an exponent of which one of the following Gharanas? (+0.833, -0.277)

a. Kirana Gharana

b. Patiala Gharana

c. Gwalior Gharana

d. Agra Gharana

---

85. Which of the following UN organisations has been awarded with Nobel Prize twice? (+0.833, -0.277)

a. IPCC

b. IAEA

c. UNHCR

d. UNICEF

---

86. Consider the following statements about the early phase of the National Movement in India: (+0.833, -0.277)

1. Ferozeshah Mehta, Badruddin Tyabji and others formed the Bombay Presidency Association.

2. Surendranath Banerjee and his group planned an Indian National Conference at Calcutta.

3. Allan Octavian Hume decided to create an all-India body as a rival to the above organisations to give vent to the grievances of the poor and marginalised Indians.

How many of the above statements is/are correct?

a. 1

b. 2

c. All

d. None

---

87. Which of the following statements regarding insolation is/are correct? **(+0.833, -0.277)**

1. Insolation is predominantly short- wave radiation, with wavelengths in the range of 0.39 micrometre to 0.76 micrometre.

2. Insolation is evenly distributed across the Earth because of the Earth's curved surface.

Select the correct answer using the code given below.

a. 1 only

b. 2 only

c. Both 1 and 2

d. Neither 1 nor 2

---

88. Who among the following was the first Indian Commander-in-Chief of the Indian Army of independent India? **(+0.833, -0.277)**

a. S. M. Srinagesh

b. K. M. Cariappa

c. K. S. Thimayya

d. K. S. Rajendrasinhji

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89. Which of the following statements is/are correct about vaccination that provides protection against an infectious disease? **(+0.833, -0.277)**

1. It blocks the entry of the infectious agent into body.

2. It produces antibodies against infection.

3. It kills the infectious agent when it enters in the body.

Select the correct answer using the code given below.

a. 1 only

b. 2 only

c. 2 and 3 only

d. 1, 2 and 3

---

90. The Giant Metrewave Radio Telescope consists of **(+0.833, -0.277)**

a. a single parabolic antenna

b. multiple parabolic antennas

c. multiple circular antennas

d. a combination of circular and parabolic antennas

---

91. Which of the following statements regarding river meanders is/are correct? **(+0.833, -0.277)**

1. It is a U-shaped bend in a river.

2. An extremely tight meander is called a goose neck; it is likely to become a cutoff, or oxbow lake, after a flood.

3. Tectonic uplift can cause a river to continue downcutting along its meandering course, producing incised or entrenched meanders.

Select the correct answer using the code given below.

a. 1 only

b. 1 and 2 only

c. 2 and 3 only

d. 1, 2 and 3

---

92. Which one of the following is an 'end-to-end secure mobile ecosystem' developed recently by the Indian Army? **(+0.833, -0.277)**

a. SANCHAR

b. VAIBHAV

c. SAMPARK

d. SAMBHAV

---

93. Which cells in human body have no nucleus? **(+0.833, -0.277)**

a. Muscle cells

b. Phagocytic cells

c. Red blood cells

d. Ciliated cells

---

94. Which one of the following is the first commercial space station? **(+0.833, -0.277)**

a. Axiom Station

b. International Space Station

c. Galileo

d. Voyager 1

---

95. How can one determine the relative humidity on a particular day at a given place? **(+0.833, -0.277)**

a. If temperature is given

b. If absolute humidity is given

c. If both temperature and absolute humidity are, given

d. If percentage of absolute humidity is given

---

96. Consider the following statements about the Regional Comprehensive Economic Partnership (RCEP): **(+0.833, -0.277)**

1. It is a comprehensive free trade agreement between the ASEAN member States and ASEAN's free trade agreement partners.

2. India opted out of RCEP.

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

---

97. The use of plastics has led to a number of environment-related problems. For this, which one of the following statements is correct? **(+0.833, -0.277)**

a. They are non-biodegradable.

b. They do not get released into water and food.

c. They do not have any biochemical synthesis activity.

d. They are harmless to humans.

---

98. Which one of the following is not a ferromagnetic material? **(+0.833, -0.277)**

a. Cobalt

b. Iron

c. Silver

d. Ferric chloride

---

99. Which greenhouse gas has maximum average residence time in the atmosphere? **(+0.833, -0.277)**

a. CFC

b. CH4

c. N20

d. Water vapour

---

100. Recently the Government of India entered into an agreement for a lithium exploration and mining project with which one among the following countries? **(+0.833, -0.277)**

a. Brazil

b. Australia

c. Argentina

d. Chile

---

101. Microbodies found to be present in plant and animal cells contain **(+0.833, -0.277)**

a. broken down membranes

b. enzymes

c. acidic fluids

d. waste metabolites

---

102. On a day when I am in hurry to go to office, I have a fixed quantity of rice which was just cooked and kept in a bowl. In order to cool it quickly, which one of the following is the best option? **(+0.833, -0.277)**

a. Let it be kept on the table in a room where there is no fan, no air conditioner

b. Let it be kept in a room with AC set at a temperature around 23 °C and a ceiling fan (or table fan) operating at slow speed

c. Let it be kept in a bowl of water (at room temperature) and operating a ceiling fan (or table fan) at full speed

d. Let it be kept in a bowl of water at room temperature only

---

103. What does BW stand for as per the Koeppen climate classification? **(+0.833, -0.277)**

a. Steppe climate

b. Desert climate

c. Tundra climate

d. Mesothermal climate

---

104. Consider the following statements about the Shanghai Cooperation Organisation (SCO): **(+0.833, -0.277)**

1. One of the goals of SCO is to promote a new democratic, fair and rational international political and economic order.

2. Iran is a permanent member of SCO.

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

---

105. An antibacterial enzyme present in saliva and tears is called **(+0.833, -0.277)**

a. ribozyme

b. lipase

c. lysozyme

d. isomerase

---

106. Which of the following statements about the 'Marrakech Partnership' is/are correct? **(+0.833, -0.277)**

1. It is an intergovernmental partnership for global climate action.

2. It is not only an intergovernmental partnership for global climate action but also a collaboration between governments and other stakeholders like cities, businesses and investors.

3. This partnership is guided by the 2030 Agenda for Sustainable Development.

Select the correct answer using the code given below.

a. 1 and 2 only

b. 1 and 3 only

c. 1, 2 and 3

d. 2 only

---

107. Which organisation publishes worldwide list of endangered species? **(+0.833, -0.277)**

a. The International Union for Conservation of Nature (IUCN)

b. The World Wide Fund for Nature (WWF)

c. The United Nations Environment Programme (UNEP)

d. The United Nations Development Programme (UNDP)

---

108. Which of the following statements about the ICC under-19 Men's Cricket World Cup, 2024 is/are correct? **(+0.833, -0.277)**

1. Australia won this title for the 4^{th} time.

2. It was organised in South Africa.

Select the correct answer using the code given below.

a. 1 only

b. 2 only

c. Both 1 and 2

d. Neither 1 nor 2

---

109. Which set of vegetables is underground stem or modified stem of a plant? **(+0.833, -0.277)**

a. Potato, artichoke, round gourd

b. Onion, garlic, carrot

c. Potato, onion, garlic

d. Potato, garlic, turnip

---

110. Consider the following statements: **(+0.833, -0.277)**

1. In India, the Special Marriage Act protects an individual if one enters into an interreligious marriage.

2. Right to marry a person of one's choice is an integral aspect of one's Fundamental Rights under Article 21 of the Constitution of India.

3. The Universal Declaration of Human Rights also resonates marital rights of every adult consenting individuals.

Which of the statements given above is/are correct?

a. 2 and 3 only

b. 1,and 3 only

c. 1, 2 and 3

d. 1 only

---

111. On which among the following is National Waterway No. 2 situated? **(+0.833, -0.277)**

a. The Ganga, Haldia-Prayagraj

b. West Coast Canal, Kottapuram- Kollam

c. The Brahmaputra, Sadiya-Dhubri

d. Godavari and Krishna, Kakinada- Puducherry

---

112. Which of the following statements with regard to Bharat Ratna Award is/are correct? **(+0.833, -0.277)**

1. It was instituted in the year 1972.

2. The award does not carry any monetary grant.

Select the correct answer using the code given below.

a. 1 only

b. 2 only

c. Both 1 and 2

d. Neither 1 nor 2

---

113. Which of the following indicators is/are used to observe the monetary transmission mechanism in economy? **(+0.833, -0.277)**

1. Weighted average lending rate

2. Weighted average domestic term deposit rate

3. 1-year median MCLR

4. SDF rate

Select the correct answer using the code given below.

a. 1 and 2 only

b. 1, 2 and 3

c. 3 and 4

d. 4 only

114. Which of the following statements about the International Court of Justice is/are correct? **(+0.833, -0.277)**

1. The Court consists of members, wherein two members cannot be nationals of the same State.

2. The General Assembly and the Security Council proceed independently of one another to elect the members of the Court.

Select the correct answer using the code given below.

a. 1 only

b. 2 only

c. Both 1 and 2

d. Neither 1 nor 2

---

115. What is culturable wasteland? **(+0.833, -0.277)**

a. Land that has been left fallow in last four years

b. Land that has been left fallow between one and two years

c. Land that has been left fallow for less than one year

d. Land that has been left fallow for more than five years

---

116. Which of the following statements about India's rank in the Global Innovation Index-2023, published by the World Intellectual Property Organisation, is/are correct? **(+0.833, -0.277)**

1. India has been placed at 40th rank.

2. India has been on a rising trajectory over the period 2015-2023.

Select the correct answer using the code given below.

a. 1 only

b. 2 only

c. Both 1 and 2

d. Neither 1 nor 2

---

117. Consider the following statements regarding instruments of monetary policy: **(+0.833, -0.277)**

1 . Standing deposit facility (SDF) rate was introduced in April 2022.

2. SDF rate replaced fixed reverse repo rate as the floor of the LAF corridor.

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

---

118. Consider the following statements regarding Bhoonidhi Vista: **(+0.833, -0.277)**

1. It is a data visualisation service of Bhoonidhi providing full resolution mosaicked data visualisation capability through Web Map Service.

2. It is enabled for ResourceSat-2/2A, Sentinel 1 and 2 satellites.

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

---

119. Which of the following statements is/are correct? **(+0.833, -0.277)**

1. Angular velocity for all locations on the Earth's surface is the same while linear velocity varies.

2. Linear velocity is maximum at the equator and minimum at the poles.

Select the correct answer using the code given below.

a. 1 only

b. 2 only

c. Both 1 and 2

d. Neither 1 nor 2

---

120. Which of the following statements about 'Green Credit Initiative' is/are correct? **(+0.833, -0.277)**

1. It is a response to the challenge of climate change.

2. It promotes plantations on wasteland and river catchment areas.

3. It is a scheme of the Government of India to replace the kerosene oil with solar power used by the rural poor.

Select the correct answer using the code given below.

a. 1, 2 and 3

b. 1 and 2 only

c. 2 only

d. 1 and 3 only

Answers

1. **Answer: b**

Explanation:

The correct answer is ***1 and 2 only***

⭐ **Key Points**

- The **Jorwe culture** predominantly covered what is now **modern Maharashtra**, excluding the coastal region known as the **Konkan district**. This coverage highlights its extensive influence across the interior regions but not in maritime areas. ***Hence, statement 1 is correct.***
- **Archaeological evidence** suggests that the **Pravara-Godavari valleys** were a central area for the Jorwe culture, indicating a concentration of settlements and cultural activities. This area's geographic and environmental features likely supported the sustenance and growth of the culture. ***Hence, statement 2 is correct.***
- The assertion that large sites of the Jorwe culture show evidence of **shifting agriculture** is not strongly supported by the archaeological record, which instead points to more established forms of agriculture. The absence of clear evidence for shifting cultivation practices among the large, settled communities of this culture negates this statement. ***Hence, statement 3 is incorrect.***

⭐ **Additional Information**

- The **Jorwe culture**, identified mainly through its **distinctive red and black pottery**, is dated from around **1400 to 700 BCE**. It marks a significant phase in the early history of peninsular India, transitioning from the later prehistoric to the early historic periods.
- Key sites like **Daimabad** not only provide evidence of **well-organized settlements** but also of socio-political structures and metallurgy, especially with respect to iron, which underlines technological advancements during this period.
- The culture's spread and societal organization suggest a **complex agrarian economy** supported by irrigation and crop rotation, rather than primitive shifting

agriculture. This reflects a more advanced stage of agricultural development aligned with urbanization trends in ancient India.
- Preservation efforts for archaeological sites associated with the Jorwe culture are crucial for understanding the cultural heritage of Maharashtra. These efforts are often governed by policies and guidelines from bodies like the **Archaeological Survey of India**, under the purview of the **Ministry of Culture**.
- Research into the Jorwe culture helps scholars trace the developmental trajectory of society in the Deccan region of India, illustrating the growth from small, agrarian communities to more complex societies with significant craft specialization and trade practices.

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2. Answer: b

Explanation:

The Correct answer is **2 only**.

⭐ **Key Points**

- The **Wholesale Price Index (WPI)** measures the changes in the prices of goods sold and traded in bulk by wholesale businesses to other businesses.
- The WPI is a crucial indicator of inflation and is used by the government to formulate policies related to the economy.
- The WPI consists of three major groups: **Primary Articles**, **Fuel and Power**, and **Manufactured Products**.
- **Statement 1:** Fuel and power have higher weightage in WPI than that of primary articles.
    - The WPI assigns different weightages to each of its components to reflect their relative importance in the economy.
    - **Primary Articles** include items like food, non-food agricultural products, and minerals.
    - **Fuel and Power** cover coal, electricity, and mineral oils.
    - The weightage of **Primary Articles** is approximately 22.62%.
    - The weightage of **Fuel and Power** is approximately 13.15%.

- Hence, **Fuel and Power** do not have a higher weightage than **Primary Articles**. **Hence, statement 1 is incorrect.**

- **Statement 2:** Weightage of manufactured products in WPI is higher than that of fuel and power.
  - **Manufactured Products** include a wide range of items such as textiles, chemicals, machinery, and metals.
  - The weightage of **Manufactured Products** in the WPI is approximately 64.23%.
  - This is significantly higher than the weightage of **Fuel and Power**, which is 13.15%.
  - Thus, the weightage of **Manufactured Products** is indeed higher than that of **Fuel and Power**. **Hence, statement 2 is correct.**

⭐ Additional Information

- The **Wholesale Price Index (WPI)** is an important economic indicator in India, helping to track inflation at the wholesale level.
- **Primary Articles** have the second-highest weightage in the WPI, highlighting their importance in the economy.
- **Fuel and Power** are crucial for industrial and economic activities, hence their inclusion in the WPI.
- **Manufactured Products** dominate the WPI due to their significant contribution to the economy and their extensive range of goods.
- The **WPI** is used by policymakers, economists, and businesses to make informed decisions regarding pricing, production, and investment.

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3. **Answer: c**

Explanation:

The correct answer is ***1, 2 and 3.***

⭐ Key Points

- The G20 Summit under India's Presidency in 2023 aimed to address several global challenges and set ambitious agendas in various domains, including

economic growth, sustainable development, and gender equality.

- **Green development** was a pivotal focus, aiming to promote sustainable practices, reduce carbon emissions, and enhance renewable energy usage, reflecting the global urgency to combat climate change and promote environmental sustainability. ***Hence, statement 1 is correct.***
- **Accelerating progress on Sustainable Development Goals (SDGs)** was another crucial objective. The SDGs, adopted by all United Nations Member States in 2015, are a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity. The G20 Summit aimed to foster international cooperation and develop strategies to achieve these goals more effectively and swiftly. ***Hence, statement 2 is correct.***
- **Women-led development** was emphasized as a key objective, highlighting the importance of gender equality and the empowerment of women and girls as central to sustainable development. This approach not only supports the achievement of SDG 5 (Gender Equality) but also recognizes the role of women as drivers of growth and development. ***Hence, statement 3 is correct.***

⭐ Additional Information

- The **G20 (Group of Twenty)** is an international forum for the governments and central bank governors from 19 countries and the European Union. It was founded in 1999 after the Asian financial crisis as a forum for finance ministers and central bank governors to discuss global financial and economic issues.
- The G20 plays a significant role in global economic governance, with members representing around **85% of global GDP, over 75% of global trade, and about two-thirds of the world's population**.
- The summit's focus on **green development** aligns with global efforts to transition to sustainable energy sources and reduce reliance on fossil fuels, critical to mitigating the impacts of climate change.
- The emphasis on **accelerating SDG progress** is crucial as the 2030 deadline approaches, with many areas requiring significant action to meet the targets. This includes addressing challenges such as poverty, inequality, climate change, environmental degradation, peace, and justice.
- The focus on **women-led development** recognizes the transformative impact of enhancing women's economic participation, leadership, and rights, which can lead to more inclusive and sustainable outcomes.

4. **Answer: a**

Explanation:

The correct answer is ***1, 2 and 3***

⭐ **Key Points**

Rana Kumbha of Mewar

- Rana Kumbha, also known as Maharana Kumbhakarna, was a ruler of Mewar, a region in the present-day state of Rajasthan, India. He is known for his contributions to art, architecture, and music, as well as his military victories.
- **He wrote a commentary on Jayadeva's Gitagovinda.** The Gitagovinda is a Sanskrit poem composed by the 12th-century Indian poet, Jayadeva, and is considered a significant text in the Bhakti movement of Hinduism. Rana Kumbha's commentary on this text highlights his scholarly interest and patronage of the arts. **Hence, statement 1 is correct.**
- **He wrote four dramas in which he is said to have made use of four provincial languages.** This fact underscores Rana Kumbha's linguistic abilities and his efforts to promote cultural diversity through literature. It reflects the cosmopolitan nature of his court and his support for regional languages. **Hence, statement 2 is correct.**
- **He erected Kirtistambha in Chitor in commemoration of his victory over Gujarat.** Kirtistambha, or the Tower of Fame, is located in Chittorgarh Fort in Rajasthan. It is an imposing victory monument that celebrates Rana Kumbha's military success. This architectural marvel stands as a testament to his power and the artistic sensibilities of the era. **Hence, statement 3 is correct.**

⭐ **Additional Information**

- **Chittorgarh Fort** is one of the largest forts in India and is a UNESCO World Heritage Site. It has witnessed numerous historical events and battles and is a symbol of Rajput valor and resistance.
- **Gitagovinda** is celebrated for its expression of devotion to Lord Krishna and is a key work in the development of the Bhakti tradition in Hinduism. Its influence

extends beyond religious texts and into various forms of art and culture in India.

- Rana Kumbha's reign is often remembered for its patronage of the arts, including music and literature, which led to the flourishing of Rajasthani culture. His contributions have left an indelible mark on the cultural landscape of India.
- His military campaigns not only expanded the territory of Mewar but also secured its borders against various adversaries, making it a formidable Rajput state during his reign.

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5. Answer: a

Explanation:

The correct answer is ***1 only.***

⭐ Key Points

Madurai and the Pandya Kingdom

- **Madurai,** historically significant as the capital of the **Pandya Kingdom**, has been a pivotal city in the cultural, economic, and architectural development of South India.
- The description of Madurai as a **large grand city enclosed by walls on three sides and the Vaigai river on the fourth side** in *Maduraikkanchi* highlights its strategic design and the importance of natural resources in urban planning during ancient times.
    - This depiction underscores the city's fortified nature and its reliance on the Vaigai river for sustenance and protection. ***Hence, statement 1 is correct.***
- Although Madurai is renowned for its rich textile history, the specific mention of it as a **centre for fine cotton textiles in the Arthashastra** is not directly attributed to ancient texts but rather inferred from its historical significance in textile production.
    - This statement, while reflecting the city's long-standing association with textile craftsmanship, lacks direct evidence from the *Arthashastra*. ***Hence, statement 2 is incorrect.***

- Madurai's recognition as a **major craft centre** in various literary sources is consistent with historical accounts of its thriving markets and artisan communities. However, the specificity of these sources and their direct correlation to Madurai's diverse crafts other than textiles is broad and encompasses various periods and contexts.
    - While it is true that Madurai was a hub for crafts, the general statement about other literary sources requires more specific context to be fully validated. ***Hence, statement 3 is incorrect.***

⭐ Additional Information

- The **Pandya Kingdom** was one of the longest-ruling dynasties in the history of southern India with Madurai serving as its capital. The city's historical significance is evident in its rich architectural heritage, including the famous **Meenakshi Amman Temple**.
- The **Vaigai River** not only provided natural protection but also supported agriculture, which was a cornerstone of the ancient economy in the region.
- Madurai's legacy in **textile production** is well-documented, with the city being famous for its **silk sarees** and cotton fabrics, reflecting a tradition that has survived through centuries.
- The city's vibrant culture is immortalized in the Tamil epic **Silappathikaram**, which offers insights into the ancient Tamil way of life, including its crafts, festivals, and societal structures.

Highlighting Madurai's historical importance provides a window into the social, economic, and cultural fabric of ancient Tamil society, showcasing the city's enduring legacy as a center of trade, craftsmanship, and literature.

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6. Answer: a

Explanation:

The correct answer is: **Option 1 – 1, 2, 3, 4 and 5**.

□ Free Trade Agreements (FTAs) and India's Export Growth

When India enters into **Free Trade Agreements (FTAs)** with other countries, it typically aims to enhance **market access**, reduce **trade barriers**, and increase the **competitiveness of its exports**. However, the success of such agreements in stimulating export growth depends on multiple interconnected factors.

Let's analyze each of the five listed components and how they influence India's export potential under FTAs:

□ 1. Extent of tariff reduction vis-à-vis MFN tariffs

- **MFN (Most Favored Nation) tariffs** refer to the standard import tariffs applied by WTO member countries.
- Under an FTA, partner countries may offer **preferential tariffs**, often lower than MFN rates.
- The **greater the tariff reduction under the FTA**, the more attractive Indian goods become to foreign buyers.
- Therefore, **the deeper the cuts compared to MFN rates**, the stronger the export boost.

□ **Highly relevant for export growth**

□ 2. Extent of relaxation in terms of rules of origin

- **Rules of origin** determine the national source of a product to qualify for FTA benefits.
- If these rules are **too stringent**, exporters may find it hard to prove compliance, negating the benefits of tariff reduction.
- **Simplified or relaxed rules** reduce compliance burdens and enhance utilization of FTAs.

□ **Crucial for practical utilization of FTA benefits**

□ 3. Extent of relaxation in sanitary and phytosanitary (SPS) measures

- **SPS measures** are health and safety standards for agricultural and food products.
- Even with zero tariffs, **stringent SPS regulations** can act as **non-tariff barriers**.

- Relaxing or harmonizing SPS norms under FTAs can open **agri-export opportunities**.

 Important for expanding exports in food and agriculture sectors

4. Level of infrastructure in India

- **Trade-enabling infrastructure**—ports, roads, customs, logistics—affects the **cost and speed** of export delivery.
- Better infrastructure enhances **supply chain efficiency** and **global competitiveness**.
- Poor infrastructure can undermine the benefits of FTAs, regardless of tariff concessions.

 Directly affects export readiness and competitiveness

5. Income in nations with which India enters into FTAs

- Export potential depends on **demand-side factors** too.
- Higher **per capita income** in partner countries leads to **greater consumption** of imported goods.
- FTAs with **wealthier nations** offer more opportunities for value-added and high-end exports.

 Demand in partner nations drives export volume and value

Summary Table

Factor	Impact on Exports
1. Tariff reduction vs. MFN	Enhances price competitiveness
2. Relaxation of rules of origin	Increases FTA utilization
3. Relaxation of SPS measures	Reduces non-tariff barriers
4. Infrastructure in India	Improves delivery and reduces transaction cost
5. Income in FTA partner nations	Drives demand for Indian goods

✅ Conclusion

All five factors—**tariff reduction**, **rules of origin**, **SPS relaxation**, **domestic infrastructure**, and **partner country income levels**—play critical roles in determining whether India's exports will actually grow under an FTA.

Therefore, the correct answer is: Option 1 – 1, 2, 3, 4 and 5.

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7. Answer: a

Explanation:

The correct classification of the dengue virus is **Flavi-ribo virus**, which refers to viruses in the *Flavivirus* genus of the *Flaviviridae* family that possess a **single-stranded, positive-sense RNA genome**. Dengue virus (DENV) falls into this category and is responsible for causing **dengue fever**, a rapidly spreading mosquito-borne viral disease. The transmission occurs primarily through the bite of infected *Aedes aegypti* mosquitoes, which are day-biting mosquitoes commonly found in tropical and subtropical regions.

Virology and Structure

The dengue virus is an enveloped virus with an icosahedral capsid. It contains RNA as its genetic material—this is where the "ribo" part of the name comes from. The term "Flavi" refers to the viral genus *Flavivirus*, which includes other notable viruses such as Zika, Yellow Fever, and West Nile Virus.

Feature	Description
Virus Family	Flaviviridae
Genus	Flavivirus
Genome Type	Single-stranded positive-sense RNA
Serotypes	DENV-1, DENV-2, DENV-3, DENV-4
Capsid	Enveloped, icosahedral
Replication Site	Cytoplasm

- These four serotypes can all cause dengue, and infection with one does not provide lasting immunity against the others. In fact, secondary infection with a different serotype increases the risk of severe dengue due to a phenomenon known as **antibody-dependent enhancement (ADE)**.

Clinical Features and Disease Progression

- Dengue infection presents a wide clinical spectrum, ranging from mild flu-like symptoms to severe complications like **Dengue Hemorrhagic Fever (DHF)** and **Dengue Shock Syndrome (DSS)**. Initial symptoms typically begin 4–10 days after the mosquito bite and include:
  - High fever
  - Severe headache
  - Retro-orbital pain (pain behind the eyes)
  - Joint and muscle pain
  - Skin rash
  - Mild bleeding (e.g., nose or gum bleed)
  - In severe cases, there may be plasma leakage, fluid accumulation, respiratory distress, and even organ impairment.

Lifecycle and Transmission

The mosquito becomes infected when it feeds on a person already infected with dengue virus. After an **extrinsic incubation period** (usually 8–12 days), the virus

replicates in the mosquito's salivary glands, and the mosquito becomes capable of transmitting the virus for life.

Stage	Action
Human with dengue virus	Bitten by Aedes mosquito → mosquito ingests virus
Virus incubation in mosquito	8–12 days for replication in midgut and salivary glands
Infected mosquito bites new host	Virus enters bloodstream and infects host cells

Comparison with Other Viruses

Other viruses listed in the options differ significantly in terms of their structure, transmission, and the diseases they cause.

Virus	Family	Genome Type	Transmission Mode	Disease
Adenovirus	Adenoviridae	Double-stranded DNA	Respiratory droplets, fecal-oral	Respiratory illnesses, conjunctivitis
Vaccinia	Poxviridae	Double-stranded DNA	Contact (used in vaccine)	Used to vaccinate against smallpox
Nipah Virus	Paramyxoviridae	ssRNA (-)	Bat → animal → human	Encephalitis, respiratory failure

None of these are mosquito-borne RNA viruses from the *Flaviviridae* family, making them incorrect choices.

Global Impact and Prevention

- Dengue has seen a dramatic global increase in incidence over recent decades, with an estimated **390 million infections annually**. It is endemic in over 100 countries, particularly in Southeast Asia, South America, and sub-Saharan Africa. Urbanization, poor sanitation, and climate change contribute to the growing spread of *Aedes* mosquitoes.
    - Efforts to prevent dengue focus primarily on mosquito control:
    - Removing standing water to prevent breeding
    - Using mosquito nets and repellents
    - Community fogging operations
    - Educating the public on preventive practices
- Although a vaccine (Dengvaxia) exists, its use is limited to certain age groups and individuals who have had previous dengue infections due to concerns over increased risk of severe disease in seronegative individuals.

In summary, the dengue virus is an RNA virus from the *Flavivirus* genus, making **Flavi-ribo virus** the correct classification. Its transmission by *Aedes* mosquitoes, broad clinical spectrum, and expanding global footprint make it a significant public health concern.

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8. **Answer: b**

Explanation:

The Chola king who encouraged the Sailendra ruler of the Sri Vijaya Empire to build a **Buddhist Vihara at Nagapattinam** was **Rajaraja I**. This episode, well-documented in historical inscriptions, illustrates the religious inclusivity and international diplomacy practiced by the Chola rulers during their imperial zenith.

Historical Context of Rajaraja I and the Cholas

- Rajaraja I (reigned c. 985–1014 CE) was one of the most illustrious rulers of the Chola dynasty. Under his leadership, the Chola state transformed into a powerful maritime empire with strong political, cultural, and trade links across the Bay of Bengal and the Indian Ocean.

- While Rajaraja I was a devout Shaivite, his reign is marked by **patronage of multiple religions**, including **Buddhism and Jainism**, which had significant followings in South India and Southeast Asia.

Diplomatic Ties with Sri Vijaya

- The **Sri Vijaya Empire**, ruled by the **Sailendra dynasty**, was a major center of Mahayana Buddhism, headquartered in what is today Sumatra, Indonesia. Rajaraja I maintained **peaceful and cooperative relations** with the Sailendra rulers, unlike his successor Rajendra I who later conducted military expeditions against Sri Vijaya.
- These diplomatic exchanges culminated in a **religious-cultural alliance**, where the Sailendra king sought and received permission to establish a **Buddhist Vihara in Nagapattinam**, a port city known for its Buddhist community and commercial significance.

Construction of the Buddhist Vihara at Nagapattinam

- The Vihara at Nagapattinam was constructed with **financial assistance from the Sailendra king**, but with **royal sanction and land grants from Rajaraja I**. This was not an isolated gesture but part of a larger pattern of religious generosity and state-supported cultural patronage during Rajaraja's reign.

Key Features of the Event

Aspect	Details
Chola Ruler Involved	**Rajaraja I** (reigned c. 985–1014 CE)
Foreign Patron	Sailendra ruler of the Sri Vijaya Empire (Indonesia)
Religious Structure	Mahayana Buddhist Vihara (Monastery)
Location	**Nagapattinam**, Tamil Nadu
Purpose	Religious diplomacy and promotion of Buddhism
Documented Evidence	Copper-plate inscriptions from Rajaraja's reign
Language of Inscription	Tamil and Sanskrit

Strategic and Cultural Significance

- This incident underscores multiple aspects of Rajaraja I's rule:
  - **Religious tolerance**: Rajaraja supported the flourishing of Buddhism despite being a Shaivite king.
  - **Cultural diplomacy**: Promoting Buddhist structures built by foreign rulers helped reinforce South India's image as a pluralistic and culturally rich civilization.
  - **Maritime influence**: Cooperation with Sri Vijaya also ensured safety and access to **Southeast Asian maritime trade routes**.

Comparative Overview of Chola Kings (in context)

Chola Ruler	Reign Period	Relevance to Nagapattinam Vihara
Parantaka I	c. 907–955 CE	Too early for the documented event; no known Buddhist patronage
Rajaraja I	c. 985–1014 CE	✅ **Allowed and supported the Sailendra ruler's vihara construction**
Rajendra I	c. 1014–1044 CE	Known for naval expeditions against Sri Vijaya; not associated with vihara
Kulottunga I	c. 1070–1122 CE	Patronized trade but not directly connected with this vihara

🔍 Inscriptions and Historical Sources

- Inscriptions, such as those found in the **Tirukkalukkunram copper plates**, mention:
  - Donations of **land and wealth** by Rajaraja I
  - The involvement of **Buddhist monks from Sri Vijaya**
  - The **Mahayana Buddhist affiliation** of the constructed Vihara
  - An enduring **legacy of Indo-Southeast Asian Buddhist connections**

✅ Conclusion

In conclusion, it was **Rajaraja I** who **encouraged and officially permitted** the construction of a **Buddhist Vihara at Nagapattinam** by the Sailendra king of Sri Vijaya. This act symbolizes the religious openness and cross-cultural diplomacy of the Chola empire, affirming its status as not just a regional superpower but a significant player in the larger Indian Ocean cultural and economic networks of the early medieval world.

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9. **Answer: a**

Explanation:

The correct answer is **Option 1 – 1 only**.

Background: Sawai Jai Singh II and His Astronomical Legacy

- **Sawai Jai Singh II** (1688–1743), the founder of **Jaipur** and ruler of **Amber**, was not only a statesman but also a **brilliant astronomer and scientific thinker**. He is best remembered for building five monumental **Jantar Mantar observatories** across India (Delhi, Jaipur, Ujjain, Varanasi, and Mathura), where he revived **Indian observational astronomy** using both traditional and modern ideas.
- Jai Singh was deeply influenced by **multiple astronomical traditions**—**Indian**, **Islamic**, and **European**—and sought to reform astronomical calculations for calendar-making, eclipse predictions, and planetary positions by improving accuracy.

✅ Statement 1: *He learnt of the accuracy of European observations, and obtained de La Hire's tables from which he reproduced a refraction table.*

- This statement is **historically accurate**.
- Jai Singh was **well aware of the shortcomings** in the Indian astronomical texts then in use, such as the *Siddhantas*, which relied on older models that were not aligned with observational data.
- He came into contact with **European Jesuit missionaries** at the **Mughal court** and learned about **European astronomical advancements**, particularly the use of **telescopes** and **mathematical tables** for planetary positions.
- Among these European influences, he studied the **astronomical tables of Philippe de La Hire**, a French astronomer associated with the **Académie des Sciences in Paris**. These tables were part of the **Paris Ephemerides** and were known for their precision.
- Jai Singh had **de La Hire's tables translated** and **used them to compare with Indian and Islamic tables**. He was impressed by their accuracy.
- As part of his project to synthesize knowledge, Jai Singh also **compiled a refraction table**—a chart that accounted for the **bending of light** in the atmosphere, which affects the observed position of celestial objects.
- This demonstrates Jai Singh's **scientific temperament** and his openness to **adopt and adapt international knowledge** for the benefit of Indian astronomy.

 Therefore, Statement 1 is correct.

Statement 2: ***His astronomers also developed a telescope of their own to observe the lunar phases of Venus.***

This statement is **incorrect**, for two key reasons:

1. **Scientific Inaccuracy: "Lunar phases of Venus"**

- The phrase is **technically incorrect**. Venus does not exhibit "lunar phases." Rather, **Venus itself goes through phases**, much like the Moon, as observed from Earth.
- These **phases of Venus** were first observed by **Galileo Galilei** in the early 17th century using a **telescope**, and they were instrumental in proving the **heliocentric model** of the solar system.
- The confusion here arises from a misstatement of terminology.

2. **No Historical Evidence of Indigenous Telescope Development**

- While Jai Singh was aware of **telescopic astronomy**, there is **no documented historical evidence** that he or his astronomers **developed telescopes of their own**.
- Instead, Jai Singh focused on **large-scale masonry instruments**—such as the **Samrat Yantra**, **Ram Yantra**, and **Jai Prakash Yantra**—which allowed for **high-precision, naked-eye observations**.
- His preference for **fixed instruments** stemmed from a desire for **permanent, highly accurate tools** that would not suffer from the alignment and maintenance issues of early telescopes.

 Hence, Statement 2 is not factually accurate.

Summary Table

Statement	Correctness	Explanation
1	□ Correct	Jai Singh obtained and studied de La Hire's tables and compiled a refraction table.
2	□ Incorrect	No record of telescope invention by his astronomers; plus, "lunar phases of Venus" is inaccurate.

Additional Insights

- Jai Singh's efforts led to the creation of the **"Zij-i-Muhammad Shahi"**, a set of astronomical tables combining traditional Indian calculations with corrections derived from European data.
- His observatories are not only scientific achievements but also **architectural marvels**, reflecting the synthesis of **science, art, and statecraft**.

□ Final Conclusion

Only **Statement 1** is correct. Sawai Jai Singh II **learned from European astronomical works**, including **de La Hire's tables**, and **compiled a refraction table** to improve observational precision. However, there is **no evidence** that his astronomers developed a telescope or observed "lunar phases of Venus"—a scientifically flawed claim.

Therefore, the correct answer is: Option 1 – 1 only.

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10. Answer: d

Explanation:

The oxide that exhibits **amphoteric behavior** among the given options is **Al_2O_3 (aluminium oxide)**. Amphoteric oxides are unique because they can react both with **acids** and **bases**, a property that places them between **acidic** and **basic oxides** in terms of chemical reactivity. This dual character is typically exhibited by metal oxides of **metalloids or elements close to the metal–nonmetal boundary** in the periodic table.

Aluminium Oxide (Al_2O_3): An Amphoteric Oxide

Aluminium, a post-transition metal, forms **Al_2O_3**, a **white, crystalline, high-melting-point solid**. It is **insoluble in water** but reacts with both acids and bases, showing amphoteric properties.

Reactions Demonstrating Amphoteric Behavior

With Acids (acts as a base):

$$Al_2O_3 + 6HCl \rightarrow 2AlCl_3 + 3H_2O$$

- Aluminium oxide neutralizes hydrochloric acid to form aluminium chloride and water.

With Bases (acts as an acid):

$$Al_2O_3 + 2NaOH + 3H_2O \rightarrow 2Na[Al(OH)_4]$$

- In this reaction, aluminium oxide reacts with sodium hydroxide (a base) to form **sodium aluminate**, indicating acidic behavior.

This capacity to behave **both as an acid and as a base** makes Al_2O_3 a classic example of an amphoteric oxide.

Comparative Analysis of Given Options

To further clarify why **only Al_2O_3** is amphoteric, here's an analysis of each oxide:

Oxide	Chemical Name	Type of Oxide	Explanation
MgO	Magnesium oxide	Basic oxide	Formed from a Group 2 metal. Reacts with acids but **not** with bases.
P_4O_{10}	Tetraphosphorus decoxide	Acidic oxide	A non-metal oxide. Reacts with bases to form salts but **not** with acids.
Na_2O	Sodium oxide	Strongly basic oxide	An alkali metal oxide. Reacts violently with water and acids, but **not** with bases.
Al_2O_3	Aluminium oxide	Amphoteric	Reacts with both acids and bases — classic amphoteric behavior.

Summary of Oxide Behaviors

Oxide	Metal / Non-metal Origin	Water Solubility	Reacts with Acids	Reacts with Bases	Oxide Nature
MgO	Metal (Group 2)	Slightly soluble	Yes	No	Basic
P_4O_{10}	Non-metal (Group 15)	Reacts to form acid	No	Yes	Acidic
Na_2O	Metal (Group 1)	Reacts to form NaOH	Yes	No	Strongly basic
Al_2O_3	Metal (borderline)	Insoluble	Yes	Yes	**Amphoteric**

Real-World Relevance of Al_2O_3

Aluminium oxide has important **industrial and environmental applications** due to its amphoteric nature:

- Used in **water purification systems** as an adsorbent.
- Serves as a **catalyst support** in chemical reactions.
- In metallurgy, helps **extract pure aluminium** through the Hall–Héroult process.
- Forms a protective **oxide coating on aluminium**, preventing corrosion.

Conclusion

Al_2O_3 (aluminium oxide) is the only compound among the given options that qualifies as an **amphoteric oxide**, because it reacts both with acids and bases. This behavior reflects aluminium's chemical position near the metalloid line in the periodic table and makes Al_2O_3 a scientifically and industrially important compound.

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11. Answer: c

Explanation:

The **blood clotting factors** are primarily released by **platelets**, which are small, disc-shaped, cell fragments found in blood. These structures play a **central role in hemostasis**, the body's natural process to prevent and stop bleeding when blood vessels are injured.

Although platelets are not complete cells—they are fragments derived from larger cells called **megakaryocytes** in the bone marrow—they are packed with granules that contain enzymes, proteins, and signaling molecules critical to blood clot formation. When a blood vessel is damaged, platelets quickly migrate to the site of injury, where they become **activated** and start the **clotting process**.

Role of Platelets in Blood Clotting

Upon vascular injury, platelets perform three essential functions:

- **Adhesion**: Platelets adhere to the exposed collagen and endothelial lining of the damaged blood vessel.
- **Activation**: The adhered platelets change shape and release the contents of their granules—this includes **clotting factors and signaling molecules**.

- **Aggregation**: Platelets stick to each other, forming a **temporary platelet plug** to block blood flow.

Most importantly, during **activation**, platelets release a wide range of substances that are directly involved in initiating and amplifying the **coagulation cascade**—a series of enzymatic reactions that culminates in the formation of a stable fibrin clot.

Clotting Substances Released by Platelets

Substance	Function in Clotting
Platelet Factor 3 (PF3)	Provides a phospholipid surface crucial for assembling clotting factor complexes.
Platelet Factor 4 (PF4)	Neutralizes heparin-like anticoagulants and supports clot formation.
Thromboxane A_2	Promotes platelet aggregation and vasoconstriction, helping seal the injury.
ADP	Stimulates platelet aggregation and recruits more platelets to the site.
Serotonin	Acts as a vasoconstrictor, reducing blood flow and aiding clot stability.

These secretions facilitate the conversion of **prothrombin to thrombin**, which then converts **fibrinogen to fibrin**, forming a **mesh-like structure** that solidifies the blood clot.

□ Why the Other Blood Components Do Not Release Clotting Factors

Component	Function	Role in Clotting
RBCs (Red Blood Cells)	Transport oxygen via hemoglobin. They do not contribute to the clotting process.	□ None
Eosinophils	A type of white blood cell involved in allergic reactions and parasitic infections.	□ No clotting function
Monocytes	White blood cells that differentiate into macrophages; involved in immunity and inflammation.	□ Not involved in hemostasis

While **white blood cells (WBCs)** like monocytes and eosinophils are crucial for immune defense, and **RBCs** are essential for oxygen transport, **none of these cells release clotting factors**. Only platelets contain the **granular content and surface molecules** necessary for initiating and sustaining coagulation.

Clinical Relevance

- A deficiency in platelet number (**thrombocytopenia**) or function can lead to **prolonged bleeding**, **easy bruising**, and in severe cases, **hemorrhagic conditions**. Conversely, overactive platelet aggregation can cause **thrombotic disorders** like heart attacks and strokes.
- In medical treatments, **antiplatelet drugs** (like aspirin and clopidogrel) are prescribed to **inhibit platelet aggregation**, thereby reducing the risk of unwanted clots in conditions like **coronary artery disease**.

□ Conclusion

The release of blood clotting factors is a specialized function of **platelets**, making them the central players in the **formation of blood clots** following vascular injury. Their ability to detect injury, aggregate rapidly, and release clot-promoting substances ensures that bleeding is controlled efficiently, preventing blood loss and facilitating wound healing.

Therefore, the correct answer is: Platelets.

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12. **Answer: d**

Explanation:

The poet who was **not** a court poet of **King Krishnadevaraya** was **Siddheshvara**. While Krishnadevaraya's court is celebrated for its extraordinary patronage of literature and scholarship—particularly through his famous circle of eight Telugu poets known as the **Ashtadiggajas**—Siddheshvara does not belong to this elite literary circle and is not historically associated with the Vijayanagara court.

Krishnadevaraya: The Emperor and His Literary Court

- King **Krishnadevaraya** (reigned 1509–1529 CE), the most illustrious ruler of the **Tuluva dynasty** of the **Vijayanagara Empire**, was a great patron of art, architecture, and literature. He ruled during a golden age of South Indian cultural expression and is known not only for his military conquests but also for his contributions to **Telugu literature**, which reached unprecedented heights during his reign.
- Krishnadevaraya himself was a scholar and poet. He authored the famous Telugu work **Amuktamalyada**, which reflects his deep interest in literature and philosophy. Surrounding him in court were eight renowned poets, collectively called the **Ashtadiggajas**—meaning "eight great elephants in the eight directions"—a metaphor signifying their unmatched literary prowess and significance.

The Ashtadiggajas: Pillars of Krishnadevaraya's Court

The Ashtadiggajas were handpicked by Krishnadevaraya and represent the **finest classical Telugu poets** of the 16th century. Their works covered themes ranging from mythology and romance to moral philosophy and wit. Among them:

1. Allasani Peddana

Regarded as the greatest of the Ashtadiggajas, he was titled **Andhra Kavita Pitamaha** (Father of Telugu Poetry). His most famous work, *Manucharitramu*, is a

prabandha (narrative poem) that elevated Telugu poetry to new heights.

2. Nandi Timmana

Also known as **Mukku Timmana**, he wrote *Parijatapaharanamu*, a popular poetic work that narrates an episode from the life of Krishna. He was known for his simplicity and clarity in language.

3. Madayyagari Mallana

Author of *Rajasekhara Charitramu*, Mallana wrote historical and semi-mythical narratives in poetic form.

4. Dhurjati

Famous for his **devotional compositions**, particularly *Kalahastishatakam*, Dhurjati was a great devotee of Lord Shiva and expressed deep spiritual themes through his poetry.

Other members of the Ashtadiggajas included:

- **Tenali Ramakrishna** (celebrated for wit and intelligence)
- **Pingali Surana**
- **Ramarajabhushanudu**
- **Ayyalaraju Ramabhadrudu**

Here is a brief overview of the notable **court poets of Krishnadevaraya**:

Poet	Notable Contributions
Allasani Peddana	Known as the "Andhra Kavita Pitamaha" (Father of Telugu Poetry); author of *Manucharitramu*.
Nandi Timmana	Also called "Mukku Timmana"; author of *Parijatapaharanamu*.
Madayyagari Mallana	Writer of *Rajasekhara Charitramu*.
Dhurjati	Authored *Kalahastishatakam* and other devotional works in Telugu.
Ayyalaraju Ramabhadrudu	Known for his poetic style and command over language.
Tenali Ramakrishna	Famous for wit and poetry; also known as Tenali Raman.
Ramarajabhushanudu	Authored *Vasucharitramu*.
Pingali Surana	Known for *Raghava Pandaveeyamu*, a unique dual-narrative kavya.

All these poets flourished under Krishnadevaraya's patronage and contributed immensely to **classical Telugu literature**.

❌ Siddheshvara: Not a Court Poet of Krishnadevaraya

Siddheshvara was not among the Ashtadiggajas or associated with Krishnadevaraya's court in any capacity. Instead, Siddheshvara is known in **Kannada literary history** as a **12th-century Veerashaiva poet**, closely linked to the **Bhakti movement** in Karnataka. His writings, known as **Vachanas**, focused on spiritual devotion and social reform rather than classical court poetry. He was a follower of **Basavanna**, the founder of the Lingayat sect, and wrote mystical, anti-ritualistic verses rooted in Shaivism.

Thus, Siddheshvara's **historical period**, **religious affiliations**, **language**, and **literary style** are entirely different from the court poets of Krishnadevaraya, who were largely **Telugu-speaking prabandha poets** of the 16th century.

□ Summary Table

Poet	Associated With Krishnadevaraya?	Remarks
Timmana	□ Yes	Wrote *Parijatapaharanamu*; one of the Ashtadiggajas
Dhurjati	□ Yes	Devotional poet; wrote *Kalahastishatakam*; part of Ashtadiggajas
Mallana	□ Yes	Authored *Rajasekhara Charitramu*; included in the Ashtadiggajas
Siddheshvara	□ **No**	12th-century Veerashaiva poet; not associated with the Vijayanagara court

□ Conclusion

While poets like **Timmana**, **Dhurjati**, and **Mallana** held prominent positions in the **court of Krishnadevaraya** and contributed significantly to Telugu classical literature, **Siddheshvara** was **not a court poet of Krishnadevaraya**. He belonged to a **different era, region, and literary tradition**, making **Option 4 – Siddheshvara** the correct answer.

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13. Answer: a

Explanation:

The treatise *Man Kautuhal*, an important early work on **Indian classical music**, was prepared under the **aegis of Raja Man Singh Tomar of Gwalior**, a 15th–16th century monarch renowned for his exceptional patronage of the arts, particularly music. His reign (c. 1486–1516 CE) marked a significant cultural renaissance in Central India, with Gwalior emerging as a leading center of musical excellence. The creation of

Man Kautuhal during his rule reflects both his scholarly interest and institutional support for systematizing musical knowledge in northern India.

Man Kautuhal: A Landmark in Medieval Indian Musicology

- The title *Man Kautuhal* translates roughly to "The Curiosity of the Mind." It is a **Sanskrit treatise** that deals with the **theory and practice of Indian music**, particularly focusing on the **Hindustani classical tradition** as it was beginning to evolve during the late medieval period.

Key Features of the Work:

- Codifies **raga classifications**, their **lakshanas** (characteristics), and performance methods.
- Includes theoretical insights into **swaras** (notes), **talas** (rhythmic cycles), and musical compositions.
- Synthesizes earlier musical traditions rooted in **Nātya Shastra**, adapting them to the emerging **Dhrupad style**.
- Serves as one of the early efforts to formalize musical pedagogy in northern India.
- This treatise bridges the **classical Sanskrit tradition** of Bharata and Matanga with the **vernacular-based performance styles** that were taking shape in royal courts and temples.

Raja Man Singh Tomar: Patron of *Man Kautuhal*

Raja Man Singh Tomar was the **ruler of Gwalior**, a strategically important and culturally vibrant kingdom during the late 15th century. His reign is remembered not only for architectural achievements like the **Man Mandir Palace** in Gwalior Fort but also for his deep commitment to promoting music and scholarship.

Contributions to Indian Music:

- **Established Gwalior as a cultural hub**, particularly for the **Dhrupad style** of Hindustani music.

- Formed a royal **school of musicians and musicologists**, encouraging both oral and written traditions.
- Personally took an interest in **music theory**, and his name is often associated with innovations in **musical composition and structure**.
- Under his guidance, *Man Kautuhal* was compiled by scholars and musicians who were part of his court.
- By commissioning such a work, Man Singh Tomar ensured the **transmission of classical music theory** to future generations in a form that would be accessible and systematic.

❌ Analysis of the Other Options

Name	Role	Relation to *Man Kautuhal*
Tansen	16th-century court musician of Akbar, disciple of Swami Haridas.	Although associated with Gwalior, he came **after** the time of Man Singh and did **not patronize or compile** *Man Kautuhal*.
Meera Bai	16th-century Bhakti saint and poetess.	Focused on **devotional poetry and bhajans**; no known contribution to formal musicology or patronage of musical texts.
Amir Khusrau	13th–14th-century poet and musician in the Delhi Sultanate.	Pioneered many musical innovations, but lived **over a century before** *Man Kautuhal* was compiled. Not linked to its creation.

Hence, while these individuals were indeed influential in the musical heritage of India, none of them were involved in the authorship, compilation, or patronage of *Man Kautuhal*.

🎼 Cultural and Historical Importance

The production of *Man Kautuhal* under Raja Man Singh Tomar's patronage marks an important phase in the **transition of Indian music**:

- From **oral traditions to written codification**.

- From **Sanskritic classical theory** to a **more court-centered performance tradition**.
- From **temple-based devotional music** to **court-sponsored classical genres** like **Dhrupad**.
- This treatise laid the groundwork for later scholars and performers, influencing both **music theory** and **pedagogy** for generations in North India.

Conclusion

Among the figures listed, it was **Raja Man Singh of Gwalior** who provided the **scholarly and institutional support** necessary for the compilation of *Man Kautuhal*, a foundational treatise on Indian music. His reign saw the flourishing of both theoretical and practical aspects of classical music, making him one of the earliest and most significant royal patrons of Hindustani musical literature.

Therefore, the correct answer is: Raja Man Singh of Gwalior (Option 1).

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14. Answer: a

Explanation:

The correct answer is: **Option 1 – butane > cyclohexane > pentane > hexane**

What Is the Octane Number?

- The **octane number** (or **octane rating**) is a standard measure of a fuel's **ability to resist knocking or pinging** during combustion, caused by the air-fuel mixture detonating prematurely in the engine. The **higher the octane number**, the **greater the resistance to knocking**, making the fuel **more suitable for high-compression engines**.
- Octane number depends on the **structure** of the hydrocarbon:
- **Branched alkanes** have higher octane numbers.
- **Straight-chain alkanes** have lower octane numbers.
- **Cyclic alkanes** generally fall **in-between**, but closer to branched ones.
- **Shorter chains** typically resist knocking better than longer ones.

Octane Ratings of the Given Compounds

Let's examine the relative **octane numbers** of the four hydrocarbons:

Compound	Structure Type	Approximate Octane Number	Explanation
Butane (C_4H_{10})	Branched alkane (n-butane and isobutane)	**~92–94**	High due to small size and branching potential
Cyclohexane (C_6H_{12})	Cyclic alkane	**~83**	Higher than straight chains due to ring strain reducing premature combustion
Pentane (C_5H_{12})	Straight-chain alkane	**~62**	Linear structure; more prone to knocking
Hexane (C_6H_{14})	Straight-chain alkane	**~48**	Longer straight chain = lower resistance to knocking

Correct Order:

Butane > Cyclohexane > Pentane > Hexane

Why This Order?

- **Butane**, especially **isobutane (methylpropane)**, has a **high octane rating** because it's **short and branched**, both of which improve anti-knock properties.
- **Cyclohexane**, being cyclic, is more stable under combustion than straight-chain hydrocarbons of similar size.
- **Pentane and hexane** are straight-chain alkanes. As the chain length increases (from C_5 to C_6), the octane number decreases due to an increased likelihood of early detonation.

Why Other Options Are Incorrect

Option	Why It's Incorrect
2 (butane > pentane > cyclohexane > hexane)	Places **cyclohexane below pentane**, which is incorrect; cyclohexane has a higher octane number.
3 (butane > pentane > hexane > cyclohexane)	Places **cyclohexane at the bottom**, which is factually incorrect.
4 (cyclohexane > butane > pentane > hexane)	While cyclohexane is high, **butane has a higher octane number**, especially its branched isomer.

Final Conclusion

Based on molecular structure and experimental values, the correct order of octane numbers is:

Butane > Cyclohexane > Pentane > Hexane

Hence, the correct answer is: Option 1.

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15. **Answer: a**

Explanation:

What Is Pulse?

- A **pulse** is the **palpable rhythmic expansion and recoil of arteries** that occurs as blood is ejected from the heart during each **cardiac cycle**. It is most commonly felt at superficial arteries like the **radial artery** (wrist), **carotid artery** (neck), or **brachial artery** (upper arm).

Source of the Pulse: Origin and Transmission

- The **root cause** of the pulse is the **rhythmic contraction (systole) and relaxation (diastole)** of the **heart's chambers**, particularly the **left ventricle**. During systole,

blood is **forcefully pumped into the aorta**, causing a **pressure wave** to travel along the arterial walls. This wave is what we perceive as the **pulse**.

- So, while the **pulse is felt in arteries**, it is **generated by the pumping action of the heart's chambers**—especially the left ventricle.

Step-by-Step Process

- **Left ventricular systole (contraction)** forces blood into the **aorta**.
- The **aortic walls expand** to accommodate this surge of blood.
- A **pressure wave** is generated and travels through the arterial system.
- The **arteries recoil** during diastole (relaxation), helping maintain blood flow.
- This wave of expansion and recoil is felt as a **pulse** in superficial arteries.

Clarifying the Confusion

Option	Explanation	Correctness
Chambers of heart	The **source** of the pulse (i.e., left ventricular contraction) originates here.	✅ *Functionally correct as origin*
Valves in veins	These prevent backflow of blood in veins. No role in pulse generation.	❌ Incorrect
Aorta and main arteries	These **transmit** and make the pulse **palpable**, but **do not generate** it themselves.	✅ *Correct in terms of site of detection*
Valves of heart	Ensure unidirectional flow of blood; do not produce the pressure wave associated with pulse.	❌ Incorrect

✅ Summary Table

Parameter	Structure Involved	Role in Pulse
Pulse Origin	**Left ventricle** (heart chamber)	Generates pressure wave through contraction
Pulse Transmission	**Aorta and arteries**	Carry and transmit pulse to peripheral sites
Pulse Palpation Site	**Superficial arteries**	Radial, carotid, brachial arteries
Pulse Regulation	**Heart rate & arterial tone**	Affected by autonomic nervous system

Conclusion

While the **pulse is physically felt in the arteries**, it is ultimately caused by the **contraction and relaxation of the chambers of the heart**, especially the **left ventricle**. Therefore, it is valid to state that **the chambers of the heart** are responsible for producing the pulse.

Hence, Option 1 – Chambers of heart – is correct when referring to the origin of the pulse phenomenon.

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16. Answer: a

Explanation:

The correct answer is ***Varaha Cave***.

⭐ Key Points

Mamallapuram's Cave Temples

- Mamallapuram, also known as Mahabalipuram, is renowned for its rock-cut caves and intricately carved temples. It is located on the Coromandel Coast of the Bay of Bengal, in the state of Tamil Nadu, India.

- The **Varaha Cave Temple** is a notable example of Indian rock-cut architecture from the 7th century. It is one of the finest testimonials to the ancient Vishwakarma Sthapathis (architects).
- This temple is dedicated to Lord Vishnu's incarnation as a Varaha (boar). The temple features exquisite carvings of mythological themes, including panels depicting Lord Vishnu as Varaha.
- The **royal portraits** found in the Varaha Cave are significant for their historical and artistic value. They are believed to portray King Simhavishnu and Mahendravarman I, Pallava kings who played pivotal roles in the development of the region.
- The artwork in the Varaha Cave Temple not only showcases the skill of the Pallava sculptors but also provides insight into the religious and cultural milieu of the time.

Hence, the statement that the royal portraits of Simhavishnu and Mahendravarman are found in the Varaha Cave Temple is correct.

⭐ Additional Information

- The **Pallava Dynasty**, ruling from the 3rd century CE to the 9th century CE, is known for its contribution to art, architecture, and poetry in South India. The dynasty's patronage of arts led to the creation of significant landmarks like the temples and sculptures in Mamallapuram.
- Mamallapuram is a UNESCO World Heritage Site, recognized for its rock-cut caves, monolithic temples (rathas), giant open-air reliefs (such as the Descent of the Ganges or Arjuna's Penance), and temple complexes like the Shore Temple.
- The **Varaha Cave Temple**, along with others in Mamallapuram, represents a critical phase in the architectural evolution that would influence later South Indian temple architecture.
- These monuments are significant not only for their historical value but also for their contributions to the study of ancient Indian art, culture, and religion. They reflect the religious harmony of the time, with temples dedicated to various deities, including Vishnu, Shiva, and Durga.

17. **Answer: b**

Explanation:

The correct answer is ***1 and 2 only.***

⭐ **Key Points**

- The **Sugamya Bharat Abhiyan**, also known as the Accessible India Campaign, is a program initiated by the **Department of Empowerment of Persons with Disabilities**, under the Ministry of Social Justice and Empowerment.
  - It focuses on enhancing the accessibility of public buildings, transport, and information & communication technology (ICT) ecosystem for persons with disabilities. ***Hence, statement 1 is correct.***
- The primary aim of this program is to **build an inclusive society** where persons with disabilities have equal access to opportunities and services, aligning with the principles of the Rights of Persons with Disabilities Act, 2016.
  - This initiative works towards ensuring accessibility in public spaces, transportation systems, and information technology. ***Hence, statement 2 is correct.***
- While the campaign focuses on creating a barrier-free environment, **it does not directly deal with the provision of pensions** for persons with disabilities.
  - Pensions and financial assistance for persons with disabilities are managed through other schemes and policies by the government. ***Hence, statement 3 is incorrect.***

⭐ **Additional Information**

- The **Rights of Persons with Disabilities Act, 2016** is a significant piece of legislation in India that aims to secure and enhance the rights and entitlements of persons with disabilities.
  - It includes provisions for accessibility, employment, education, social security, and legal capacity for persons with disabilities, highlighting the government's commitment to an inclusive society.
- The **Department of Empowerment of Persons with Disabilities** plays a crucial role in implementing the policies and schemes designed for the welfare of

persons with disabilities, including the Sugamya Bharat Abhiyan.
    - Its efforts are crucial for achieving the goals set under the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD), to which India is a signatory.
- Accessibility and inclusivity initiatives like the **Sugamya Bharat Abhiyan** are essential for creating a society that accommodates all its members, including those with disabilities, ensuring they can participate fully in all aspects of life.

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18. Answer: a

Explanation:

The correct answer is ***Mg > Al > Zn > Fe.***

⭐ **Key Points**

Reactivity with HCl

- The reactivity of metals with hydrochloric acid (HCl) depends on their position in the reactivity series. The **reactivity series** is a list of metals arranged in order of decreasing reactivity.
- **Magnesium (Mg)** is more reactive than aluminum (Al), zinc (Zn), and iron (Fe) with HCl. This is because magnesium is higher up in the reactivity series.
- **Aluminum (Al)**, though protected by an oxide layer, reacts with HCl once this layer is penetrated, making it more reactive than zinc and iron.
- **Zinc (Zn)** reacts with HCl to form zinc chloride ($ZnCl_2$) and hydrogen gas (H_2), but its reactivity is less than Mg and Al.
- **Iron (Fe)** is the least reactive among the given metals with HCl, reacting to form iron(II) chloride ($FeCl_2$) and hydrogen gas.

⭐ **Additional Information**

- The **reactivity series** is an essential concept in chemistry that predicts the outcome of reactions between metals and other substances. It helps in understanding which metal can displace another in a chemical reaction.

- **Hydrochloric acid (HCl)** is a strong acid that reacts with metals above hydrogen in the reactivity series to produce salt and hydrogen gas.
- The reaction of metals with HCl is an example of a **single displacement reaction**, where a more reactive metal displaces a less reactive metal from its compound.
- Understanding the reactivity of metals with acids like HCl is crucial in various applications, including **metal extraction, corrosion prevention, and manufacturing of chemicals**.
- The protective oxide layer on aluminum makes it less reactive initially, but once this layer is removed or penetrated, aluminum becomes quite reactive due to its relatively high position in the reactivity series.

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19. **Answer: b**

Explanation:

The correct answer is ***proteins.***

⭐ Key Points

Thermal Denaturation of Proteins in Eggs

- The process of cooking eggs involves **heating**, which causes the **transparent liquid portion** around the yolk to turn **solid and become turbid white**. This transformation is a result of the **thermal denaturation of proteins**, specifically the egg white proteins such as ovalbumin.
- Thermal denaturation is a process where **proteins lose their tertiary and secondary structure** due to the application of heat, leading to the **unfolding** of the protein molecules.
- As the proteins unfold, they **expose their hydrophobic regions** to water, which causes them to **aggregate** and form a solid structure. This is what causes the egg whites to turn from liquid to solid.
- The primary protein in egg white, **ovalbumin**, constitutes about **54%** of the protein content and is the main component responsible for the coagulation and whitening effect.

- **Denaturation** is not limited to the application of heat. It can also occur due to mechanical action, pH changes, or the presence of certain chemicals, but in the context of cooking eggs, heat is the primary factor.

Hence, statement 2 is correct.

⭐ Additional Information

- Proteins are **large biomolecules**, or macromolecules, consisting of one or more long chains of amino acid residues. They perform a vast array of functions within organisms, including catalyzing metabolic reactions, DNA replication, responding to stimuli, and transporting molecules from one location to another.
- Eggs are considered a **complete protein source**, meaning they provide all nine essential amino acids necessary for the human diet. This makes them an important food source globally.
- The **denaturation of proteins** is not only crucial in cooking but also in biological processes and the manufacturing of pharmaceuticals, where control of protein folding and structure is essential.
- **Ovalbumin**, along with other proteins like ovotransferrin and ovomucoid, contributes to the unique cooking properties of eggs, making them versatile ingredients in culinary arts.

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20. Answer: b

Explanation:

The correct answer is *2.*

⭐ Key Points

Namdev and His Contributions

- Namdev, a prominent **Bhakti saint**, played a significant role in shaping the Bhakti movement in India.
- He is known for his efforts in **transmitting the Bhakti tradition from the southern part of India to the north**, thereby creating a bridge between the two regions'

spiritual cultures.***Hence, statement 1 is correct.***

- As a proponent of Bhakti, Namdev emphasized the importance of a **personal and direct relationship with God**, bypassing the need for rituals and caste distinctions.
- His teachings and poetry often spoke against caste discrimination, advocating for **egalitarianism and universal brotherhood**.***Hence, statement 2 is correct.***
- Contrary to the claim in the question, Namdev was **not a follower of Kabir**. In fact, it is believed that Kabir, who lived in the 15th century, was influenced by Namdev's work. Namdev preceded Kabir, making it historically inaccurate to label him as a follower of Kabir. ***Hence, statement 3 is incorrect.***
- ***Hence, two statements are correct.***

⭐ Additional Information

- Namdev's poetry and devotional songs, known as **Abhangas**, are a significant part of Marathi and Sikh sacred literature.
  - His works are included in the **Guru Granth Sahib**, the holy scripture of Sikhism.
- The Bhakti movement, to which Namdev contributed significantly, was a devotional trend that emphasized **love and devotion to God** as the path to salvation.
  - This movement challenged the traditional caste system and rituals, promoting a more personal and direct approach to spirituality.
- Namdev's legacy is not just limited to his poetry but also extends to his impact on the **cultural and religious life of India**, promoting values of devotion, equality, and love beyond societal barriers.

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21. Answer: c

Explanation:

The correct answer is ***Option 3.***

⭐ Key Points

- The Non-Cooperation Movement, launched under the leadership of Mahatma Gandhi, aimed at resisting British rule in India through non-violent means.
- **The Congress organization was to reach down to the village and the Mohalla level:** This was indeed a part of the action programme of the Non-Cooperation Movement, aimed at spreading the message and involving more people at the grassroots level.
    - This approach was to ensure mass participation and create a structure that could mobilize opinion and resources at the local level. **Hence, this statement is incorrect.**
- **Boycott of government affiliated schools and colleges:** This was a key aspect of the Non-Cooperation Movement. The idea was to reject British institutions and establish national schools and colleges that would foster a sense of nationalism and self-reliance among Indians.
    - The boycott extended to colleges, schools, and other institutions that were seen as symbols of British authority. **Hence, this statement is incorrect.**
- **Taking control of the law and order machinery of the State by the Congress Working Committee:** This was not a part of the action programme of the Non-Cooperation Movement. The movement focused on non-violent protest and civil disobedience, and taking control of the state's law and order machinery would have contradicted its core principles.
    - Such an action would have implied a direct confrontation with the British authorities, which was not the strategy of the Non-Cooperation Movement. **Hence, this statement is correct.**
- **Surrender of titles and honours given by the government:** Encouraging Indians to surrender titles and honours conferred by the British government was a significant part of the Non-Cooperation Movement's strategy to undermine the legitimacy of British rule.
    - This action symbolized the rejection of British recognition and the quest for self-respect and independence. **Hence, this statement is incorrect.**

⭐ Additional Information

- The **Non-Cooperation Movement** marked the transition of Indian nationalism from a middle-class to a mass base, involving various sections of Indian society.

- It laid the foundation for future mass movements and was a critical step towards full independence. The strategy of non-violent non-cooperation influenced several other national liberation movements across the world.
- The movement also saw the rise of new leaders who would go on to play pivotal roles in India's struggle for freedom, and it significantly weakened British control over the Indian economy and administration.
- Despite its suspension in 1922 following the Chauri Chaura incident, the Non-Cooperation Movement's impact on the Indian freedom struggle was profound, setting the stage for subsequent campaigns against British rule.

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22. Answer: b

Explanation:

The correct answer is **Option 2.**

⭐ **Key Points**

Why Methanol is Toxic?

- Methanol, also known as wood alcohol, is a toxic chemical that, when ingested, inhaled, or absorbed through the skin, can lead to serious health complications and potentially death.
- The primary reason for its toxicity is its metabolism within the human body, where **methanol is oxidised to methanal (formaldehyde)** by liver enzymes.
- Formaldehyde is highly toxic and can cause **protein coagulation**. This means it can **denature proteins, leading to cellular dysfunction and cell death**.
- The toxic effects of methanol poisoning can include visual disturbances, headaches, dizziness, and in severe cases, coma, and death.
- Treatment for methanol poisoning includes the administration of ethanol or fomepizole, which have a higher affinity for the alcohol dehydrogenase enzyme, thus preventing the metabolism of methanol to its toxic metabolites.

Hence, statement 2 is correct.

⭐ **Additional Information**

- **Methanol** is often used in industrial applications, including as a solvent and antifreeze. Its use in homemade alcoholic beverages can lead to outbreaks of poisoning.
- The body metabolizes methanol using the enzyme **alcohol dehydrogenase**, which also metabolizes ethanol, the type of alcohol typically found in alcoholic beverages. This is why ethanol is used as an antidote because it competes with methanol for the same enzyme, reducing the rate at which methanol is metabolized into toxic compounds.
- Healthcare providers may also use **hemodialysis** to remove methanol and its metabolites from the blood of affected individuals.
- **Preventive measures** include ensuring industrial methanol is denatured and properly labeled to prevent accidental ingestion and implementing strict regulations on alcoholic beverage production.

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23. Answer: d

Explanation:

The correct answer is ***Neither 1 nor 2.***

⭐ Key Points

- The **GDP deflator** is a measure of the level of prices of all new, domestically produced, final goods and services in an economy in a year. It is not confined to a fixed basket of goods and services but applies to all goods and services produced domestically. ***Hence, statement 1 is incorrect.***
- The **GDP deflator** can indeed be used to measure the **inflation rate** by showing how much prices have changed since a base year. It is calculated by dividing the nominal GDP by the real GDP and then multiplying by 100.
- The **real GDP** of the economy is calculated by adjusting the nominal GDP for inflation, and the GDP deflator is used in this process.
- Thus, indicating that the GDP deflator can be used to measure the real GDP is **correct**, but the statement as presented in the question is phrased to suggest that it cannot, which is **incorrect**. ***Hence, statement 2 is also incorrect.***

⭐ Additional Information

- The **GDP deflator** is considered a broad measure of inflation within the economy, as it reflects the prices of all goods and services produced domestically. It differs from the Consumer Price Index (CPI) in that CPI only measures the prices of goods and services bought by consumers, excluding investment goods and government services, and can include imported goods.
- **Nominal GDP** is the market value of goods and services produced in an economy, unadjusted for inflation. It is usually higher than real GDP in an inflationary environment because it reflects prices that have not been adjusted for inflation.
- **Real GDP** is adjusted for inflation and reflects the true value of goods and services in an economy, allowing for comparisons across different time periods without the distortion of changing price levels.

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24. Answer: a

Explanation:

The correct answer is *1*

⭐ Key Points

Medicine and Related Practices in Medieval India

- The **Graeco-Arabic tradition of medicine**, also known as Tibb-i-Yunani, was highly influenced by Greek and Arab medicinal knowledge. It was indeed quite similar to contemporary Persian medicine in terms of practice and theory.
    - This tradition was brought to India through Persian and Arab traders and scholars. **Hence, statement 1 is correct.**
- **William Harvey's discovery of the circulation of blood** was a significant advancement in medical science during the 17th century. Francois Bernier, a French traveler and physician, who spent a considerable time at the Mughal court, did discuss European medical discoveries with Indian scholars, including such groundbreaking works.

    - However, the statement as it stands lacks specific details on whether Harvey's discovery was explained in the given context. Despite this, Bernier's interactions indicate a flow of medical knowledge from Europe to India. **This makes the interpretation of statement 2 challenging without additional context, but it aligns with historical exchanges.**
- The **practice of smallpox inoculation**, known as variolation, was indeed present in India before it was introduced to the Western world. This practice was observed by European travelers and documented in their accounts.
    - However, referring to it as a part of "Yunani Ayurvedic texts" may be misleading, as Ayurveda and Yunani are two distinct traditional systems of medicine in India, with Ayurveda being indigenous and Yunani of Greek-Arabic origin. **Hence, statement 3's wording is imprecise**, as it conflates two separate traditions.

⭐ Additional Information

- The **Yunani system of medicine** emphasizes the balance of bodily fluids and their harmony for health, drawing from Hippocratic and Galenic principles.
    - It was enriched by the works of Persian and Arab physicians and became a part of the scholarly and practical medical landscape in medieval India.
- **Ayurveda**, meaning 'the science of life', is one of the world's oldest holistic healing systems. It was developed more than 3,000 years ago in India.
    - It is based on the belief that health and wellness depend on a delicate balance between the mind, body, and spirit.
- **Smallpox inoculation** in India predates Edward Jenner's development of the smallpox vaccine in the late 18th century. This practice demonstrated an early understanding of disease prevention through exposure to a controlled dose of the disease agent.
    - This historical instance highlights the rich tradition of medical knowledge and practices in India, contributing to global health advancements.

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25. **Answer: c**

Explanation:

The correct answer is ***3 only.***

⭐ Key Points

The Mauryan State and the Forest People

- The Mauryan Empire, one of the largest empires of the ancient world, had a unique relationship with the forest and its inhabitants.
    - The forest was not only a resource for timber, elephants, and other products but also a space that needed control and management.
- The statement about the forest people being subjected to new forms of political and economic dominance reflects the Mauryan efforts to integrate these regions into the empire's economy and control system. The necessity to assimilate them did lead to a change in attitude from exclusion to inclusion.
    - **Hence, statement 1 is correct.**
- Contrary to the assertion that the State recognized the forest produce as the sole monopoly of the forest people, historical evidence suggests that the Mauryan state exerted control over forest resources. The state saw these resources as vital to its economic and military strength, indicating a form of state monopoly rather than leaving it to the forest dwellers.
    - **Hence, statement 2 is incorrect.**
- The Mauryan state's concern for conservation, including the prohibition of forest burning, indicates an early form of state-led environmentalism. This was likely aimed at sustainable management of resources, which was essential for the empire's long-term interests.
    - **Hence, statement 3 is correct.**
- Utilizing forest people as troops, spies, and assassins indicates the strategic integration of these communities into the state apparatus. This reflects a pragmatic approach to governance and security by leveraging local knowledge and skills.
    - **Hence, statement 4 is incorrect** as it doesn't reflect a widespread or consistent policy across the Mauryan empire.

⭐ Additional Information

- The **Mauryan Empire**, under rulers like Chandragupta Maurya and Ashoka, showcased an advanced understanding of statecraft, economics, and

environmental management.
    - Its administration included a sophisticated bureaucracy and a network of spies for internal security.
- **Ashoka's Dhamma**, which emphasized moral and ethical governance, also included concerns for animal welfare and conservation efforts.
    - This reflects a holistic approach to governance, integrating ethical, environmental, and social dimensions.
- The Mauryan approach to forests and forest dwellers provides early examples of environmental management and the integration of peripheral communities into the state mechanism.
    - It underscores the complexity and sophistication of ancient Indian governance and environmental conservation strategies.

---

26. Answer: a

Explanation:

The correct answer is ***5-8% solution of acetic acid in water.***

⭐ Key Points

Vinegar Composition

- Vinegar is a versatile ingredient used in the culinary world, known for its acidic taste and preservative properties.
- It is primarily a **5-8% solution of acetic acid** in water, which is produced through the fermentation process.
- The process involves the fermentation of ethanol by acetic acid bacteria, which converts alcohol into acetic acid, giving vinegar its characteristic sour taste and smell.
- Aside from its use in cooking, vinegar is also used for cleaning, medicinal purposes, and as a natural preservative due to its antimicrobial properties.
- The concentration of acetic acid in vinegar can vary depending on the type and purpose, but for culinary uses, it typically ranges from 5% to 8%.

Hence, the correct option is 5-8% solution of acetic acid in water.

⭐ Additional Information

- **Fermentation Process:** The conversion of ethanol to acetic acid is a key step in vinegar production. This biological process is facilitated by Acetobacter, a genus of acetic acid bacteria.
- **Types of Vinegar:** There are various types of vinegar, including but not limited to, apple cider vinegar, white vinegar, balsamic vinegar, and rice vinegar. Each type has its unique flavor profile and uses in cooking.
- **Health Benefits:** Vinegar, particularly apple cider vinegar, is often touted for its potential health benefits, including weight loss, improved digestion, and blood sugar regulation. However, scientific evidence supporting these claims is mixed.
- **Cleaning and Disinfecting:** Due to its acidic nature, vinegar is an effective natural cleaner and disinfectant. It is commonly used in eco-friendly cleaning solutions for its ability to kill bacteria and remove odors.
- **Preservation:** The antimicrobial properties of vinegar make it an excellent preservative for pickling vegetables, fruits, and other food items, extending their shelf life by inhibiting the growth of bacteria.

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27. **Answer: a**

Explanation:

The correct answer is ***1 only.***

⭐ Key Points

Understanding Price Index and Inflation Rate Calculation

- A **price index** is a measure that examines the weighted average of prices of a basket of consumer goods and services, such as transportation, food, and medical care. It is calculated by taking price changes for each item in the predetermined basket of goods and averaging them.
  - **Changes in the price index over time** reflect the economy's inflation rate.
- The statement that a **price index captures the change in the average price of a constant basket of commodities** is accurate. It's a fundamental tool in the

economics field to measure the cost of living and inflation.
    - *Hence, statement 1 is correct.*
- Regarding the **inflation rate calculation**, it is derived from the price index by calculating the percentage change in the index over consecutive periods. If the price index moves from 100 to 110, the inflation rate for that period is calculated as [(110-100)/100] * 100 = 10%.
    - Similarly, if it then increases to 121, the inflation rate for the next period is [(121-110)/110] * 100 = 10%, not 21% as mentioned.
- The error in the second statement arises from a misunderstanding of how to calculate percentage changes correctly. The inflation rate is based on the **relative change from one period to the next**, not the absolute change from the base period.
    - *Hence, statement 2 is incorrect.*

⭐ Additional Information

- **Inflation** is a measure of the rate at which the overall level of prices for goods and services is rising, and, subsequently, purchasing power is falling. Central banks attempt to limit inflation, and avoid deflation, in order to keep the economy running smoothly.
- Understanding the **Consumer Price Index (CPI)** and **Wholesale Price Index (WPI)** are crucial for analyzing inflation. These indices provide insights into price changes from the perspective of consumers and wholesalers, respectively.
    - The CPI measures the average change over time in the prices paid by urban consumers for a market basket of consumer goods and services.
    - WPI measures the changes in the prices of goods sold and traded in bulk by wholesale businesses to other businesses.
- **Monetary policy** tools such as interest rates are often adjusted based on inflation trends to ensure economic stability.

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28. Answer: d

Explanation:

The correct answer is ***3 only.***

⭐ Key Points

Virashaivism

- Virashaivism, also known as Lingayatism, is a distinct Shaivite religious tradition in India. It originated in the 12th century in Karnataka.
- The **Virashaivas** worship **Shiva** in the form of a Linga, a symbol representing the universe and the formless God.
- The philosophy of Virashaivism is often described as **Shakti Vishishtadvaita**, which combines the concept of personal god with Advaita (non-duality) philosophy.
- **Ashtavarana** refers to the eight shields or coverings that protect and guide a devotee on the spiritual path within Virashaivism.
    - These include Guru (teacher), Linga (symbol of Shiva), Jangama (wandering monks), Padodaka (sanctified water), Prasada (sanctified offerings), Vibhuti (sacred ash), Rudraksha (sacred beads), and Mantra (sacred chant).
- The origin of Virashaivism is traditionally attributed to the five **Panchacharyas** (great teachers), not the individuals mentioned in statement 1. ***Hence, statement 1 is incorrect.***
- While Virashaivism does emphasize a unique philosophy, the term **Shaktivishishtadvaita** is not commonly used to describe it. The philosophy is more accurately described as a form of qualified non-dualism, focusing on the unity of the soul with the absolute (Shiva), but this specific term is not traditionally associated with it. ***Hence, statement 2 is incorrect.***
- The **Ashtavarana** are indeed an essential aspect of Virashaiva practice, emphasizing various forms of devotion and worship towards Shiva.***Hence, statement 3 is correct.***

⭐ Additional Information

- Virashaivism places a strong emphasis on **personal devotion** and a direct relationship with God, bypassing the traditional Hindu caste system and priesthood. This has made it a movement of social reform and spiritual democracy.

- The **Linga** worn by followers, usually around the neck, is a distinctive practice of Virashaivism, symbolizing the presence of Shiva at all times with the devotee.
- **Basavanna**, a 12th-century philosopher and statesman, is one of the most revered figures in Virashaivism. He propagated the principles of equality, community service, and devotion to Shiva.
- Virashaivism contributed significantly to the **Kannada literature** and culture, with Vachana Sahitya being a prominent literary form expressing mystical devotion.

---

29. Answer: c

Explanation:

The correct answer is **Panna**.

⭐ **Key Points**

- **Diamond mining** was carried out at **Panna** during the Delhi Sultanate period.
- **Panna** is a city located in the Indian state of Madhya Pradesh.
- It is famous for its **diamond mines**, particularly the **Panna Diamond Mines**, which have been operational since ancient times.
- The **Delhi Sultanate** period in Indian history spanned from the 13th to the 16th century, during which various regions were under the rule of Muslim sultans.
- While Panna gained prominence for its diamond mining activities, other regions such as Khambhat in Gujarat were also known for their involvement in the diamond trade.

⭐ **Additional Information**

- **Khambhat**
  - Khambhat, also known as **Cambay**, is located in the state of Gujarat, India.
  - It was a prominent trading center for diamonds and other precious stones during the medieval period, but it is not specifically mentioned in historical records for diamond mining during the Delhi Sultanate period.
- **Awadh**

- Awadh, also known as **Oudh**, is a historical region located in present-day Uttar Pradesh, India.
- It was known for its cultural and literary heritage but was not associated with diamond mining during the Delhi Sultanate period.

- Lakhnauti
  - Lakhnauti, also known as **Gaur**, was the capital of the Bengal region during the Delhi Sultanate period.
  - While Lakhnauti was a significant urban center and a hub of trade and commerce, it was not specifically known for diamond mining during that period.

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30. Answer: d

Explanation:

The correct answer is **Fall of temperature due to increased particulates.**

⭐ Key Points

- **Global dimming** is a phenomenon characterized by a **decrease in the amount of solar radiation reaching the Earth's surface**, which has been observed since the mid-20th century.
- This dimming effect is largely attributed to **increased particulates in the atmosphere**, which include pollutants like sulfates, soot, and other aerosols.
- These particulates increase the **Earth's albedo**, or the reflectivity of the Earth's surface and atmosphere, causing more of the **Sun's energy to be reflected back** into space rather than warming the Earth.
- As a result, global dimming can lead to a fall in temperature on Earth, counteracting some of the effects of global warming to an extent.
- It also has impacts on climate patterns, p**ossibly leading to altered precipitation patterns and reduced evaporation, affecting water resources and agricultural productivity**.

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31. **Answer: a**

Explanation:

The correct answer is ***1 only.***

⭐ **Key Points**

Analysis of Statements

- Most of India's reserves being held in the form of foreign currency is a reflection of the country's strategy to manage its international trade and foreign exchange rates effectively. Foreign currency reserves are crucial for a country's economic stability, allowing it to pay off international debts, influence exchange rates, and maintain confidence in its financial markets.
    - These reserves are typically held in major global currencies like the US dollar, Euro, and British Pound, among others. ***Hence, statement 1 is correct.***
- Contrary to the second statement, there is indeed a cost of holding foreign currency as reserves. This cost comes in various forms such as the opportunity cost of not investing these funds in potentially higher-yielding assets or domestic development projects. Additionally, there are actual costs associated with the management and security of these reserves.
    - Moreover, holding large amounts of a foreign currency can expose a country to currency risk if the value of that currency depreciates significantly. ***Hence, statement 2 is incorrect.***

⭐ **Additional Information**

- The composition of a country's reserves is a strategic decision influenced by factors like trade patterns, currency stability, and economic policy goals. **Foreign currency reserves** play a pivotal role in ensuring a country's economic security and are a key indicator of its ability to engage in international trade.
- **Opportunity cost** is a critical concept in economics and finance, referring to the potential benefits an individual, investor, or business misses out on when choosing one alternative over another. In the context of holding foreign currency reserves, the opportunity cost could be significant, especially for

developing countries that could have otherwise used these funds for infrastructure, education, or healthcare.

- **Currency risk,** also known as exchange rate risk, arises from the change in the price of one currency against another. Countries managing large foreign currency reserves must carefully navigate this risk to protect the value of their assets.
- Understanding the dynamics of **foreign exchange reserves** is crucial for policy-making, especially in developing economies that are more vulnerable to external shocks. These reserves serve as a buffer against economic crises, allowing countries to support their national currencies when needed.

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32. Answer: a

Explanation:

The correct answer is ***Vasugupta***.

⭐ **Key Points**

Kashmir Shaivism

- Kashmir Shaivism is a school of **Shivaism** that originated in Kashmir in the first half of the 1st millennium.
- It is characterized by its **highly metaphysical approach** and the emphasis on the recognition of the individual self as identical with the universal consciousness, Shiva.
- Vasugupta, the sage to whom the revelation of the **Shiva Sutras** was attributed, is considered the founder of this philosophical and religious tradition.
- The teachings of Kashmir Shaivism are deeply rooted in the concept of **non-dualism**, where the ultimate goal is the realization of one's self as part of the universal consciousness.
- It employs methods of **spiritual practice** (sadhana) that include meditation, mantra recitation, and rituals, aimed at awakening the spiritual power (kundalini) and realizing the unity of the individual soul (atman) with the supreme (Brahman).

Hence, the correct answer is Vasugupta.

⭐ Additional Information

- **Abhinavagupta** was another key figure in Kashmir Shaivism, known for his extensive writings that elaborated on and clarified the teachings of Vasugupta. His works are considered essential in understanding the intricacies of this tradition.
- The **Shiva Sutras** are a collection of seventy-seven aphorisms that serve as foundational texts for Kashmir Shaivism. They are said to have been revealed to Vasugupta in a dream or vision, etched on a rock.
- Kashmir Shaivism is known for its **Trika philosophy**, which refers to the triad of Shiva, Shakti, and Nara (the individual soul), emphasizing their intrinsic unity.
- This tradition also contributed significantly to the fields of **poetry, dance, and aesthetics** in Indian culture, offering profound insights into the nature of beauty and the arts as expressions of divine consciousness.
- The spiritual practices associated with Kashmir Shaivism are designed to transcend **ordinary consciousness** and experience the divine within the self, making it a highly introspective and transformative path.

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33. **Answer: a**

Explanation:

The correct answer is ***It orbits the Sun, about 15 lakh km away from the Earth.***

⭐ Key Points

James Webb Space Telescope (JWST)

- The **James Webb Space Telescope (JWST)** is a significant advance in space observatories, designed to provide a much deeper understanding of the universe.
- It is positioned at the **Second Lagrange Point (L2)**, which is nearly **1.5 million kilometers (about 15 lakh km) away from the Earth**, in the direction opposite to the Sun.

- This location allows the JWST to stay in line with the Earth as it orbits the Sun, providing a stable environment for observations.
- The telescope is equipped with a **large mirror** and **infrared capabilities**, enabling it to observe the universe with unprecedented clarity and depth.
- The JWST's mission includes exploring the universe's earliest galaxies, studying the formation of stars and planets, and investigating potential atmospheres of exoplanets for signs of life.
- **It does not orbit around the Earth** or the Moon, nor is it stationary in space. Its orbit around the L2 point allows it to maintain a constant distance from Earth and avoid the shadow, maximizing its observational efficiency.

Hence, the statement that It orbits the Sun, about 15 lakh km away from the Earth is correct.

⭐ Additional Information

- The **Lagrange Points** are positions in space where objects sent there tend to stay put relative to the rest of the system. L2 is one of five such points related to the Earth-Sun system, offering an ideal vantage for astronomical observatories like the JWST.
- The **deployment of JWST** was a complex process involving unfolding its sunshield, which is about the size of a tennis court, and its mirror, which is 6.5 meters in diameter, after reaching its destination in space. This process took several weeks to complete.
- The JWST is considered the **scientific successor** to the Hubble Space Telescope but with a much larger primary mirror and instruments that can observe in the infrared spectrum, allowing it to look further back in time than Hubble.
- The telescope was developed by **NASA** with significant contributions from the European Space Agency (ESA) and the Canadian Space Agency (CSA).
- The JWST will help scientists in the **study of the formation of the universe**, including the formation of the first galaxies, stars, and planetary systems, potentially leading to groundbreaking discoveries in astrophysics.

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34. Answer: a

Explanation:

The correct answer is ***Hexadecane.***

⭐ Key Points

Cetane Number and Hexadecane

- The term **cetane** refers to **hexadecane**, a straight-chain alkane with the chemical formula $C_{16}H_{34}$. It is a significant component in diesel fuel, where it serves as a standard measure for the fuel's ignition quality.
- The **cetane number** of a diesel fuel is a measure of its **ignition delay**, the time period between the start of injection and the start of combustion (ignition) of the fuel. Higher cetane numbers indicate fuels that ignite more quickly.
- Hexadecane, as a pure compound, has a **cetane number of 100** by definition, serving as a benchmark for comparing the ignition quality of diesel fuels.
- In diesel engines, fuels with **higher cetane numbers** are desirable as they lead to smoother engine operation, less engine noise, and reduced emissions of harmful substances.

Hence, the correct answer is Hexadecane.

⭐ Additional Information

- **Diesel fuels** are evaluated for various properties, including cetane number, **viscosity**, **volatility**, and **sulfur content**. These characteristics affect engine performance, efficiency, and emissions.
- The **ignition quality** of diesel fuel is critical for the efficient operation of an engine. Poor ignition quality can lead to incomplete combustion, higher emissions, and engine damage over time.
- Other compounds used in **comparing diesel fuel qualities** include **heptamethylnonane** (HMN), which has a cetane number lower than that of hexadecane, and is used to create a scale for measuring cetane numbers below 100.
- In addition to cetane number, the **energy content** and **cold flow properties** of diesel fuel are important for overall vehicle performance, especially in cold weather conditions.

35. **Answer: a**

Explanation:

The correct answer is ***The market mechanism over-produces a good that generates positive externality.***

⭐ Key Points

Analysis of the Given Statements

- In reality, the market mechanism often **under-produces goods that generate positive externalities**, not over-produces. This is because the social benefits of such goods exceed the private benefits, leading to less production than is socially optimal.
  - For instance, education and vaccinations provide benefits not only to the individual receiving them but also to society at large. ***Hence, the statement is incorrect.***
- **A cap and trade system** for pollution permits allows companies that can reduce pollution more cheaply to sell their extra permits to companies that find it more expensive to make reductions. This system can indeed help achieve a socially optimal level of pollution.
  - It leverages market mechanisms to reduce pollution in a cost-effective way. ***Hence, the statement is correct.***
- The **optimal amount of subsidy** for an activity that produces a positive externality is indeed the difference between the social and private benefits at the optimal level of production or consumption.
  - This subsidy is meant to encourage the production or consumption of goods that have positive externalities. ***Hence, the statement is correct.***
- **Tragedy of the Commons** is a situation in a shared-resource system where individual users acting independently according to their own self-interest behave contrary to the common good of all users by depleting or spoiling the resource through their collective action.
  - It is indeed an example of negative externality where individual actions have negative effects on the larger community. ***Hence, the statement is***

correct.

⭐ Additional Information

- **Positive Externalities** occur when the consumption or production of a good causes a benefit to a third party. Examples include education, public health initiatives, and research and development.
    - They lead to societal benefits that are not fully captured by the market price.
- **Negative Externalities** occur when the production or consumption of a good causes harm to a third party. Examples include pollution, noise, and congestion.
    - These are costs imposed on society that are not reflected in market prices.
- The concept of **Tragedy of the Commons** was introduced by Garrett Hardin in 1968. It highlights the conflict between individual interests and the common good in resource management.
    - This concept is often used to discuss environmental issues, such as overfishing, deforestation, and air pollution.
- **Cap and Trade Systems** are used to reduce pollutants by setting a maximum level of pollution (the cap), issuing permits for emissions, and allowing companies to buy and sell these permits.
    - It creates a financial incentive for reducing emissions and is a flexible approach for businesses to meet environmental standards.

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36. Answer: d

Explanation:

The correct answer is ***The Human Rights Council.***

⭐ Key Points

The Protection of Human Rights Act, 1993

- The **Protection of Human Rights Act, 1993** was enacted to provide for the constitution of a National Human Rights Commission (NHRC), State Human Rights Commissions in States and Human Rights Courts for better protection of human rights and for matters connected therewith or incidental thereto.
    - **The National Human Rights Commission (NHRC)** is a statutory body established in 1993 under this Act. It is responsible for the protection and promotion of human rights, defined by the Act as "rights relating to life, liberty, equality and dignity of the individual guaranteed by the Constitution or embodied in the International Covenants". **Hence, statement 1 is incorrect.**
    - **The State Human Rights Commission** operates at the state level with powers similar to those of the NHRC but restricted to their respective states. **Hence, statement 2 is incorrect.**
    - **Human Rights Courts** are designated for the speedy trial of violations of human rights. They are established at the district level, where a Sessions Judge or an Additional Sessions Judge is appointed as a Special Judge to preside over these courts. **Hence, statement 3 is incorrect.**
- The **Human Rights Council**, on the other hand, is not a body constituted under the Protection of Human Rights Act, 1993. It is an inter-governmental body within the United Nations system made up of 47 States responsible for the promotion and protection of all human rights around the globe. It was established by the United Nations General Assembly in 2006. **Hence, statement 4 is correct.**

⭐ **Additional Information**

- The **NHRC** and the **State Commissions** have been provided with broad powers to inquire into complaints or take suo moto action on issues relating to violations of human rights or negligence in the prevention of such violation by a public servant. They can also review the safeguards provided by or under the Constitution or any law for the time being in force for the protection of human rights and recommend measures for their effective implementation.
- The **Human Rights Council**, being a global body, plays a critical role in addressing situations of human rights violations worldwide and makes recommendations to the U.N. General Assembly for the development of international law in the field of human rights.

- The **Protection of Human Rights Act, 1993** is a significant piece of legislation in Indian law that reflects the country's commitment to the Universal Declaration of Human Rights and fulfills its treaty obligations under the International Covenant on Civil and Political Rights and the International Covenant on Economic, Social and Cultural Rights, to which India is a party.

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37. Answer: b

Explanation:

The correct answer is *1, 2, 3 and 4*

⭐ Key Points

Understanding Subatomic Particles

- **Electrons** are negatively charged particles that orbit the nucleus of an atom. They are a fundamental component of all atoms, playing a critical role in chemical reactions and electrical conductivity.
  - *Hence, statement 1 is correct.*
- **Protons** are positively charged particles found within the nucleus of an atom. Along with neutrons, protons determine the atomic mass and identity of an element.
  - *Hence, statement 2 is correct.*
- **Neutrons** are neutral particles that do not carry any charge and are found in the nucleus of an atom. They contribute to the mass of an atom and play a key role in the stability of the nucleus.
  - *Hence, statement 3 is correct.*
- **Muons** are elementary particles similar to electrons, with a negative electric charge and a spin of 1/2. However, they are around 207 times more massive than electrons. Despite not being part of the atom itself, muons are considered subatomic particles because they are involved in high-energy physics processes and can interact with atoms under certain conditions.
  - *Hence, statement 4 is correct.*

⭐ Additional Information

- The **study of subatomic particles** is a fundamental aspect of **physics**, particularly **quantum mechanics** and **particle physics**. It helps scientists understand the building blocks of matter and the forces that govern their interactions.
    - Discoveries of subatomic particles have led to significant advancements in technology, including nuclear energy, medical diagnostics (such as PET scans), and various applications in electronics.
- **The Standard Model of particle physics** provides a framework for understanding the fundamental particles and forces in the universe. It includes fermions (quarks and leptons, including electrons and muons) and bosons (gauge bosons and the Higgs boson), which mediate the fundamental forces.
    - Subatomic particles play crucial roles in the structure of matter, the interactions between particles, and the overall dynamics of the universe.
- **Accelerators and detectors** are essential tools in the study of subatomic particles. These devices allow scientists to observe and measure particles that are otherwise too small to detect, leading to breakthroughs in our understanding of the universe.
    - Experiments in particle physics often require large collaborations and facilities, such as the Large Hadron Collider (LHC) at CERN, where the Higgs boson was discovered.

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38. Answer: c

Explanation:

The correct answer is ***Jordan.***

⭐ Key Points

Geographical Location

- The **Arabian Peninsula** is a prominent peninsula in Southwest Asia, at the junction of Africa and Asia.
- **Kuwait, Oman,** and **Yemen** are countries located on the Arabian Peninsula, making them part of this geographic region.

- **Jordan**, however, is situated to the northwest of Saudi Arabia, making it not part of the Arabian Peninsula but rather part of the Levant region in the Middle East.
- The Arabian Peninsula is surrounded by the Red Sea to the west and southwest, the Persian Gulf to the northeast, and the Arabian Sea to the southeast.
- The significance of the Arabian Peninsula lies not only in its strategic geographical location but also in its rich oil reserves, making it a vital area of economic and geopolitical interest.

Hence, statement 3 is correct.

⭐ Additional Information

- The **Levant** is a geographical term that denotes a large area in the Eastern Mediterranean, which includes countries like Jordan, Lebanon, Israel, Palestine, and Syria.
- The Arabian Peninsula is mostly desert, with the **Rub' al Khali (Empty Quarter)** being one of the largest continuous sand deserts in the world.
- The region is historically significant as the **birthplace of Islam**, with the two holiest cities in Islam, Mecca and Medina, located in Saudi Arabia.
- Geopolitically, the Arabian Peninsula has been a focal point in global affairs due to its vast **petroleum and natural gas reserves**, influencing both regional and international politics.

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39. Answer: a

Explanation:

The correct answer is *Option 1.*

⭐ Key Points

Analyzing the Statements

- The Goods and Services Tax (GST) was introduced in India to consolidate multiple indirect tax levies into a single tax, aiming to make the tax system

more efficient and business-friendly.

- **Amendment 115 to the Constitution of India** does not exist in the context of GST. The relevant amendment for GST is the **101st Amendment Act of 2016**, which brought GST into effect. This statement is factually incorrect, making it the right answer by default. ***Hence, the highlighted statement is correct.***
- **Amendment 122 to the Constitution of India** also does not pertain to GST as mentioned. The correct constitutional amendment for GST is the 101st Amendment Act of 2016. However, the statement about **keeping only alcohol for human use outside the ambit of GST is accurate**. Alcohol for human consumption is indeed kept outside GST as per the provisions of the amended constitution.
- **Precious metals** being taxed at a specific rate under GST is subject to change based on decisions by the GST council. The statement provides a specific rate, which may vary and should be verified for the current rate. The GST Council has the authority to revise tax rates, including those on precious metals.
- The tax rate on **unworked diamond** is a specific detail that can be verified against current GST rate notifications. The tax rate on unworked or rough diamonds has been kept low to benefit the diamond processing industry in India.

⭐ Additional Information

- The **101st Amendment Act of 2016** is a landmark in the Indian tax system, introducing the Goods and Services Tax (GST) and thereby consolidating numerous central and state taxes into a single tax system to avoid the cascading effect of taxes.
- **Alcohol for human consumption, petroleum products** (like petrol, diesel, aviation turbine fuel, natural gas, and crude oil), and **electricity** are not covered under GST. These continue to be taxed as per the previous tax regime by state governments and the central government.
- The **GST Council**, a governing body comprising the Union Finance Minister as the chairperson and State Finance Ministers as members, oversees the GST implementation, including tax rates, exemptions, and the inclusion of goods and services under the GST ambit.
- GST aims to **eliminate the cascading effect of taxes** (tax on tax) and create a single national market, enhancing the efficiency of goods and services

production and distribution across the country.

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40. Answer: d

Explanation:

The correct answer is ***Article 32***.

⭐ Key Points

Understanding Article 32 of the Indian Constitution

- Article 32 of the Indian Constitution is regarded as the **"heart and soul"** of the Constitution by B. R. Ambedkar, one of its chief architects.
- It provides the **right to constitutional remedies**, allowing citizens to move the Supreme Court (or High Courts) for enforcement of their fundamental rights.
- Article 32 is a fundamental right in itself, making it a unique feature of the Indian Constitution.
- It empowers the Supreme Court to issue various types of writs - habeas corpus, mandamus, prohibition, quo warranto, and certiorari - for the enforcement of rights of individuals.
- The significance of Article 32 lies in its role as a protector of citizens' liberties against arbitrary and unchecked use of power by the state.
- **Dr. B.R. Ambedkar** emphasized its importance by stating that without Article 32, the Constitution would be reduced to nullity.

Hence, the statement that Article 32 is the 'heart and soul' of the Constitution of India is correct.

⭐ Additional Information

- **Article 15** prohibits discrimination on grounds of religion, race, caste, sex, or place of birth.
- **Article 21** guarantees the protection of life and personal liberty to every citizen.
- **Article 23** prohibits traffic in human beings and forced labor.

- These articles, alongside Article 32, form the core of the fundamental rights guaranteed by the Constitution of India.

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41. Answer: c

Explanation:

The correct answer is **quantum computers**.

⭐ **Key Points**

- A **qubit**, or **quantum bit**, is the fundamental unit of quantum information in quantum computing.
- Unlike a classic binary bit, which can exist in one of **two states (0 or 1)**, a qubit can exist simultaneously in multiple states due to quantum superposition.
- This property allows quantum computers to process a vast amount of information at once, making them potentially much more powerful than classical computers for certain tasks.
- Quantum entanglement, another quantum phenomenon, allows qubits that are entangled to be correlated with each other regardless of the distance separating them. This is integral for quantum computing and quantum cryptography.
- Current research and development in quantum computing are focused on harnessing these properties for applications in **cryptography, modeling, and solving complex computational problems** that are infeasible for classical computers.

⭐ **Additional Information**

- **Classical computers**
  - Classical computers use the traditional binary data system (bits), which can be either a 0 or a 1.
  - They are powerful for a wide range of tasks, including general-purpose computing and running of software applications, but are limited by binary processing for specific complex computations.
- **Classical cryptography**

- Relies on traditional mathematical computations for encryption and security.
- While quantum computers pose a threat to classical cryptography due to their potential to break existing encryption methods, classical forms are still widely used and effective for most current security needs.

- Lasers
  - Lasers emit light through a process of optical amplification based on the stimulated emission of electromagnetic radiation.
  - While they have applications in various areas of science and technology, including in creating quantum states for research, they do not inherently involve qubits or quantum computing.

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42. Answer: c

Explanation:

The correct answer is ***Both 1 and 2***.

⭐ Key Points

The Continent of Antarctica

- Antarctica is renowned for having the **highest average elevation** of all the continents. This is primarily due to the vast ice sheets that cover the majority of the continent. ***Hence, statement 1 is correct.***
- - **The average elevation of Antarctica is about 2,500 meters (8,200 feet),** making it the highest continent.
- **Mount Vinson** is recognized as the **highest peak in Antarctica**, standing at an elevation of 4,892 meters (16,050 feet) above sea level.
  - It is located in the Ellsworth Mountains, which are situated in the interior part of the Western Hemisphere portion of the continent. ***Hence, statement 2 is correct.***

⭐ Additional Information

- Antarctica is the **fifth-largest continent** and is nearly twice the size of Australia. It is the **southernmost continent** and is situated around the South Pole.
- It is covered by an **ice sheet** that contains **approximately 90% of the world's fresh water**. The thickness of the ice can average 1.9 kilometers (1.2 miles).
    - This vast ice sheet plays a critical role in the earth's climate, reflecting a significant amount of the sun's energy back into space.
- The continent is surrounded by the **Southern Ocean** and does not have a permanent population. It hosts researchers and scientists from around the world who study its environment and ecosystems.
- Antarctica is governed by the **Antarctic Treaty System**, which establishes the region as a scientific preserve and bans military activity on the continent.
    - The treaty was signed in 1959 and has been ratified by numerous countries.
- The **Antarctic climate** is extremely cold, making it the coldest continent. The lowest temperature ever recorded on Earth, -89.2°C (-128.6°F), was at Russia's Vostok Station in Antarctica.
- **Global warming** and climate change pose significant threats to Antarctica's ice sheets, which could have global implications for sea-level rise and climate patterns.

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43. Answer: a

Explanation:

The correct answer is ***1 only.***

⭐ Key Points

The Report of Tendulkar Committee on Poverty Estimates

- The Tendulkar Committee was constituted by the Planning Commission of India in 2005, with the objective of reviewing the methodology for poverty estimation and reporting in India.
- The Committee **used an all-India urban poverty line basket** as a reference to derive both rural and urban poverty levels. This approach was adopted to

account for the differences in the cost of living and to ensure a uniform poverty threshold across urban and rural areas.
    - **Hence, statement 1 is correct.**
- Contrary to previous methods, the **Tendulkar Committee moved away from anchoring the poverty line strictly to calorie intake**. Instead, it adopted a broader consumption-based approach. This included spending on food, education, health, and clothing among others, thereby providing a more comprehensive measure of poverty.
    - **Hence, statement 2 is incorrect.**

⭐ Additional Information

- The **Tendulkar Committee's methodology** marked a significant shift in the way poverty was measured in India, making the poverty estimates more comprehensive by including a **wider range of consumption items**.
- The Committee's approach was also significant for focusing on **poverty alleviation** strategies that went **beyond mere calorie consumption** to include factors affecting living standards such as **health, education, and sanitation**.
- The **Planning Commission**, now replaced by the **NITI Aayog**, played a pivotal role in formulating India's five-year plans and in efforts aimed at reducing poverty through various schemes and measures.

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44. Answer: c

Explanation:

The correct answer is ***Justice K. S. Puttaswamy***.

⭐ Key Points

Right to Privacy as a Fundamental Right

- The **Right to Privacy** was recognized as a Fundamental Right under the Indian Constitution by the Supreme Court in a **landmark judgement in August 2017**.
- This historic verdict was the outcome of a **Writ Petition (Civil) No 494 of 2012** filed by **Justice K. S. Puttaswamy (Retd.)** and another versus Union of India and

others.
- The judgement was passed by a nine-judge bench of the Supreme Court, which unanimously held that the Right to Privacy is protected as an intrinsic part of the **Right to Life and Personal Liberty under Article 21** and as a part of the freedoms guaranteed by Part III of the Constitution.
- The court overruled its earlier decisions in the **M.P. Sharma and Kharak Singh cases**, where it was held that privacy is not protected under the Indian Constitution.

Hence, the statement that Justice K. S. Puttaswamy filed the Writ Petition leading to the recognition of the Right to Privacy as a Fundamental Right is correct.

⭐ Additional Information

- The **Right to Privacy** is considered a fundamental aspect of human dignity and autonomy, which is essential for the exercise of other rights and freedoms.
- The judgment in **Justice K. S. Puttaswamy (Retd.) vs Union Of India case** has far-reaching implications on various aspects of law and governance, **including data protection, surveillance, personal autonomy, and decision-making.**
- This judgement is a testament to the **evolving nature of constitutional law** in India, reflecting the changing societal values and technological landscapes.

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45. **Answer: b**

Explanation:

The correct answer is ***DNA molecules.***

⭐ Key Points

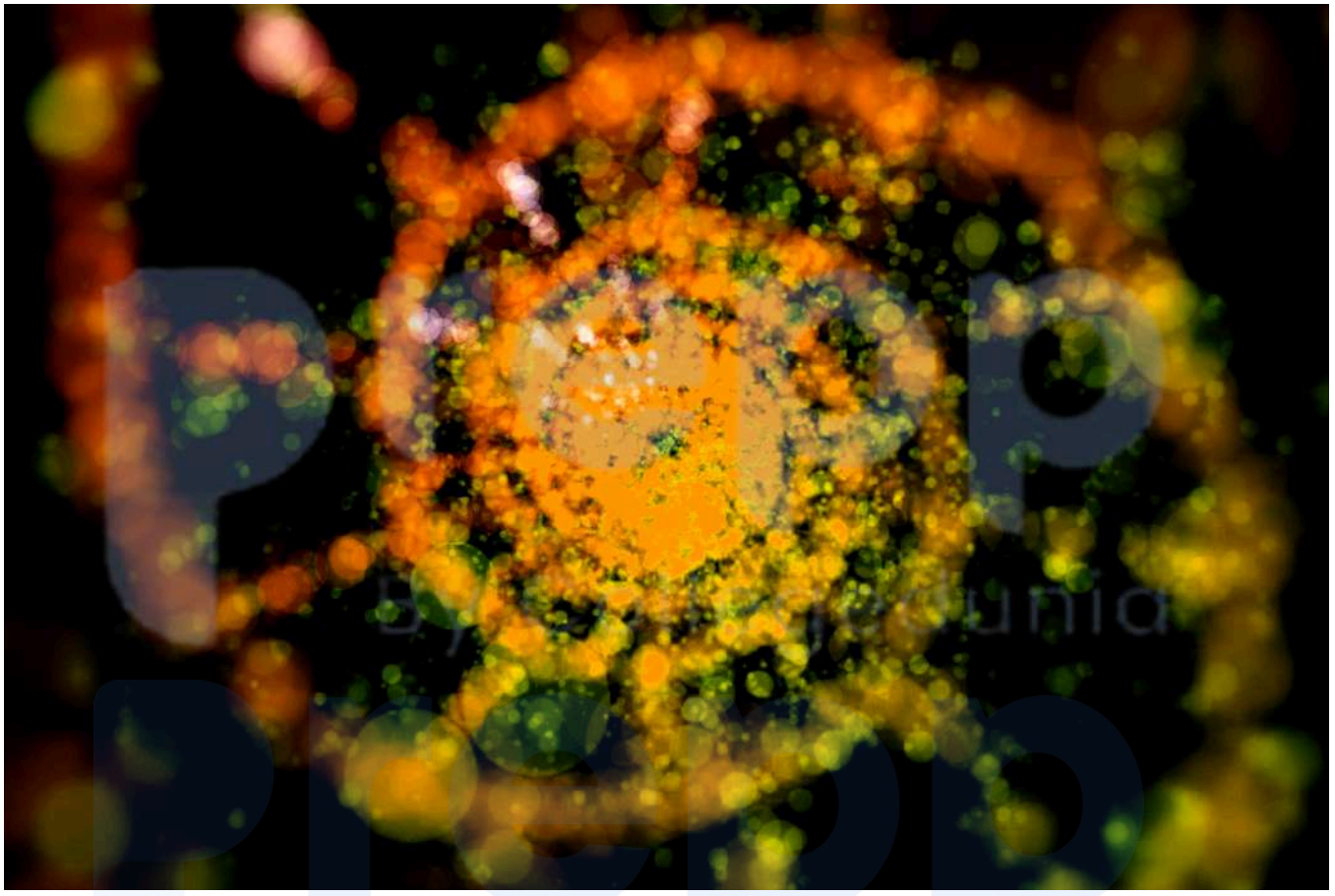
Photo 51

- Photo 51 is an **X-ray diffraction image** of crystallized DNA.
- It was taken by **Rosalind Franklin** and **Raymond Gosling** at King's College London in 1952.

- The image played a **crucial role** in the discovery of the DNA double helix structure by **James Watson and Francis Crick**.
- The **unique pattern** in Photo 51 indicated that DNA was a **double helix**.
- Franklin's **contributions were initially not fully acknowledged**, but her work has since been recognized as pivotal in understanding DNA's structure and function.

⭐ Additional Information

- **James Watson, Francis Crick, and Maurice Wilkins** were awarded the **Nobel Prize in Physiology or Medicine in 1962** for their discoveries concerning the molecular structure of nucleic acids and its significance for information transfer in living material.
- **Rosalind Franklin** had passed away by the time the Nobel Prize was awarded, and the Nobel Prize is not awarded posthumously.
- The discovery of DNA's structure **opened the doors** to molecular biology, allowing scientists to understand how DNA functions as the genetic material.
- DNA's double helix structure is essential for its replication and function in **genetic inheritance**.
- The **X-ray crystallography** technique used by Franklin has since become a fundamental tool in molecular biology to determine the 3D structures of biological molecules.



46. **Answer: a**

Explanation:

The correct answer is ***Nilgiri***.

⭐ **Key Points**

Nilgiri Biosphere Reserve

- The **Nilgiri Biosphere Reserve** is a unique and fascinating region in the Western Ghats and Nilgiri Hills in South India. It is renowned for its ecological significance and biodiversity conservation.
- It spans across three states in India: **Tamil Nadu, Karnataka, and Kerala**, making it the first and most prominent biosphere reserve in India to cover multiple states.

- The reserve encompasses a protected area of over **5,520 square kilometers**, providing habitat for numerous species of flora and fauna, including several endangered and endemic species.
- It was declared as a **UNESCO World Biosphere Reserve** in **2000**, highlighting its global importance for conservation and sustainable development.
- The region is characterized by **varied ecosystems**, ranging from tropical moist forests to montane grasslands, which support a rich diversity of life forms.
- It plays a crucial role in the conservation of several key species like the **Tiger, Asian Elephant, and the Nilgiri Tahr**.
- **Cultural significance** is also paramount in the Nilgiri Biosphere Reserve, with indigenous communities such as the Toda, Kurumba, and others, maintaining their traditional lifestyles that are closely linked with the natural environment.

Hence, the statement regarding Nilgiri Biosphere Reserve spreading over three States in India is correct.

⭐ Additional Information

- **Biosphere Reserves** are areas of terrestrial and coastal ecosystems promoting solutions to reconcile the conservation of biodiversity with its sustainable use. They are internationally recognized, nominated by national governments and remain under the sovereign jurisdiction of the states where they are located.
- UNESCO's **Man and the Biosphere (MAB) Programme** works with international governmental and non-governmental organizations, as well as local communities, to develop Biosphere Reserves as sites for testing interdisciplinary approaches to understanding and managing changes and interactions between social and ecological systems, including conflict prevention and management of biodiversity.
- The **Western Ghats**, where the Nilgiri Biosphere Reserve is located, is recognized as one of the world's eight **'hottest hotspots'** of biological diversity.

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47. **Answer: a**

Explanation:

The correct answer is ***1 and 2 only.***

⭐ Key Points

Central Government Taxes on Petroleum Products

- The taxation system on petroleum products in India is complex, with various components designed to meet different fiscal objectives.
- **Basic Excise Duty** is levied by the central government. It forms a significant part of the central excise duty on petroleum products.
    - This component is **shareable with the States**, making it a crucial revenue source for them as well. ***Hence, statement 1 is incorrect.***
- **Additional Excise Duty**, also known as the Road and Infrastructure Cess, is levied over and above the basic excise duty.
    - This duty is **not shareable with the States**, and is earmarked for financing infrastructure projects. ***Hence, statement 2 is correct.***
- **Special Additional Excise Duty** is another layer of duty imposed to generate additional revenue.
    - Similar to the Additional Excise Duty, it is **not shared with the States**. However, for the purpose of this question and its specific options, this statement's alignment with the options provided needs clarification as the correct answer suggests that Special Additional Excise Duty is not included in the non-shareable components with States in this context. ***Hence, statement 3 is considered in a different context in the given options.***

⭐ Additional Information

- The distribution of revenue from the taxation of petroleum products between the central and state governments is a critical aspect of India's fiscal federalism.
- **Fiscal Federalism** in India aims to ensure both central and state governments have adequate resources to fulfill their responsibilities. This system is governed by the recommendations of the Finance Commission and the Constitution of India.
    - The **Finance Commission** plays a pivotal role in defining the financial relations between the centre and the states, including recommendations

on the distribution of tax revenues.

- Petroleum products are among the largest sources of revenue for both the central and state governments. The way these taxes are structured and shared impacts the financial health of both levels of government.
- The **Goods and Services Tax (GST)** does not currently apply to petroleum products, making excise duties and Value Added Tax (VAT) the primary taxes on these products.
- The central government's decision on which components of the excise duty are shared with or withheld from the states can significantly influence state finances and central-state fiscal relations.

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48. Answer: b

Explanation:

The correct answer is ***2 only.***

⭐ **Key Points**

- The **Forty Second Amendment** to the Constitution of India, enacted in 1976, is one of the most comprehensive amendments, often referred to as the "Mini Constitution" due to the extensive changes it made to the Constitution.
- One of the key features of this amendment was the alteration to the Preamble of the Constitution. However, the amendment did **not substitute** 'Liberty of thought, expression, belief' with 'Liberty of thought, expression, belief, faith and worship'. This part of the Preamble remained unchanged.
    - As a result, **statement 1 is incorrect.**
- The amendment did indeed **substitute** 'Unity of the Nation' with 'Unity and Integrity of the Nation' in the Preamble. This change was aimed at emphasizing the importance of maintaining not just unity but also the integrity of the nation, reflecting a commitment to national cohesion and the territorial integrity of India.
    - **Hence, statement 2 is correct.**

⭐ **Additional Information**

- The **42nd Amendment Act** of 1976 is also known for its role in strengthening the central government, **enhancing the powers of the Prime Minister, and making the directive principles more prominent than the fundamental rights**.
- It also added three new words to the **Preamble: Socialist, Secular, and Integrity**, thereby expanding the objectives of the Indian Republic.
- The amendment **affected almost all parts** of the Constitution, including the **Preamble, the fundamental rights, the directive principles, the executive, the judiciary, and the legislative relations between the Union and the states**.

---

49. Answer: c

Explanation:

The correct answer is ***100 GeV.***

⭐ Key Points

Understanding the Higgs Boson's Mass

- The **Higgs boson** is a fundamental particle associated with the Higgs field, which is responsible for giving mass to other particles.
- The discovery of the Higgs boson at the **Large Hadron Collider (LHC)** by the ATLAS and CMS experiments in 2012 confirmed the existence of the Higgs field.
- The rest mass of the Higgs boson is estimated to be around **125 GeV (Giga electron Volts)**, which is equivalent to approximately **100 GeV** when considering the range within which this value is expected to fall.
- This mass is significantly higher than that of other subatomic particles, highlighting the unique nature of the Higgs boson.

⭐ Additional Information

- The **Higgs field** is an energy field that is thought to exist throughout the universe. The interaction of particles with this field is what gives them mass.
- The concept of the Higgs field and Higgs boson is a central part of the **Standard Model of particle physics**, which is a theory that describes the fundamental particles and forces that govern the universe.

- The **Large Hadron Collider (LHC)** is the world's largest and most powerful particle collider, located at CERN (European Organization for Nuclear Research). It was instrumental in the discovery of the Higgs boson.
- The discovery of the Higgs boson was a monumental achievement in physics and earned the 2013 Nobel Prize in Physics for François Englert and Peter Higgs, who had theorized the existence of the Higgs boson in the 1960s.

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50. Answer: a

Explanation:

The correct answer is *Option 1*.

⭐ Key Points

Analysis of the Given Statements

- **Chakrashila Wildlife Sanctuary: Assam** - This sanctuary is indeed located in Assam and is well-known for its population of the golden langur, a species endemic to this region.
  - It encompasses a variety of habitats and is a biodiversity hotspot. **Hence, this statement is correct.**
- **Nahar Wildlife Sanctuary: Haryana** - This sanctuary is correctly matched to Haryana. It is a protected area known for its efforts in conserving local flora and fauna, including several species of birds and mammals.
  - It plays a crucial role in the ecological balance of the region. **Hence, this statement is correct.**
- **Kane Wildlife Sanctuary: Arunachal Pradesh** - Located in Arunachal Pradesh, this sanctuary is a crucial part of the state's rich biodiversity. It is home to a wide range of species, including some that are rare and endangered.
  - The sanctuary's diverse ecosystems provide vital habitats for wildlife. **Hence, this statement is correct.**
- **Ramnagar Wildlife Sanctuary: Uttarakhand** - The incorrect match in the list. The confusion might arise because there is a place called Ramnagar in Uttarakhand, known for the Corbett National Park's proximity. However, there is

no officially recognized wildlife sanctuary by this name in Uttarakhand, making this pair incorrectly matched.
    - **Hence, this statement is incorrect.**

⭐ Additional Information

- **Wildlife Sanctuaries in India** are protected areas designated for the conservation of animals and their habitats. They play a crucial role in biodiversity conservation, providing sanctuary to species that are in danger of extinction.
- **Biodiversity Hotspots** - These are regions with significant levels of biodiversity that are under threat from humans. Conservation efforts in such areas are crucial for preserving global biodiversity.
- **Endemic Species** - Species that are found in a particular area and nowhere else in the world. The golden langur in Chakrashila is an example of such species, highlighting the importance of these sanctuaries in conservation efforts.

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51. Answer: d

Explanation:

The correct answer is ***1, 2 and 3.***

⭐ Key Points

Factors Affecting Per Capita GDP

- The **proportion of population in the working age** significantly affects a country's per capita GDP. A higher proportion of working-age population can lead to a higher potential labor force, which, if employed, enhances the nation's productivity and its per capita GDP. ***Hence, statement 1 is correct.***
- **Work participation rate** refers to the number of individuals who are actively employed or seeking employment. A higher work participation rate indicates a more significant portion of the population contributing to the economy, thus potentially increasing the per capita GDP. ***Hence, statement 2 is correct.***

- **Per worker productivity** is a crucial determinant of per capita GDP. It measures the average output per employed person. Higher productivity means more goods and services are produced per worker, leading to a higher overall economic output and, consequently, a higher per capita GDP. ***Hence, statement 3 is correct.***

⭐ Additional Information

- **Economic Development:** Understanding these factors is crucial for policy-makers aiming to foster economic development. By focusing on increasing the working-age population through immigration or policies that support higher birth rates, improving work participation rates through education and training, and enhancing per worker productivity through technology and innovation, a country can significantly improve its per capita GDP.
- **Demographic Dividend:** The concept of demographic dividend refers to the economic growth potential that can result from shifts in a population's age structure, mainly when the share of the working-age population (15 to 64) is larger than the non-working-age share of the population (14 and younger, and 65 and older). Countries aiming to capitalize on the demographic dividend must ensure that policies are in place to provide adequate employment and productivity enhancement opportunities to their working-age population.
- **Technological Advancement:** Technology plays a pivotal role in enhancing per worker productivity. Investments in research and development, innovation, and education are essential for improving productivity. Countries leading in technology adoption and innovation tend to have higher per capita GDP figures.
- **Labour Market Policies:** Effective labour market policies, including those that encourage participation of women and older workers, can significantly impact the work participation rate and, subsequently, the per capita GDP. Policies aimed at removing barriers to employment, providing retraining programs, and ensuring workplace flexibility are crucial in this regard.

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52. **Answer: a**

Explanation:

The correct answer is ***1 and 2 only.***

⭐ **Key Points**

Seventh Schedule of the Constitution of India

- The **Seventh Schedule** of the Constitution of India delineates the division of powers between the Union government and the States through three lists: the Union List, the State List, and the Concurrent List.
- **Taxes on agricultural income** fall under the State List, giving states the exclusive power to levy taxes on agricultural income. This is designed to allow states to manage their agricultural policies and taxation in a way that suits their specific needs and conditions.
    - As per the constitutional arrangement, the central government cannot levy taxes on agricultural income, ensuring that this vital area remains under the direct control of state governments. ***Hence, statement 1 is correct.***
- **Duties in respect of succession of agricultural land** are also under the jurisdiction of the states. This means states have the authority to regulate and impose duties on the transfer of agricultural land upon the death of the owner, allowing them to manage and control agricultural land succession within their territory.
    - This autonomy supports the management of agricultural lands in accordance with local requirements and traditions. ***Hence, statement 2 is correct.***
- **Estate duty in respect of agricultural land**, however, is a subject that can be a bit complex, given the overlap of central and state interests in estate duties. While the states have powers related to agricultural lands, estate duties, in general, can fall under the Concurrent List, where both the Centre and states have jurisdiction. Therefore, without specific constitutional provision assigning it solely to states, it cannot be conclusively said to be under state jurisdiction only.
    - Given the intricacies of constitutional law and the specific allocation of powers, this statement does not hold as clearly as the others in the context of exclusive state jurisdiction. ***Hence, statement 3 is not specifically correct within the given options.***

⭐ Additional Information

- The **Constitution of India** was designed to accommodate the vast diversity of the country by allowing different regions to have control over certain areas crucial to their economic and social structures, such as agriculture.
- **Agricultural income** in India is defined under the Income Tax Act, 1961, and is exempt from taxation by the central government, reflecting the importance of agriculture to the Indian economy and livelihood of its people.
- The **state's power to levy taxes** and duties on agricultural income and succession of agricultural land is crucial for its autonomy in agricultural policy-making and land management, allowing for region-specific strategies that can better address local needs and challenges.

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53. Answer: c

Explanation:

The correct answer is ***Resonant frequency in cesium (or rubidium) atom.***

⭐ Key Points

Principle of Atomic Clocks

- Atomic clocks operate on the principle of measuring the **resonant frequency of atoms**, typically cesium-133 or rubidium-87.
- The **cesium atomic clock**, for instance, uses the exact frequency of the microwave spectral line emitted by cesium atoms to keep time with extreme accuracy.
- These clocks do not rely on the **vibration of a quartz crystal** or any simple harmonic motion but on the **quantum-mechanical properties** of the atoms.
- Atomic clocks are able to keep time accurately to within a few billionths of a second per day, making them the **most accurate timekeeping devices known**.
- The process involves cooling cesium gas and placing it in a microwave cavity, where the atoms absorb and emit microwaves at a precise frequency. The clock's mechanism measures these vibrations to **keep track of time**.

Hence, statement 3 is correct.

⭐ Additional Information

- The concept of **quantum mechanics** plays a crucial role in the operation of atomic clocks, exploiting the precise energy levels of atoms.
- Cesium atomic clocks are so precise that they are used as the standard for **International System of Units (SI) definition of the second**.
- Atomic clocks are used in various applications including **global positioning systems (GPS), internet data transfer synchronization**, and in the study of **relativity**.
- The **development of optical lattice clocks** with strontium atoms is underway, which promises even greater accuracy, potentially reaching accuracy levels of 1 second in over 14 billion years.
- **Rubidium atomic clocks**, while slightly **less accurate than cesium ones**, are smaller, use less power, and are more cost-effective, making them suitable for many applications including telecommunications and satellite navigation.

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54. Answer: a

Explanation:

The correct answer is ***1 only.***

⭐ Key Points

- Lakshadweep is known for its **coconut production**, which plays a crucial role in the livelihood of the local population.
- The **productivity of coconut per hectare** in Lakshadweep is indeed among the **highest in India**. This is attributed to the island's favorable climate, soil conditions, and traditional farming methods that are well-suited for coconut cultivation.
    - **Hence, statement 1 is correct.**
- Regarding the **oil content in nuts**, while Lakshadweep coconuts are known for their quality, the claim that they have the **highest oil content in the world** is not

substantiated by specific data. There are other regions in the world, including some in the Philippines and Indonesia, known for high oil content in coconuts.
    - **Hence, statement 2 is incorrect.**

⭐ Additional Information

- Lakshadweep's **economy** is predominantly based on agriculture, with coconut being the main crop. The islands also engage in fishery, which is another significant economic activity.
- The **geographical isolation** of Lakshadweep has helped in preserving its biodiversity. The unique ecosystem of these islands includes coral reefs, lagoons, and a variety of marine species.
- **Coconut cultivation** practices in Lakshadweep have been sustainable over the years, incorporating traditional knowledge with minimal environmental impact. This sustainability contributes to the high productivity of the crop in the region.
- **Coconut-based products** from Lakshadweep, such as copra (dried coconut kernel), coconut oil, and coconut powder, are important for both local consumption and export. These products contribute significantly to the islands' economy.
- The **Government of India** and various agencies have implemented development programs in Lakshadweep to enhance agricultural productivity, promote sustainable practices, and improve the livelihood of the local community.

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55. Answer: c

Explanation:

The correct answer is ***2 and 4.***

⭐ Key Points

M1 Definition of Money for the Indian Economy

- **M1**, also known as **narrow money**, includes assets that are highly liquid and can be quickly converted into cash.

- **Currency** includes all paper money and coins in circulation. It is the most liquid form of money and can be used directly for transactions. **Hence, statement 2 is correct.**
- **Demand deposits** are bank account balances that can be withdrawn on demand without any prior notice. They include current accounts and savings accounts that offer no or low interest but high liquidity. **Hence, statement 4 is correct.**
- **Reserves**, such as those held by banks at the central bank, are not directly used for transactions by the public and hence are not included in M1. **Hence, statement 1 is incorrect.**
- **Time deposits**, like fixed deposits, cannot be withdrawn before a certain date without penalty and thus, are not considered part of M1 due to their low liquidity. **Hence, statement 3 is incorrect.**

⭐ Additional Information

- The **Indian economy** uses various measures of the money supply, including M1, M2, M3, and M4. Each measure includes different components based on their liquidity.
- **M2** includes M1 plus savings deposits with post office savings banks.
- **M3**, also known as broad money, includes M1 plus time deposits with the banking system and is a key indicator of the money supply in the economy.
- **M4** includes M3 plus all deposits with the post office savings banks (excluding National Savings Certificates).
- Understanding these concepts is crucial for analyzing economic policies, inflation, and the overall health of the economy. The Reserve Bank of India (RBI) plays a pivotal role in regulating the money supply to ensure economic stability.
- **Liquidity** refers to how quickly and easily an asset can be converted into cash without significantly affecting its value. Highly liquid assets are essential for the smooth functioning of the financial markets and for enabling transactions.

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56. **Answer: d**

Explanation:

The correct answer is **Perth**.

⭐ **Key Points**

- **7th Edition of the Indian Ocean Conference**
  - The 7th edition of the Indian Ocean Conference was held in **Perth, Australia** on **February 9-10, 2024**.
  - The conference was hosted by India Foundation in association with the **Ministry of External Affairs of India**, the Department of **Foreign Affairs** and Trade, Government of Australia, Perth USAsia Centre of Australia, and S. Rajaratnam School of International Studies of Singapore.
  - The theme for the conference was not specified in the search results, but it generally focuses on issues pertaining to the Indian Ocean region, such as maritime security, trade, and international cooperation.

⭐ **Additional Information**

- The **Indian Ocean Region (IOR)** is of strategic importance to global trade and security. It includes key maritime routes that are vital for the global economy, making regional cooperation and stability crucial.
- **Maritime security** is a recurring theme in the conference, addressing piracy, terrorism, and other non-traditional security threats, which are of paramount importance for the safety of sea lanes and international trade.

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57. Answer: d

Explanation:

The correct answer is **Neither 1 nor 2**.

⭐ **Key Points**

- **Normative and Empirical Approaches**
  - **Empirical Approach:** This approach seeks to describe and analyze the political world through observed, factual evidence. It aims to be value-neutral and objective, focusing on what is, rather than what ought to be.

Empirical political science assumes that facts exist and that these facts can be verified.
    - **Normative Approach:** This approach deals with questions about what ought to be. It aims to understand the values, purposes, and ethical considerations of politics, thus it is inherently value-laden and subjective.

⭐ Additional Information

- Explanation:
    - **Statement 1**: Knowledge acquired through the empirical approach is not value-loaded; it is intended to be objectively neutral and based on factual, observable evidence.
    - **Statement 2**: Knowledge acquired through the normative approach is not objectively neutral; it is inherently value-laden and concerned with ethical, moral, and normative questions.

---

58. Answer: c

Explanation:

The correct answer is ***2 and 3 only.***

⭐ Key Points

Barrier Islands

- Barrier islands are **elongated, narrow islands** made of sand or sediment that form parallel to the mainland coast, not far offshore. They serve to protect the coast from erosion and storms.
- **Lagoons, bays, or marshes** often separate barrier islands from the mainland, providing vital habitats for a variety of wildlife and supporting rich biodiversity.
- Despite their natural beauty and ecological importance, barrier islands are **prone to erosion and can be severely impacted by storms and hurricanes**. This makes them somewhat hazardous locations for permanent settlements due to their vulnerability to natural disasters.

    - The statement that barrier islands form far from the coast is **incorrect**. They are typically located relatively close to the mainland. ***Hence, statement 1 is incorrect.***
- The separation of barrier islands from the mainland by lagoons or shallower marshes is a **defining characteristic**, providing critical ecological functions. ***Hence, statement 2 is correct.***
- The vulnerability of these islands to storms and hurricanes, along with their shifting nature due to erosion and deposition, indeed makes them hazardous for permanent structures and settlements. ***Hence, statement 3 is correct.***

⭐ Additional Information

- Barrier islands play a **critical role in coastal protection** by absorbing the brunt of storm energy, which helps in reducing erosion and protecting the mainland from storm surges.
- These islands are **dynamic landscapes** that shift over time due to processes such as sediment deposition and erosion. Their shape and size can change significantly after major storms and hurricanes.
- Barrier islands also provide **important habitats** for wildlife, including birds, sea turtles, and various marine species. The marshes, lagoons, and intertidal zones between the islands and the mainland are rich in biodiversity.
- **Human activities**, such as development and construction on barrier islands, can disrupt their natural processes and increase vulnerability to erosion and storm impacts. It is crucial to balance development with conservation efforts to protect these unique ecosystems and the services they provide.

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59. Answer: b

Explanation:

The correct answer is *Option 2.*

⭐ Key Points

National Income Accounting for India

- **Imports calculation being subtracted in Gross Domestic Product (GDP)** is a standard practice in national income accounting. This is because GDP measures the total market value of all final goods and services produced within a country in a given period. Imports are subtracted since they represent the spending on goods and services not produced domestically. ***Hence, statement 1 is correct.***
- **Net factor payments earned from abroad** are not included in the Gross Domestic Product. Instead, they are included in the Gross National Product (GNP). GNP adjusts GDP by adding income earned by residents from investments abroad and subtracting income earned by foreign residents from domestic investments. ***Hence, statement 2 is incorrect.***
- **Purchase and sale of second-hand goods** are not included in GDP because these transactions do not reflect current production. GDP measures the value of current production of goods and services within the national borders. Second-hand sales do not add to the current production; hence, they are excluded. ***Hence, statement 3 is correct.***
- **Inventories** are considered part of Gross Domestic Capital Formation. This includes the unsold goods and materials held by businesses, which represents investment in the economy. Including inventories in GDP accounts for production that has occurred but has not yet been sold. ***Hence, statement 4 is correct.***

⭐ Additional Information

- **Gross Domestic Product (GDP)** is a primary indicator used to gauge the health of a country's economy. It represents the total dollar value of all goods and services produced over a specific time period within a nation's borders.
- **Gross National Product (GNP)**, on the other hand, measures the total economic output of the residents of a country, including profits earned from overseas investments and excluding income earned within the domestic economy by overseas residents.
- **Net factor payments from abroad** include wages, rents, and profits earned by residents from overseas investments minus the same incomes earned by non-residents from within the domestic economy. This distinction highlights the difference between GDP and GNP.

- **Second-hand goods** are excluded from GDP calculations to ensure that the measure reflects only the production of new goods and services. This exclusion avoids double counting of goods that were produced in previous periods.
- **Inventories** play a critical role in understanding economic activity. Changes in inventory levels can indicate future economic activity; for instance, an increase in inventories can signal that producers anticipate higher demand.

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60. **Answer: c**

Explanation:

The correct answer is ***A - 3, B - 4, C - 2, D - 1***.

⭐ Key Points

Matching Political Ideas with Thinkers

- **Human beings, unlike all other objects, possess dignity** is a philosophical idea associated with **Immanuel Kant**, a German philosopher who is considered a central figure in modern philosophy. Kant argued that humans have intrinsic value and dignity because of their ability to reason and should always be treated as ends in themselves, not merely as means to an end. ***Hence, A matches with 3.***
- **It is Swaraj when we learn to rule ourselves** reflects the political thought of **Mahatma Gandhi**, an Indian lawyer, anti-colonial nationalist, and political ethicist who led the campaign for India's independence from British rule. Gandhi's concept of Swaraj was not just political independence but self-rule and self-restraint. ***Hence, B matches with 4.***
- **Freedom implies not only emancipation from political bondage but also equal distribution of wealth** is a view that can be attributed to **Subhas Chandra Bose**, an Indian nationalist whose defiant patriotism made him a hero in India, but whose attempt during World War II to rid India of British rule with the help of Nazi Germany and Imperial Japan left a troubled legacy. ***Hence, C matches with 2.***

- **For me real freedom is freedom from fear** is a quote attributed to **Aung San Suu Kyi**, a Burmese politician, diplomat, author, and Nobel Peace Prize laureate (1991). Suu Kyi has been a notable proponent of democracy and human rights in Myanmar. ***Hence, D matches with 1.***

⭐ Additional Information

- **Immanuel Kant** is known for his theory of knowledge, ethics, and aesthetics. His categorical imperative provides a moral law that applies to all rational beings and is independent of personal motive or desire.
    - Kant's philosophy emphasizes the importance of autonomy and the moral worth of actions performed out of duty.
- **Mahatma Gandhi** introduced the concept of non-violent resistance called **Satyagraha**, which he used effectively against British rule. Gandhi's ideas have inspired civil rights movements around the world.
    - Gandhi's emphasis on simple living, self-sufficiency, and swadeshi (the use of goods produced locally) were integral to his vision of Swaraj.
- **Subhas Chandra Bose** is remembered for his role in India's independence movement as leader of the Azad Hind Fauj (Indian National Army). Bose sought to liberate India through armed struggle and sought assistance from Axis powers during World War II.
    - Bose's approach to freedom was more radical compared to other contemporary leaders, focusing on absolute independence through any means necessary.
- **Aung San Suu Kyi** led the National League for Democracy (NLD) in Myanmar to a majority win in elections in 1990, although the military nullified the results and placed her under house arrest for almost 15 of the 21 years from 1989 to 2010.
    - Her non-violent struggle for democracy and human rights earned her international acclaim, though her later years in power have been marred by controversy.

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61. **Answer: d**

Explanation:

The correct answer is ***Autonomy of civil society.***

⭐ Key Points

Totalitarian Regime Characteristics

- **State control of the political and often personal realms of individual life** is a hallmark of totalitarian regimes. They often dictate many aspects of private life, limiting freedoms and controlling personal choices.
    - As this is a defining characteristic of such regimes, ***this statement is correct.***
- **A monopoly of the means of mass communication** is another feature of totalitarian states. These regimes control information flow, restrict access to outside media, and use propaganda to maintain power and control over the populace.
    - This aligns with the operational methods of totalitarian governments, ***hence, this statement is correct.***
- **One-party State** is typically observed in totalitarian regimes, where a single political party controls the government, and no opposition or alternative political discourse is allowed.
    - This is a common attribute of such governments, ***making this statement correct.***
- **Autonomy of civil society** is not characteristic of totalitarian regimes. Instead, these regimes often suppress civil liberties and control or eliminate any form of civic organization or expression that could challenge the authority of the state.
    - Given that totalitarian regimes do not permit autonomy in civil society, ***this statement is incorrect.***

⭐ Additional Information

- **Totalitarian Regimes** are characterized by their attempt to control all aspects of public and private life through the centralization of authority. This control extends to economic, social, and cultural aspects of citizens' lives.
    - Examples include Nazi Germany under Adolf Hitler and the Soviet Union under Joseph Stalin.
- **Propaganda** is a powerful tool used by totalitarian regimes to manipulate and control the populace, often through misinformation, censorship, and the

creation of a cult of personality around the leader.

- **Suppression of Dissent**: Totalitarian governments often employ violent and non-violent means to suppress any form of opposition or criticism towards the ruling party or leader.
- **Surveillance** is extensively used in totalitarian states to monitor and control the activities of citizens, often justified in the name of national security but used to maintain the regime's grip on power.

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62. Answer: d

Explanation:

The correct answer is ***Cirrocumulus***.

⭐ Key Points

Cloud Classification

- **Cirrocumulus clouds** are high-altitude clouds that are characterized by their thin, puffy appearance. They are composed of ice crystals and often appear as white ripples across the sky.
  - They are typically found at altitudes between **20,000 feet and 40,000 feet** above the Earth's surface. ***Hence, statement 2 is correct.***
- These clouds can cover large areas of the sky and sometimes form patterns that resemble fish scales, known as a **'mackerel sky.'** This particular appearance is more prominent when the clouds are colored pink or red at sunset or sunrise.
  - The term **'mackerel sky'** specifically refers to the pattern and appearance of Cirrocumulus clouds, making them easily recognizable. ***Hence, statement 3 is correct.***
- Cirrocumulus clouds are part of the **cirrus** cloud family, which are the highest clouds in the atmosphere. Unlike other cirrus clouds, Cirrocumulus are smaller and more closely packed together.
  - Their high altitude and composition of ice crystals contribute to their thin and wispy appearance. ***Hence, statement 1 is correct.***

⭐ Additional Information

- **Cloud Classification:** Clouds are classified into categories based on their appearance, altitude, and the physical processes that create them. The main categories are Cirrus, Cumulus, Stratus, and Nimbus.
  - Cirrus clouds are high, wispy clouds made of ice crystals.
  - Cumulus clouds are puffy, white clouds that often have a flat base.
  - Stratus clouds are uniform grayish clouds that often cover the entire sky.
  - Nimbus clouds are rain-bearing clouds that can be of any shape but are typically dark and dense.
- **Importance of Clouds:** Clouds play a crucial role in the Earth's climate system. They affect weather patterns, regulate temperatures, and are integral to the water cycle, acting as a medium for precipitation.
- **Weather Prediction:** The study and observation of clouds can help meteorologists predict weather changes. For example, a mackerel sky, often associated with Cirrocumulus clouds, can indicate instability in the atmosphere and predict changes in weather.

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63. **Answer: c**

Explanation:

The correct answer is ***decrease in equilibrium quantity and no change in price.***

⭐ Key Points

Understanding the Impact of an Exogenous Decrease in Demand on Market Equilibrium

- Under a **normal downward sloping demand curve**, as the price of a commodity decreases, the quantity demanded increases, and vice versa.
- With a **fully elastic supply curve**, the supply of a commodity can adjust to any demand level at a constant price.
- An **exogenous decrease in demand** means that something outside the usual price-demand relationship causes demand to fall. This could be due to changes in consumer preferences, income, or the prices of related goods.

- In response to a decrease in demand, under a fully elastic supply curve, suppliers are willing to supply any quantity at the same price, leading to **no change in price**.
- However, since there's less demand for the commodity, the **equilibrium quantity will decrease** as suppliers adjust to the new demand level.
- Therefore, the market adjusts through a reduction in quantity sold, while the price remains unchanged due to the fully elastic nature of the supply.

⭐ Additional Information

- **Elasticity of Supply** refers to how much the quantity supplied of a good responds to a change in the price of that good. A fully elastic supply curve is horizontal, indicating that any amount of the good can be supplied at a particular price.
- **Market Equilibrium** is achieved at the point where the quantity demanded by consumers equals the quantity supplied by producers, determining the market price and quantity of the commodity.
- **Exogenous Factors** affecting demand or supply can include technological changes, governmental policies, changes in consumer tastes, and external economic factors.
- Understanding the dynamics between **demand, supply, and market equilibrium** is crucial for analyzing how various factors influence market outcomes, including prices and quantities.
- This concept is fundamental in **microeconomics**, helping to explain how markets adjust to changes and achieve equilibrium over time.

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64. Answer: d

Explanation:

The correct answer is Manoj Mukund Naravane.

⭐ Key Points

- **Four Stars of Destiny: An Autobiography** is authored by **General Manoj Mukund Naravane**.

- **Manoj Mukund Naravane** served as the **27th Chief of Army Staff** of the **Indian Army**.
- He has had a distinguished career with numerous commendations for his service and leadership in various capacities.
- The autobiography provides an **in-depth look at his personal and professional life**, shedding light on the experiences and challenges faced during his military service.
- The book is not only an account of his life but also offers insights into the broader workings and history of the Indian Army.

⭐ Additional Information

- Sam Manekshaw
  - Field Marshal Sam Manekshaw was the Chief of the Army Staff of the Indian Army during the Indo-Pakistani War of 1971.
  - He is renowned for his leadership and strategic acumen during the war, which led to the creation of Bangladesh.
- K. J. S. Dhillon
  - General K. J. S. Dhillon is a retired General of the Indian Army, having served in various high-profile roles during his career.
  - He has not authored "Four Stars of Destiny: An Autobiography".
- Bipin Rawat
  - General Bipin Rawat was the first Chief of Defence Staff (CDS) of India, a position he took up in January 2020.
  - He served as the Chief of Army Staff of the Indian Army before becoming the CDS.

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65. Answer: b

Explanation:

The correct answer is *2 and 3 only.*

⭐ Key Points

- **'Hard power'** refers to the use of military and economic means to influence the behavior or interests of other political bodies. This form of power is often aggressive and coercive, involving threats or actual use of force. While traditionally associated with states, non-state actors like terrorist groups can also wield hard power. **Hence, statement 1 is incorrect.**
- **Globalisation** encompasses both economic and cultural dimensions. Economic globalisation involves the integration of national economies through trade, investment, and capital flow. Cultural globalisation refers to the spread of ideas, information, images, and people across national boundaries, leading to greater cultural interaction and exchange. **Hence, statement 2 is incorrect.**
- The **'Washington Consensus'** is a set of economic policy recommendations for developing countries that emphasizes free market principles such as trade liberalization, privatization, and deregulation, aimed at achieving macroeconomic stability and growth. It does not seek intervention in the market but rather promotes reducing the role of the state in the economy. **Hence, statement 3 is incorrect.**
- **'Autarky'** is indeed the concept of a country being self-sufficient, not relying on imports from other countries. It is a strategy that aims to minimize reliance on international trade and foster domestic production of goods and services. **Hence, statement 4 is correct.**

⭐ **Additional Information**

- In the context of **world politics**, the distinction between **hard power and soft power** is crucial. Soft power contrasts with hard power as it seeks to attract and co-opt rather than coerce, using cultural and ideological influence.
- **Globalisation** has led to increased interconnectedness among countries, affecting not just economies but also social structures, political systems, and cultures. It has both supporters and critics, with arguments focusing on its benefits in promoting global economic growth and concerns over cultural homogenization and economic disparities.
- The **'Washington Consensus'** has been subject to significant criticism for its one-size-fits-all approach and its perceived negative effects on the economies of developing countries, particularly in Latin America.
- **Autarky** is often more of an ideal than a practical policy goal in the highly interconnected global economy. Historical attempts at autarky, such as in

North Korea and Albania, have often led to economic inefficiency and isolation.

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66. **Answer: a**

Explanation:

The correct answer is ***Dendritic.***

⭐ **Key Points**

Dendritic Drainage Pattern

- A **dendritic drainage pattern** is the most **common and widespread pattern** found on the Earth's surface. It resembles the **branches of a tree or the veins of a leaf**.
- The tributaries join the main rivers at **acute angles**, similar to the branches of a tree joining the trunk.
- This pattern is **not controlled by the topographical or geological structure** but rather by the slope of the land.
- The term **dendritic** is derived from the Greek word ***dendron***, meaning tree.
- On a map or aerial photograph, a dendritic drainage pattern displays a **tree-like branching**, where smaller streams join larger ones, and these in turn feed into even larger rivers. ***Hence, based on the given characteristics, the drainage pattern is Dendritic.***

⭐ **Additional Information**

- **Other types of drainage patterns** include radial, trellis, and centripetal, each with unique characteristics determined by local topography and geology.
- **Radial patterns** form when rivers flow away from a central high point, resembling spokes on a wheel, common in volcanic cones and domed mountains.
- **Trellis drainage** occurs in regions with alternating bands of resistant and weak rocks, leading to a pattern of long main rivers with short tributaries entering at right angles, reminiscent of a garden trellis.

- **Centripetal patterns** are the opposite of radial, with streams converging into a single basin from all directions, often found in deserts and basins.
- Understanding drainage patterns is crucial for **geographical and environmental studies**, aiding in the prediction of water flow, sediment transport, and potential areas of erosion or deposition.
- They are also significant in **urban planning, environmental management,** and **landscape architecture,** where drainage patterns influence the design of infrastructure, flood management systems, and conservation strategies.

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67. Answer: a

Explanation:

The correct answer is ***Na > Li > Be > O***.

⭐ Key Points

Atomic Radius Trends on the Periodic Table

- The **atomic radius** refers to the size of an atom, indicating the distance from the center of the nucleus to the boundary of the surrounding cloud of electrons.
- As we move **down a group** in the periodic table, the atomic radius **increases**. This is because each successive element has an additional energy level, which places the outermost electrons further from the nucleus.
- As we move **across a period** from left to right, the atomic radius **decreases**. Despite the addition of more electrons, the increasing positive charge in the nucleus pulls the electron cloud closer to the nucleus.
- The elements given, Li (Lithium), Na (Sodium), Be (Beryllium), and O (Oxygen), belong to the **second and third periods** of the periodic table. Lithium and Beryllium are in the second period, while Sodium is in the third period, and Oxygen is also in the second period but towards the right side.
- Given these trends, Sodium (Na), being in the third period and the farthest left among the given elements, has the **largest atomic radius**. Following Sodium,

Lithium (Li), which is in the same group but in the second period, has the next largest atomic radius.

- Beryllium (Be), despite being in the second period like Lithium, has a smaller atomic radius than Lithium because it is to the right of Lithium in the periodic table.
- Oxygen (O), being far to the right in the second period, has the **smallest atomic radius** among the given elements.
- **Hence, the correct order of atomic radius from largest to smallest is Na > Li > Be > O.**

⭐ Additional Information

- The concept of **atomic radius** is crucial in understanding the **chemical behavior** of elements. For instance, elements with larger atomic radii tend to be more **reactive** in the alkali metals group.
- The trend of atomic radius also plays a significant role in the **ionization energy** and **electronegativity** of elements. Generally, as the atomic radius decreases, the ionization energy increases, and the element becomes more electronegative.
- This knowledge is applied in various scientific fields, including **chemistry, physics, and materials science**, to predict and explain the behavior of elements and compounds.
- Understanding the periodic trends, including atomic radius, helps in the **systematic study of elements** and their properties, making it easier to predict the characteristics of unknown or newly discovered elements.

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68. Answer: c

Explanation:

The correct answer is Jammu and Kashmir.

⭐ Key Points

- Operation Sarvashakti

- The Indian Army launched '**Operation Sarvashakti**' in the **Rajouri-Poonch** sector of **Jammu and Kashmir**.
- The operation involves deploying forces on both sides of the **Pir Panjal range** to target **terrorists** responsible for a series of attacks on Indian troops in the area.
- This operation aims to **thwart attempts to revive terrorism** in the region, addressing recent escalations and protecting the local population.

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69. **Answer: c**

Explanation:

The correct answer is ***Both 1 and 2***

⭐ **Key Points**

- Part III of the Constitution of India deals with Fundamental Rights, which are guaranteed to the citizens of India. These rights are enforceable by the courts, ensuring protection against any arbitrary action or inaction by the state.
- The first statement acknowledges that individuals can enforce their rights against actions of government authorities that violate their Fundamental Rights. This is a basic feature of a constitutional democracy that ensures the state's power is limited and accountable.
  - **Hence, statement 1 is correct.**
- The second statement extends this enforceability to cases of inaction by the government. If the government fails to perform its duties resulting in the violation of an individual's Fundamental Rights, such inaction can also be challenged in the courts. This ensures that the government cannot escape its responsibilities by merely being passive.
  - **Hence, statement 2 is correct.**
- Therefore, both statements correctly interpret the scope of Part III of the Constitution of India, emphasizing the comprehensive protection it offers against both action and inaction by the government that infringes upon Fundamental Rights.

⭐ Additional Information

- **Fundamental Rights** under Part III of the Constitution of India include the Right to Equality, Right to Freedom, Right Against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, and Right to Constitutional Remedies.
- The **Right to Constitutional Remedies (Article 32)** empowers the citizens to move to a court of law in case of any denial of the fundamental rights. This right has been described by Dr. B.R. Ambedkar as the heart and soul of the Constitution.
- The **Doctrine of State Action** implies that the actions or inactions of the state can be challenged in a court of law if they infringe upon the Fundamental Rights of individuals. This doctrine is central to understanding the applicability of Fundamental Rights against the state.
- **Public Interest Litigation (PIL)** has been a crucial tool in the hands of the public to seek judicial redress for the enforcement of both public duties by the government and the Fundamental Rights of individuals.
- The Constitution not only guarantees the protection of rights but also imposes duties on the state to ensure the creation of conditions where every citizen can enjoy their rights fully.

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70. **Answer: a**

Explanation:

The correct answer is ***1 only.***

⭐ Key Points

- A **gateway city** is characterized by its strategic geographical location, acting as a pivotal entry or exit point between one country or region and others. This makes it a crucial hub for trade, commerce, and cultural exchange.
  - **Hence, statement 1 is correct.**
- While gateway cities often hold significant influence due to their control over trade routes and connections, the statement that they exercise control over a

large area by commanding entry and exit rights and powers is overly broad and not a defining characteristic of all gateway cities.
    - **Hence, statement 2 is incorrect.**
- Many gateway cities are indeed ports, and historically, a number of these port cities were administrative centers during colonial times. However, not all gateway cities are ports, nor were all historically administrative centers for colonial governments. The definition of a gateway city is broader and includes its function as a crucial link, regardless of its colonial history or whether it is a port.
    - **Hence, statement 3 is incorrect.**

⭐ Additional Information

- **Gateway cities** play a vital role in the global economy. They serve as major points for international flights, shipping, and telecommunications, linking their countries with the rest of the world.
    - Examples include New York City in the United States, Singapore in Southeast Asia, and Rotterdam in the Netherlands, among others.
- These cities often have advanced infrastructure to support their role in global trade, including ports, airports, and technology hubs. They also tend to be centers of financial services, innovation, and cultural exchange.
- The strategic importance of gateway cities can also make them targets for geopolitical interests and conflicts, highlighting their role in international relations and security.
- In addition to their economic functions, gateway cities often have a rich cultural diversity, resulting from centuries of trade and immigration. This diversity can be seen in the variety of languages spoken, the cultural festivals celebrated, and the international cuisines available.

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71. Answer: d

Explanation:

The correct answer is ***Nickel and H2***.

⭐ Key Points

Reduction of Unsaturated Hydrocarbons to Saturated Hydrocarbons

- The **reduction of unsaturated hydrocarbons to saturated hydrocarbons** involves the addition of hydrogen (H2) across the double or triple bonds of alkenes or alkynes, respectively, turning them into alkanes.
- This process is known as **hydrogenation** and requires the presence of a catalyst to proceed under mild conditions.
- **Nickel (Ni)** is a widely used catalyst for this purpose due to its **effectiveness in breaking the H-H bond** and facilitating its addition to the unsaturated hydrocarbon.
- Other metals like **Palladium (Pd) and Platinum (Pt)** are also used as catalysts in hydrogenation reactions, but Nickel is preferred for its cost-effectiveness and availability.
- The reaction typically occurs under **increased pressure** and at **moderate temperatures**, which the Nickel catalyst helps to lower, making the process energetically favorable.

Hence, the correct option is Nickel and H2.

⭐ Additional Information

- **Hydrogenation reactions** are not only limited to the production of saturated hydrocarbons but also play a significant role in the **food industry**, where they are used to convert vegetable oils into semi-solid fats for margarine and shortening.
- The choice of catalyst and reaction conditions can influence the **selectivity** of the hydrogenation process, allowing for the partial hydrogenation of polyunsaturated fats to monounsaturated fats, which are considered healthier.
- **Catalyst poisoning** is a phenomenon where the catalyst's activity is significantly reduced due to the presence of certain substances that strongly adsorb to the catalyst surface, thereby blocking the active sites. Sulphur compounds are common poisons for Nickel catalysts in hydrogenation reactions.
- The development of **more efficient and selective catalysts** is a key area of research in green chemistry, aiming to reduce energy consumption and improve the sustainability of chemical processes.

72. **Answer: b**

Explanation:

The correct answer is **Indore and Surat**.

⭐ Key Points

- **Indore and Surat:** These two cities were conferred with the cleanest city award under the **Swachh Survekshan Awards 2023**.
  - **Indore:** Known for maintaining its top position as the cleanest city in India, Indore has now achieved this distinction for the **seventh consecutive year**. The city's consistent efforts in waste management, public cleanliness, and civic participation have earned it widespread recognition.
  - **Surat:** Surat has also made significant strides in maintaining cleanliness, featuring prominently in the Swachh Survekshan rankings. The city's implementation of effective waste management practices and active participation in cleanliness initiatives have contributed to this accolade.
  - **Joint Victory:** Indore and Surat shared the cleanest city title in a joint recognition by the Swachh Survekshan Awards 2023. This joint victory highlights the remarkable efforts of both cities in achieving and maintaining high standards of cleanliness.

⭐ Additional Information

- The **Swachh Bharat Mission** was launched by the Government of India with the aim of making India clean and free of open defecation by October 2, 2019, marking the 150th birth anniversary of Mahatma Gandhi. The mission has two main components: Swachh Bharat Mission (Rural) and Swachh Bharat Mission (Urban).
- The **Swachh Survekshan survey** is conducted by the Ministry of Housing and Urban Affairs (MoHUA) to rank cities on various parameters of cleanliness and sanitation. It is considered the world's largest cleanliness survey.
- **Waste management practices**, including segregation at source, processing and disposal of waste, play a crucial role in determining the rankings of cities in

the Swachh Survekshan Awards.

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73. Answer: a

Explanation:

The correct answer is ***1 only.***

⭐ **Key Points**

The International Covenant on Civil and Political Rights (ICCPR)

- The **International Covenant on Civil and Political Rights (ICCPR)** is a key international treaty that aims to ensure the protection of civil and political rights globally. It was adopted by the United Nations General Assembly in 1966 and came into force in 1976.
- One of the fundamental principles laid out in the ICCPR is that **everyone shall have the right to recognition everywhere as a person before the law**. This underscores the importance of legal identity and ensures that every individual is recognized as a person with rights under the law. ***Hence, statement 1 is correct.***
- **India** is one of the countries that has **ratified the ICCPR**, demonstrating its commitment to upholding civil and political rights as outlined in the covenant. Ratification means that India has agreed to be legally bound by the terms of the covenant and has incorporated its provisions into domestic law. ***Hence, statement 2 is incorrect.***

⭐ **Additional Information**

- The **ICCPR** along with the International Covenant on Economic, Social and Cultural Rights (ICESCR) and the Universal Declaration of Human Rights (UDHR), form the so-called **International Bill of Human Rights**, a comprehensive set of international treaties and declarations intended to protect and promote human rights globally.
- Upon ratification, countries are required to submit regular reports to the UN Human Rights Committee, a body of independent experts that monitors

compliance with the ICCPR. This ensures that states are held accountable for their human rights records.

- The ICCPR covers a wide range of civil and political rights, including the right to life, freedom of speech, freedom of religion, voting rights, rights to a fair trial, and protection against torture and other cruel, inhuman or degrading treatment or punishment.
- In addition to ratifying the ICCPR, countries can also sign optional protocols associated with the treaty. For instance, the **First Optional Protocol** allows individuals to submit complaints to the Human Rights Committee if they believe their rights under the Covenant have been violated.
- **India's ratification** of the ICCPR signifies its pledge to adhere to international standards regarding civil and political rights. It also reflects India's recognition of the importance of human rights on the global stage and its role in promoting these rights both domestically and internationally.

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74. Answer: b

Explanation:

The correct answer is **Shiva as Yoga-Dakshinamurti**.

⭐ **Key Points**

- The important early Chola painting discovered at the B**rihadisvara Temple** in Thanjavur in 1931 is "**Shiva as Yoga-Dakshinamurti".**
- **Brihadisvara Temple:** Also known as the "Big Temple," it is one of the most significant monuments of the **Chola dynasty, built by Raja Raja Chola I.**
- **Discovery Year:** The paintings were discovered by historian S.K. Govindaswami in 1931.
- **Painting Depiction:** "Shiva as Yoga-Dakshinamurti" shows **Lord Shiva** as the universal teacher, in a meditative and yogic posture.
- **Artistic Significance:** These paintings are considered among the earliest and finest examples of Chola art, showcasing the advanced techniques and profound religious themes of the period.

- **Preservation:** The paintings have been subject to preservation efforts due to their historical and cultural importance.

⭐ Additional Information

- Buddha with Chauri-bearers on either side
  - This depiction is more typically associated with Buddhist art rather than Chola art.
  - Buddha is often shown with attendants, or "chauri-bearers", symbolizing his royal and divine status.
- Yakshi Kali
  - Yakshi Kali refers to female nature spirits in Hindu and Buddhist art.
  - They are not typically a central theme in Chola dynasty paintings.
- Parshvanatha with snake-hood on a lion-throne
  - Parshvanatha is the 23rd Tirthankara in Jainism, often depicted with a snake canopy.
  - This imagery is predominantly found in Jain art and is not a characteristic theme of Chola paintings.

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75. Answer: d

Explanation:

The correct answer is K_2S.

⭐ Key Points

Understanding Ionic Character

- The **ionic character** of a compound refers to the extent to which a bond between atoms in the compound is ionic versus covalent.
- Ionic bonds form between **metals and non-metals** where there is a significant difference in electronegativity, leading to the transfer of electrons from one atom to another.
- Covalent bonds form between **non-metals**, where electrons are shared rather than transferred.

- The **greater the difference** in electronegativity between the bonding atoms, the **higher the ionic character** of the bond.
- **K_2S (Potassium Sulfide)** contains a metal (Potassium) and a non-metal (Sulfur), which have a significant difference in electronegativity, leading to a high ionic character.
- Comparatively, compounds like **BeF_3, SiO_2, and NCl_3** involve bonding between non-metals or metals with non-metals where the difference in electronegativity is not as pronounced as in K_2S, leading to lower ionic character.

Hence, the correct option is K_2S.

⭐ Additional Information

- **Electronegativity** is a chemical property that describes the tendency of an atom to attract a shared pair of electrons (or electron density) towards itself.
- **Ionic compounds** typically have **high melting and boiling points**, are solid at room temperature, and conduct electricity when dissolved in water or melted, due to the free movement of ions.
- **K_2S** is an example of an ionic compound where potassium donates electrons to sulfur, resulting in the formation of potassium cations (K^+) and sulfide anions (S^{2-}).
- **Understanding the nature of chemical bonds** is crucial for predicting the properties of compounds, including their reactivity, state of matter at room temperature, and electrical conductivity.

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76. Answer: d

Explanation:

The correct answer is ***Ugram***.

⭐ Key Points

Indigenous Assault Rifle Development

- The Defense Research and Development Organization (DRDO) is India's premier agency for the development of defense technology and systems, including small arms.
- **Ugram** is an assault rifle developed indigenously by the DRDO, highlighting India's growing self-reliance in defense manufacturing.
- Assault rifles like **Ugram** are designed for versatility, combining the accuracy and firepower necessary for modern infantry engagements.
- The development of indigenous weapons systems, such as **Ugram**, is a strategic move towards reducing dependence on foreign arms and enhancing national security.
- Indigenous development also supports the government's "Make in India" initiative, aimed at boosting domestic manufacturing and technological capabilities.

Hence, the statement that Ugram is an indigenous assault rifle developed by DRDO is correct.

⭐ **Additional Information**

- The **DRDO** plays a crucial role in empowering India with cutting-edge defense technologies and has been instrumental in numerous indigenous development projects across various defense domains.
- Assault rifles like **Ugram** are central to infantry combat, providing soldiers with the capability to engage effectively in close to medium-range combat scenarios.
- Indigenous weapon systems development not only enhances national security but also contributes to economic growth through the creation of jobs and fostering of technological expertise within the country.
- The success of weapons like **Ugram** underscores the importance of self-reliance in defense technology and the potential benefits of investing in indigenous research and development efforts.
- Through initiatives like **"Make in India,"** the government aims to transform the country into a global manufacturing hub, with **defense manufacturing** being a key sector of focus.

77. **Answer: a**

Explanation:

The correct answer is ***1 only.***

⭐ **Key Points**

Right to Legal Aid

- The **Constitution of India** includes the right to legal aid under the **Directive Principles of State Policy**. This is found in Article 39A of the Constitution, which emphasizes that the state should ensure that the legal system promotes justice on a basis of equal opportunity and shall, in particular, provide free legal aid, by suitable legislation or schemes or in any other way, to ensure that opportunities for securing justice are not denied to any citizen by reason of economic or other disabilities.
    - As such, the statement that under the Constitution of India, the right to legal aid is given under the Directive Principles of State Policy is ***Hence, statement 1 is correct.***
- The second statement regarding the duty of the police to inform the nearest Legal Aid Committee immediately after the arrest of a person is not explicitly mentioned in the Constitution. This is more a procedural aspect that might be covered under different laws and regulations pertaining to the criminal justice system, and the specific practices can vary. However, the Code of Criminal Procedure, 1973 (CrPC) in India does mandate that a person arrested without a warrant must be informed of the grounds of arrest, and must have the right to consult a lawyer of their choice, which aligns with the broader principle of legal aid.
    - However, the direct obligation of the police to inform the nearest Legal Aid Committee immediately after arrest is not a constitutional provision but is part of procedural laws and guidelines issued by various authorities. ***Hence, statement 2 is incorrect.***

⭐ **Additional Information**

- The concept of **legal aid** is crucial for ensuring access to justice for all citizens, especially the poor and marginalized. It includes not just representation in court but also legal advice, education, and awareness.
- **Article 39A** was introduced by the **42nd Amendment Act of 1976**, emphasizing the commitment of the state to a fair legal system.
- The **Legal Services Authorities Act, 1987** was enacted by the Parliament to give effect to Article 39A. This Act provides for a statutory base for legal aid programs throughout the country on a uniform pattern.
- This Act establishes a nationwide network of legal services authorities and committees from the National Legal Services Authority (NALSA) at the top, to the State Legal Services Authorities, District Legal Services Authorities, Taluk Legal Services Committees, High Court Legal Services Committees, and Supreme Court Legal Services Committee to provide free and competent legal services to the weaker sections of the society.
- The principle behind legal aid is that **justice should not be denied to any citizen because of economic or other disabilities**. This is an essential aspect of any fair and just legal system that aims to uphold the rule of law and ensure equality before the law.

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78. Answer: c

Explanation:

The correct answer is **3**.

⭐ **Key Points**

- During the initial development of railways in India by the British, several incentives were provided to private investors to encourage the growth of railway infrastructure.
- **Private financial investors for railways were indeed provided land free of charge by the British Government in India.** This policy was aimed at stimulating the rapid expansion of railway networks across India by reducing the capital investment required from private companies. **Hence, statement 1 is correct.**

- **Investors were guaranteed a return of 5 percent on their capital from the government,** even if their operations ran at a loss or secured inadequate profit. This guarantee was crucial in attracting British capital to the railway sector in India, providing a safety net for investors. **Hence, statement 2 is correct.**
- The railways were subject to a system of **joint management with the government,** which involved elements of public-private partnership. This arrangement ensured that while private companies handled the everyday operations and management, the government had significant control and oversight over strategic decisions. **Hence, statement 3 is correct.**

⭐ Additional Information

- The **first train in India** ran between Bombay (now Mumbai) and Thane on 16th April 1853, marking the beginning of railway transport in the country.
- The initial phases of railway development were marked by the **Guarantee System,** wherein the British government provided various concessions and guarantees to private investors.
- This model was later criticized for its generous terms to British investors at the expense of Indian resources and led to the eventual nationalization of the railways.
- The development of railways was instrumental in the economic colonization of India, facilitating the movement of raw materials from the interior to ports for export to Britain, and the distribution of British-manufactured goods within India.
- The **Indian Railways** is now one of the world's largest railway networks, highlighting the enduring legacy of this initial phase of development.

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79. Answer: b

Explanation:

The correct answer is 1 and 2 only.

⭐ Key Points

Ice-Cap Climate

- The **Köppen climate classification** is a widely used vegetation-based, empirical climate classification system. It divides climates into five main groups, with several types and subtypes. **Ice-cap climate** is denoted by the symbol **EF**, where **E** stands for polar climates and **F** specifically indicates ice-cap climates. ***Hence, statement 1 is correct.***
- In an **ice-cap climate**, the mean monthly temperature does not exceed 0°C. This is the Earth's most severe climate, prevalent in areas such as Antarctica and the interior of Greenland. ***Hence, statement 2 is correct.***
- The **Pir Panjal** and the **Great Himalayas** do experience severe winters and substantial snowfall. However, these regions do not have an ice-cap climate. They are characterized by a range of climatic conditions, including alpine, subalpine, and temperate climates, depending on the altitude. Therefore, these regions do not fit the criteria of having a mean monthly temperature always below 0°C throughout the year. ***Hence, statement 3 is incorrect.***

⭐ Additional Information

- The **Köppen climate classification** system is based on the concept that native vegetation is the best expression of climate. Thus, it uses temperature and precipitation as the main climate indicators.
- **Ice-cap climates (EF)** are found primarily in Greenland and Antarctica. These regions are characterized by a **permanent layer of ice** and **snow cover**.
- Despite the harsh conditions, these ice-covered regions play a critical role in the Earth's climate system. They reflect a significant amount of solar radiation back into space (albedo effect) and are pivotal in regulating the global temperature.
- The **Himalayan region**, including the **Pir Panjal** and the **Great Himalayas**, is crucial for its biodiversity, climate regulation, and as a source for many major rivers in Asia. These mountains act as a natural barrier affecting weather patterns and precipitation distribution in **South Asia**.

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80. **Answer: b**

Explanation:

The correct answer is **Shooting**.

⭐ **Key Points**

- **Yogesh Singh:** He won gold medals in two shooting events at the **Asian Shooting Championships 2024.**
- India's Yogesh Singh won a gold medal in the **men's 25m standard pistol event** at the Asian Shooting Championships 2024 in **Jakarta, Indonesia**.
- Competing in a **20-shooter field** in the non-Olympic shooting discipline, Yogesh Singh shot an impressive **572** to claim the top prize.

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81. Answer: a

Explanation:

The correct answer is ***1 only.***

⭐ **Key Points**

Universal Declaration of Human Rights

- The Universal Declaration of Human Rights (UDHR) was adopted by the United Nations General Assembly in 1948 as a common standard of achievements for all peoples and all nations.
- It sets out, for the first time, fundamental human rights to be universally protected and it has been translated into over 500 languages.
- The Declaration consists of 30 articles affirming an individual's rights. Those rights include civil and political rights, like the right to life, liberty, free speech, and privacy. They also include economic, social and cultural rights, like the right to social security, health, and education.
- **Regarding the first statement:** The Declaration indeed states that everyone has the right to seek and to enjoy in other countries asylum from persecution. This right is particularly outlined in Article 14 of the UDHR. However, it does not specifically mention "political crimes" but rather persecution in general. ***Hence, statement 1 is correct.***

- **Regarding the second statement:** While the Declaration does affirm the right to change one's nationality (Article 15), it does not explicitly provide a provision regarding freedom from arbitrary deprivation of nationality. The statement as presented misrepresents the scope of the Declaration. The emphasis is on the right to a nationality and the prohibition against arbitrary denial or deprivation of nationality, not specifically on the conditions mentioned. ***Hence, statement 2 is incorrect.***

⭐ Additional Information

- **Article 14 of the UDHR** is significant because it was one of the first international recognitions of the right to asylum. This has paved the way for later treaties and international laws concerning refugees and asylum seekers.
- **Article 15 of the UDHR** highlights that everyone has the right to a nationality and that no one should be arbitrarily deprived of their nationality nor denied the right to change it. This article underpins the importance of nationality to an individual's sense of identity and legal recognition.
- The principles laid out in the UDHR are considered to be of fundamental importance in the international human rights regime, influencing numerous international treaties, national constitutions, and other protective laws.
- The Declaration, while not a legally binding document, has inspired more than 60 human rights instruments which together constitute an international standard of human rights.
- Among these subsequent instruments are the International Covenant on Civil and Political Rights and the International Covenant on Economic, Social and Cultural Rights, which together with the Declaration form the so-called International Bill of Human Rights.

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82. Answer: b

Explanation:

The correct answer is **Cotton textiles.**

⭐ Key Points

Impact of Deindustrialisation on Indian Industries in the 19th Century

- The **19th century was a period of significant economic transformation** in India, marked by the deindustrialisation of its traditional industries due to the colonial policies of the British Empire.
- **Cotton textiles,** one of India's ancient and flourishing industries, was **severely impacted** by deindustrialisation. This industry had a long-standing reputation for producing high-quality cotton products, which were in demand both domestically and internationally.
    - British policies favoured the import of cotton fabrics from Britain to India, imposing heavy duties on Indian cotton goods and thus undermining the local industry. ***Hence, option 2 is correct.***
- The **iron and steel industry** in India was not yet fully developed in the 19th century, and thus, while affected, its impact was not as significant compared to the traditional industries like silk and cotton.
- **Woolen manufacture** in India was less prominent compared to silk and cotton, and thus, while affected, it did not face the level of impact seen in the silk industry.

⭐ Additional Information

- The **process of deindustrialisation** was characterized by the decline of India's traditional industries due to a combination of colonial exploitation, discriminatory tariffs, and the influx of cheaper British manufactured goods.
- Deindustrialisation had a profound impact on the Indian economy, leading to **increased unemployment, loss of skilled artisans, and a shift towards agriculture** as the primary source of livelihood for many, further exacerbating economic challenges.
- The **British colonial rule** systematically dismantled the Indian handloom industry to create a market for their manufactured goods, leading to a significant socio-economic shift and contributing to the economic underdevelopment of India during the colonial period.
- Understanding the impact of deindustrialisation is crucial for comprehending the broader historical context of **economic policies** under British colonial rule and their long-term effects on India's economic development.

83. **Answer: c**

Explanation:

The correct answer is ***1 and 3 only.***

⭐ Key Points

- The Industrial Revolution marked a significant shift in society from a predominantly agrarian and handicraft economy to one characterized by industrial and machine manufacturing processes.
- **The first Industrial Revolution** is noted for its major developments in industries such as textiles, iron, and the widespread use of the steam engine. This transformative period began in **Great Britain** in the late 18th century, around the 1760s, making the statement about its beginning in Germany incorrect. ***Hence, statement 2 is incorrect.***
- Technological advancements during the Industrial Revolution were indeed pivotal. Innovations in **iron smelting** significantly improved the production process, making it more efficient and cost-effective. **Steel production** later played a crucial role in the construction and machinery industries, among others. The invention and application of the **steam engine** revolutionized transportation and manufacturing, making it a hallmark of this era. ***Hence, statement 3 is correct.***
- The change towards industrial society involved a shift where the majority of the population began earning their livelihood in the industrial sector, moving away from agricultural practices. This transition is a defining characteristic of the Industrial Revolution. ***Hence, statement 1 is correct.***

⭐ Additional Information

- The **Industrial Revolution** led to urbanization, as people moved to cities in search of jobs in the new factories. This shift had profound social, economic, and environmental impacts.
- It introduced a new era of **innovations** such as the **cotton gin, interchangeable parts, and the telegraph**, which further propelled industrial growth and efficiency.

- The revolution also brought about significant changes in **social structures**, with the rise of a new working class and the development of new social classes associated with industrial capitalists.
- Environmental impacts were significant, with the increased use of fossil fuels contributing to pollution and the beginning of significant changes in global climates.
- It paved the way for the **Second Industrial Revolution**, which saw advancements in electricity, chemical manufacturing, and internal combustion engines, further transforming societies and economies worldwide.

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84. Answer: a

Explanation:

The correct answer is ***Kirana Gharana.***

⭐ **Key Points**

Prabha Atre and Kirana Gharana

- Prabha Atre was a **renowned classical singer** and an exponent of the **Kirana Gharana**, one of the most influential gharanas in Indian classical music.
- The **Kirana Gharana** is known for its emphasis on the blending of **melodic and rhythmic aspects** of music, focusing particularly on the elaboration of **ragas**.
- Prabha Atre's music was characterized by her **innovative style** and **technical finesse**, which she brought to the traditional compositions of the Kirana Gharana.
- She was a **versatile performer**, adept at both classical and semi-classical forms like **Thumri and Bhajan**.
- Her contribution to Indian classical music includes not only her performances but also her role as an **educator and author**, enriching the musical landscape with her knowledge and expertise.

Hence, the correct option is Kirana Gharana.

⭐ **Additional Information**

- The **Kirana Gharana** originated in the late 19th century and is named after Kirana or Kairana, a town in Uttar Pradesh, India. It has produced many legendary musicians.
- This gharana's distinctive feature is its **pure and emotional rendition** of ragas, achieved through a fine blend of **khayal** singing and **tantrakari** (instrumental virtuosity).
- Prabha Atre's approach to music was deeply influenced by her gurus and the tradition of the Kirana Gharana, yet she brought her own creativity to her performances, making her a beloved figure in the Indian classical music community.
- She was awarded several prestigious awards for her contribution to Indian classical music, including the **Padma Shri** and **Padma Bhushan**, recognizing her as a leading figure in the promotion and preservation of Indian classical music.
- Prabha Atre's work in music education and literature includes writing books that serve as important resources for students and aficionados of Indian classical music, reflecting her dedication to spreading the knowledge and appreciation of this art form.

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85. Answer: c

Explanation:

The correct answer is **UNHCR**.

⭐ **Key Points**

- **UNHCR (United Nations High Commissioner for Refugees):** The UNHCR has been awarded the Nobel Peace Prize twice:
  - First in 1954
  - Second in 1981 for their continued work to aid refugees for three decades.

⭐ **Additional Information**

- **Explanation for Other Options:**

- **IPCC (Intergovernmental Panel on Climate Change):** Awarded the Nobel Peace Prize once, in 2007.
- **IAEA (International Atomic Energy Agency):** Awarded the Nobel Peace Prize once, in 2005.
- **UNICEF (United Nations International Children's Emergency Fund):** Awarded the Nobel Peace Prize once, in 1965.

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86. Answer: b

Explanation:

The correct answer is ***2 only.***

⭐ **Key Points**

The Early Phase of the National Movement in India

- **Ferozeshah Mehta, Dadabhai Naoroji**, and Dinshaw Wacha founded the **Bombay Presidency Association** in 1885, not Ferozeshah Mehta and Badruddin Tyabji as mentioned. Therefore, the first statement is incorrect.
- **Surendranath Banerjee** was indeed instrumental in founding the **Indian National Conference**, which later merged with the Indian National Congress. This makes the second statement correct. ***Hence, statement 2 is correct.***
- Allan Octavian Hume played a pivotal role in the founding of the **Indian National Congress** in 1885, with the intention of forming a platform for civic and political dialogue among educated Indians. Contrary to the claim in the third statement, Hume's aim was not to create a rival organisation but to establish a unified body to represent Indian interests, particularly those of the educated elite, not specifically the poor and marginalised. ***Hence, statement 3 is incorrect.***

⭐ **Additional Information**

- The **Bombay Presidency Association** was one of the early political associations in British India, reflecting the growing political consciousness among the Indian elite.

- The **Indian National Conference**, established by Surendranath Banerjee, played a significant role in the formation of the Indian National Congress, which became the leading vehicle for India's struggle for independence.
- **Allan Octavian Hume** is often called the 'Father of the Indian National Congress' due to his role in its formation. His vision was to create a platform for the educated Indians to discuss and propose solutions to their problems and present them to the British Government.
- The **Indian National Congress** was not intended to be a party for the poor and marginalised at its inception. Over time, however, it evolved to include wider sections of the Indian society and became a principal player in the Indian freedom struggle, adopting various resolutions and movements against British rule.

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87. Answer: a

Explanation:

The correct answer is ***1 only.***

⭐ Key Points

Insolation

- Insolation, or incoming solar radiation, refers to the solar energy that reaches the Earth's surface. It is a critical factor driving weather patterns and climate.
- The statement that **insolation is predominantly short-wave radiation, with wavelengths in the range of 0.39 micrometre to 0.76 micrometre**, is accurate. This range includes the visible spectrum, which is a significant portion of the solar radiation that reaches and warms the Earth. ***Hence, statement 1 is correct.***
- The claim that **insolation is evenly distributed across the Earth because of the Earth's curved surface** is incorrect. The Earth's curvature, axial tilt, and orbital eccentricities result in uneven distribution of solar energy, with the equatorial regions receiving more insolation than polar regions. This uneven distribution is a fundamental cause of climate zones and seasonal changes. ***Hence, statement 2 is incorrect.***

⭐ Additional Information

- **Solar Radiation:** The sun emits energy in the form of electromagnetic radiation. When this radiation travels through space and reaches the Earth's atmosphere and surface, it is referred to as solar radiation or insolation.
- **Wavelengths of Solar Radiation:** The solar spectrum includes not only visible light but also ultraviolet (UV) and infrared (IR) radiation. UV radiation has shorter wavelengths than visible light, whereas IR radiation has longer wavelengths.
- **Effects of Insolation:** The amount of insolation received by different parts of the Earth influences climate patterns, weather conditions, and the growth of vegetation. It is also a key factor in the Earth's energy balance, affecting temperature and atmospheric circulation.
- **Seasonal Variations:** The Earth's tilt and its orbit around the sun lead to variations in the angle at which the sun's rays strike the Earth, causing seasons. This results in significant changes in insolation over the course of a year for most locations.
- **Latitude and Insolation:** Insolation varies with latitude, with equatorial regions receiving more consistent and direct sunlight year-round compared to higher latitudes, which experience more pronounced seasonal variations.

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88. **Answer: b**

Explanation:

The correct answer is ***K. M. Cariappa.***

⭐ Key Points

- Field Marshal **Kodandera Madappa Cariappa** was the **first Indian Commander-in-Chief** of the Indian Army after independence.
- He took over as Commander-in-Chief of the Indian Army from General Sir Francis Butcher, the last British Commander-in-Chief of India, on **15 January 1949**.

- This day is celebrated as **Army Day in India** every year in recognition of Field Marshal K.M. Cariappa's taking over as the first Commander-in-Chief of the Indian Army from General Sir Francis Butcher.
- Field Marshal Cariappa's leadership was instrumental in shaping the early years of the Indian Army post-independence.
- He is also one of the only two Indian Army officers to hold the highest rank of Field Marshal; the other being **Field Marshal Sam Manekshaw.**

Hence, the correct answer is K. M. Cariappa.

⭐ Additional Information

- The role of the **Commander-in-Chief** is critical in the defense architecture of a country, being the highest-ranking officer in the armed forces and responsible for the overall operational command.
- Field Marshal K.M. Cariappa's tenure is remembered for his emphasis on discipline, secularism, and a professional approach towards the armed forces.
- He was known for his strict adherence to the principle of civilian control over the military, laying the foundation for a democratic and professional military ethos in independent India.
- **Field Marshal Cariappa**'s legacy includes not only his military achievements but also his humanitarian approach, including his efforts towards the welfare of soldiers and his stance on human rights during military operations.
- The rank of **Field Marshal** is the **highest rank** in the Indian Army. It is a ceremonial or wartime rank, and as of the last update, has been conferred on only two officers.

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89. Answer: b

Explanation:

The correct answer is ***2 only.***

⭐ Key Points

- Vaccinations work primarily by stimulating the immune system to produce antibodies without causing the disease itself.
- **Blocking the entry of the infectious agent into the body** is not a function of vaccines. Vaccines work after the infectious agent enters the body by preparing the immune system to recognize and fight the infectious agent.
    - Hence, statement 1 is incorrect.
- **Producing antibodies against infection** is a core function of vaccines. By introducing a harmless component of the infectious agent or a blueprint for producing such components, vaccines train the immune system to recognize and combat the pathogen without causing the disease.
    - Hence, statement 2 is correct.
- **Killing the infectious agent when it enters the body** is not the direct action of vaccines. While vaccines prepare the immune system to effectively fight the infectious agent, they do not directly kill pathogens. The immune response facilitated by vaccination is responsible for targeting and eliminating the infectious agent.
    - Hence, statement 3 is incorrect.

⭐ Additional Information

- **Types of Vaccines:** There are several types of vaccines, including live attenuated vaccines, inactivated vaccines, subunit vaccines, toxoid vaccines, and mRNA vaccines. Each type has a different method of preparing the immune system to fight the disease.
- **Herd Immunity:** When a significant portion of a population becomes immune to an infectious disease (through vaccination and/or previous infections), herd immunity is achieved. This provides a measure of protection for individuals who are not immune.
- **Global Vaccination Efforts:** Organizations like the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC) play critical roles in promoting vaccination and providing guidelines for vaccine use worldwide to prevent outbreaks of infectious diseases.
- **Immunization Schedules:** Countries have specific immunization schedules for children and adults to protect against various infectious diseases. These schedules recommend the ages at which people should receive vaccinations to ensure optimal protection.

- **Vaccine Safety:** Vaccines undergo rigorous testing for safety and efficacy through multiple phases of clinical trials before they are approved for public use.

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90. Answer: b

Explanation:

The correct answer is **multiple parabolic antennas**.

⭐ **Key Points**

The Giant Metrewave Radio Telescope (GMRT)

- The **GMRT** is an array of thirty fully s**teerable gigantic parabolic dishes of 45 meters** in diameter.
- These antennas are spread over distances of up to **25 kilometers** and function together as a single large telescope.
- It utilizes radio frequencies in the range of **50 MHz to 1.5 GHz,** making it one of the most v**ersatile radio observatories**.
- The **GMRT** is located near **Pune**, India, and is operated by the **National Centre for Radio Astrophysics.**
- It is one of the **world's most powerful radio observatories** for investigating various astronomical phenomena such as **pulsars, quasars, supernovae, and galaxies.**
- Despite the wording suggesting circular, the correct terminology in radio astronomy for the shape of the antennas is 'parabolic', which refers to the dish's shape that focuses the radio waves. ***Hence, option 2 is correct.***

⭐ **Additional Information**

- The **GMRT** was conceptualized in the early **1980s**, with construction beginning in the early 1990s and completed in 1997.
- Its design allows for upgrades, and it has undergone enhancements to improve sensitivity and operational frequency range, ensuring its continued relevance in astronomical research.

- The **GMRT** has contributed to several key discoveries, including the **detection of the farthest known radio galaxy and insights into the nature of the early Universe.**

General Information on Telescope Arrays

- A telescope array, like GMRT, uses multiple antennas working together, effectively operating as a single, larger telescope. This methodology, known as interferometry, significantly boosts observational capabilities.
- Telescope arrays combine signals from individual antennas to improve resolution and image quality, which is crucial for modern astronomical research.
- **Examples** of other notable radio telescope arrays include the **Very Large Array (VLA) in New Mexico, USA, and the Atacama Large Millimeter/submillimeter Array (ALMA) in Chile.**

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91. Answer: d

Explanation:

The correct answer is **1, 2 and 3**.

Key Points

- Meanders are **sinuous bends or curves in a river channel**, which form naturally as a river erodes the landscape in snake-like paths.
- While a **U-shaped** description is simplistic, meanders are indeed characterized by their winding or bending form, which can resemble a series of U-shapes or large loops along a river course. **Hence, statement 1 is correct.**
- An **extremely tight meander**, sometimes resembling a neck of a goose, hence termed a **gooseneck**, is prone to the natural process of cutoff, particularly during floods. This process creates an **oxbow lake**, which is a U-shaped water body left behind when the river finds a shorter course, bypassing the meander. **Hence, statement 2 is correct.**
- **Tectonic uplift** can indeed influence a river's behavior. When an area undergoes uplift, it can alter the river's gradient, prompting it to carve deeper into its bed

rather than meandering across a floodplain. This process can lead to the formation of **incised or entrenched meanders**, where meanders cut deeply into the underlying terrain. **Hence, statement 3 is correct.**

⭐ Additional Information

- **Meander formation** is primarily driven by the lateral erosion and deposition along the outer and inner banks of the river bend, respectively.
- The **stream velocity** is higher along the outer edge of a bend due to greater water depth, leading to more erosion; conversely, the inner edge experiences slower velocities, prompting sediment deposition.
- **Oxbow lakes** are important for biodiversity, serving as habitats for various aquatic and bird species, even as they represent a snapshot in the dynamic process of fluvial geomorphology.
- **Incised meanders** serve as a testament to the river's history, capturing the interplay between climatic, tectonic, and hydrological factors over geological time scales.
- The study of river meanders and their evolution is crucial in **hydrology, river engineering, and environmental science**, informing flood management practices and river restoration projects.

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92. **Answer: d**

Explanation:

The correct answer is **SAMBHAV.**

⭐ Key Points

- **SAMBHAV is an end-to-end secure mobile ecosystem developed by the Indian Army.**
- It ensures that communication within the army is secure and encrypted to prevent any unauthorized access.
- **SAMBHAV is designed to provide a secure means of communication for the Indian Army personnel.**

- It is a step towards self-reliance in defense technology for the Indian Armed Forces.

⭐ Additional Information

- **SANCHAR:** SANCHAR is not related to the Indian Army's secure mobile ecosystem. It generally refers to communication but is not specific to any military application.
- **VAIBHAV**: VAIBHAV is an initiative that stands for "Vaishvik Bhartiya Vaigyanik" (Global Indian Scientists) and is not related to the Indian Army's secure mobile ecosystem.
- **SAMPARK**: SAMPARK is generally associated with communication or interaction but is not the name of the secure mobile ecosystem developed by the Indian Army.

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93. **Answer: c**

Explanation:

The correct answer is ***Red blood cells.***

⭐ Key Points

Characteristics of Red Blood Cells (RBCs)

- Red blood cells, also known as **erythrocytes**, are distinctive among human body cells as they lack a nucleus in their mature form.
- These cells are responsible for **transporting oxygen** from the lungs to the rest of the body and returning carbon dioxide back to the lungs for exhalation.
- RBCs have a unique biconcave shape that increases their surface area for oxygen exchange and allows them to deform as they navigate through the body's capillaries.
- The absence of a nucleus and other organelles in mature red blood cells provides **more space for hemoglobin**, the protein that binds oxygen. This specialization enhances their oxygen-carrying capacity.

- The lifespan of an RBC is about **120 days**. After this, they are broken down and recycled by the spleen and liver.
- Red blood cells are produced in the bone marrow through a process called **erythropoiesis**, controlled by the hormone erythropoietin.
- **Anemia** can result from a decrease in RBC count or hemoglobin, leading to reduced oxygen transport to the body's tissues. ***Hence, statement 3 is correct.***

⭐ Additional Information

- **Muscle cells** contain nuclei and are specialized for contraction. Skeletal muscle cells, for instance, are multinucleated.
- **Phagocytic cells**, such as macrophages, play a crucial role in the body's immune response by ingesting harmful pathogens. These cells have a nucleus.
- **Ciliated cells** are characterized by the presence of cilia on their surface and are found in various parts of the body, such as the respiratory tract, where they help move mucus and trapped particles out of the lungs. Ciliated cells also contain a nucleus.
- The process of **erythropoiesis** is stimulated by low oxygen levels in the blood, detected by the kidneys, which then secrete erythropoietin to increase RBC production.
- **Hemoglobin** within RBCs not only transports oxygen but also plays a role in the transport of carbon dioxide and hydrogen ions, which are crucial for maintaining the body's acid-base balance.

---

94. Answer: a

Explanation:

The correct answer is ***Axiom Station***.

⭐ Key Points

- The **Axiom Station** is set to become the first commercial space station, marking a significant milestone in the commercialization of space.
- Unlike the **International Space Station (ISS)**, which is a multinational collaborative project involving five participating space agencies: NASA (United

States), Roscosmos (Russia), JAXA (Japan), ESA (Europe), and CSA (Canada), Axiom Station is being developed by a private company, Axiom Space.

- Axiom Space's vision includes not only providing research and manufacturing facilities in low Earth orbit but also promoting space tourism and eventually serving as a hub for missions to deeper space.
- The station is planned to attach initially to the ISS, leveraging the existing infrastructure, before eventually becoming a fully independent, commercial space station.
- **Galileo** and **Voyager 1** are unrelated to commercial space stations; Galileo is a global navigation satellite system (GNSS) used for positioning, while Voyager 1 is a space probe launched by NASA to study the outer Solar System and interstellar space.

Hence, the correct option is Axiom Station.

⭐ Additional Information

- The **International Space Station (ISS)** has been in operation since 1998 and represents the longest continuous human presence in low Earth orbit, serving as a model for international cooperation in space.
- Axiom Space's initiative to build a commercial space station highlights the growing trend of private-sector participation in space exploration, a domain that was traditionally dominated by government space agencies.
- Commercial space stations like Axiom Station are expected to play a crucial role in the future of space exploration, including providing platforms for scientific research, manufacturing in microgravity conditions, and facilitating commercial space tourism.
- The development of commercial space habitats is also seen as a stepping stone for human colonization of other planets, with companies and researchers exploring how to sustain human life in space for extended periods.
- **Space tourism** is becoming an increasingly tangible reality, with companies such as SpaceX, Blue Origin, and Virgin Galactic working towards making space accessible to non-professional astronauts.

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95. Answer: c

Explanation:

The correct answer is **Option 3.**

⭐ Key Points

Understanding Relative Humidity

- Relative humidity is a way of describing how much humidity is present in the air, compared to how much there could be at a particular temperature.
- **Temperature** is crucial because the capacity of air to hold water vapor increases as the air gets warmer. This means that relative humidity changes with temperature even if the amount of moisture in the air remains constant.
- **Absolute humidity** is the measure of water vapor (moisture) in the air, regardless of temperature. It is expressed as grams of moisture per cubic meter of air (g/m3).
- To calculate **relative humidity**, one needs to know both the current absolute humidity and the maximum possible absolute humidity at the current temperature. The formula for relative humidity is: *Relative Humidity = (Absolute Humidity / Maximum Possible Absolute Humidity) * 100*.
- **Therefore, both the temperature and absolute humidity are required** to determine the relative humidity. Knowing only one of these variables is insufficient because you cannot calculate how saturated the air is with water vapor without both pieces of information. ***Hence, statement 3 is correct.***

⭐ Additional Information

- **Measurement of Humidity:** Devices such as hygrometers and psychrometers are used to measure humidity. A hygrometer measures the humidity directly, while a psychrometer uses the difference between two temperature readings (dry bulb and wet bulb) to calculate humidity.
- **Importance of Humidity:** Humidity plays a significant role in weather patterns and can affect human comfort and health, agricultural conditions, and the preservation of materials.
- **Dehumidifiers and Humidifiers:** These devices are used to control the level of humidity in indoor environments. A dehumidifier removes excess moisture

from the air, while a humidifier adds moisture to the air, helping to maintain a comfortable and healthy indoor atmosphere.

- **Weather Forecasting:** Understanding humidity is essential for predicting weather conditions, such as rain, snow, fog, and dew. Meteorologists use measurements of temperature, absolute humidity, and relative humidity in their forecasts.
- **Heat Index:** The heat index or "feels-like" temperature takes into account both the air temperature and the relative humidity to determine how hot the weather feels to the human body. High relative humidity reduces the body's ability to cool itself through evaporation of perspiration, making it feel hotter than the actual air temperature.

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96. **Answer: c**

Explanation:

The correct answer is ***Both 1 and 2***.

⭐ **Key Points**

Regional Comprehensive Economic Partnership (RCEP)

- The **Regional Comprehensive Economic Partnership (RCEP)** is a free trade agreement in the Asia-Pacific region between the ten ASEAN member states and five of their FTA partners.
- **ASEAN member states** include Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam.
- The **five ASEAN FTA partners** involved in RCEP are Australia, China, Japan, New Zealand, and South Korea.
- **India was originally part of the negotiations** but opted out in 2019 citing concerns that reducing tariffs across the board would harm its domestic producers by opening them up to a flood of cheap imports.
- RCEP aims to **standardize trade-related rules**, reduce tariffs and non-tariff barriers, and enhance economic cooperation among its members.

- **RCEP is significant** as it covers nearly a third of the global population and accounts for almost 30% of global GDP, making it one of the world's largest trading blocs.
- *Hence, statement 1 is correct.*
- *Hence, statement 2 is correct.*

⭐ Additional Information

- The **objectives of RCEP** include enhancing economic integration and fostering trade among the participating countries, contributing to the growth and development of the region.
- For **India,** concerns over RCEP included not just the potential for increased imports but also issues related to non-tariff barriers and the need for better market access for its services.
- RCEP negotiations were **formally launched** in November 2012 at the ASEAN Summit in Cambodia and concluded in November 2020.
- The agreement is seen as a **counterbalance** to the influence of the United States in the region, especially after the U.S. withdrew from the Trans-Pacific Partnership (TPP).
- While India is not a part of RCEP, it has the **option to join** the agreement in the future if it decides that the terms are favorable or if its concerns are addressed satisfactorily.

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97. **Answer: a**

Explanation:

The correct answer is **They are non-biodegradable.**

⭐ Key Points

- **Plastics** are **synthetic or semi-synthetic materials** that are durable and resistant to many natural processes of degradation, making them non-biodegradable.
- Their **resistance to biodegradation** results in a **long-lasting** presence in the environment, contributing to pollution on land and in water bodies.

- This property leads to significant environmental problems, including **soil and water pollution**, harm to marine and wildlife, and the accumulation of non-decomposable waste in landfills.
- The chemical structure of plastics is such that microorganisms in the environment cannot easily break them down, resulting in their accumulation over time.

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98. Answer: c

Explanation:

The correct answer is ***Silver.***

⭐ Key Points

Ferromagnetic Materials

- **Ferromagnetism** is a physical phenomenon in which a material can exhibit a spontaneous magnetization, and it is one of the strongest forms of magnetism.
- Materials that are known to be ferromagnetic include **Iron (Fe), Cobalt (Co), and Nickel (Ni)** along with some of their alloys and certain rare earth metals.
- Ferromagnetic materials have **domains** in which the magnetic moments are aligned in the same direction. When these materials are placed in an external magnetic field, these domains become aligned, making the material magnetized.
- **Silver**, however, is **not ferromagnetic**. Silver is classified as a **diamagnetic material**, which means it tends to become magnetized in a direction opposite to that of the magnetic field applied but with a very weak intensity. Therefore, it does not retain magnetization in the absence of an external magnetic field.
- **Ferric chloride**, although not a pure metal, can exhibit magnetic properties due to the presence of iron, but it is not inherently a strong ferromagnetic material like pure Iron, Cobalt, or Nickel.
- *Hence, Silver is not a ferromagnetic material.*

⭐ Additional Information

- In the context of **electromagnetism**, materials are broadly classified into several types based on their magnetic properties: **ferromagnetic, paramagnetic, diamagnetic, and antiferromagnetic materials**.
- **Ferromagnetic materials** are highly attracted to magnets and can become permanent magnets themselves when exposed to a magnetic field.
- **Paramagnetic materials**, like aluminum and platinum, are weakly attracted to magnets and do not retain magnetic properties once the external field is removed.
- **Diamagnetic materials**, such as silver and gold, are weakly repelled by both poles of a magnet and do not retain any magnetization.
- **Antiferromagnetic materials** have magnetic moments that are aligned in opposite directions, resulting in no overall magnetization.
- The study of these materials and their properties is crucial in various applications, including **electronics, data storage, medical imaging, and automotive sensors**.

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99. **Answer: a**

Explanation:

The correct answer is ***CFC***.

⭐ Key Points

Greenhouse Gases and Their Atmospheric Residence Time

- **Chlorofluorocarbons (CFCs)** are synthetic compounds consisting of carbon, chlorine, and fluorine. They were once widely used in industrial applications, including as refrigerants, solvents, and foam blowing agents.
- CFCs are known for their role in ozone depletion as well as their greenhouse gas effects. They absorb infrared radiation, trapping heat in the atmosphere, which contributes to global warming.
- The **average residence time** of CFCs in the atmosphere is significantly longer than that of other greenhouse gases. They can stay in the atmosphere for up to **50 to 100 years** before decomposing or being removed.

- Comparatively, other greenhouse gases such as **methane (CH_4)** and **nitrous oxide (N_2O)** have shorter atmospheric lifetimes. Methane has an average residence time of approximately **12 years**, while nitrous oxide remains in the atmosphere for about **114 years**.
- **Water vapor**, though a potent greenhouse gas, has a relatively short residence time in the atmosphere, typically ranging from a **few days to a couple of weeks**, depending on the prevailing climatic conditions.

Hence, the statement that CFC has the maximum average residence time in the atmosphere is correct.

⭐ Additional Information

- The **Montreal Protocol** on Substances that Deplete the Ozone Layer is an international treaty designed to protect the ozone layer by phasing out the production of numerous substances, including CFCs, responsible for ozone depletion.
- While **CFCs** have a **high global warming potential (GWP)**, efforts to reduce their use have been successful in mitigating both ozone depletion and their contribution to global warming.
- The role of greenhouse gases in global warming is critical, as their presence in the atmosphere regulates Earth's temperature. However, excessive concentrations, particularly of long-lived gases like CFCs, can lead to a significant and harmful increase in global temperatures.
- Understanding the **atmospheric residence time** of greenhouse gases is essential for predicting their long-term effects on global climate patterns and for developing strategies to mitigate climate change.

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100. Answer: c

Explanation:

The Correct answer is **Argentina**.

⭐ Key Points

- The **Government of India** has entered into an agreement with **Argentina** for a **lithium exploration and mining project**.
- This agreement is part of India's strategy to secure critical minerals and diversify its sources of **lithium**.
- **Argentina** is one of the leading countries in the world with significant lithium reserves, particularly in the **Lithium Triangle** region.
- The agreement aims to enhance **bilateral cooperation** between India and Argentina in the mining sector.
- India is looking to boost its **electric vehicle (EV) industry** and renewable energy projects, which require a steady supply of lithium for batteries.
- This collaboration is expected to help India meet its **domestic lithium demand** and reduce dependence on other countries.

⭐ Additional Information

- **Brazil**
  - Brazil is known for its rich natural resources, including significant deposits of iron ore, gold, and bauxite.
  - It is not a leading country in lithium reserves compared to Argentina.
  - Brazil has strong agricultural and mining sectors, contributing significantly to its economy.
- **Australia**
  - Australia is a major global player in the mining industry, particularly known for its extensive **lithium reserves**.
  - It is one of the world's largest producers of lithium, primarily from the Greenbushes lithium mine in Western Australia.
  - Australia has well-established mining infrastructure and technology for lithium extraction.
- **Chile**
  - Chile is part of the **Lithium Triangle** in South America, alongside Argentina and Bolivia, and has vast lithium reserves.
  - It is one of the world's largest producers of lithium, with significant operations in the Salar de Atacama.
  - Chile's lithium is crucial for the global supply chain of batteries and electric vehicles.

101. **Answer: b**

Explanation:

The correct answer is ***enzymes.***

⭐ Key Points

Microbodies in Plant and Animal Cells

- Microbodies are **specialized organelles** found within both plant and animal cells, serving various functions depending on their specific types such as peroxisomes, glyoxysomes, and others.
- These organelles are **key to various metabolic processes** including lipid metabolism, the detoxification of hydrogen peroxide via the enzyme catalase, and other pathways involving enzymes.
- Microbodies contain **enzymes** that are crucial for the breakdown of fatty acids and the detoxification processes. These enzymes facilitate reactions that would otherwise be harmful to the cell.
- **Enzymes** within microbodies play a vital role in the conversion of reactive oxygen species into safer molecules, protecting cells from oxidative stress.
- The presence of enzymes in microbodies highlights their role in **cellular metabolism and protection**.

Hence, the correct statement is that microbodies contain enzymes.

⭐ Additional Information

- **Peroxisomes** are a type of microbody found in virtually all eukaryotic cells, involved in the catabolism of very long chain fatty acids, branched chain fatty acids, D-amino acids, and polyamines.
- **Glyoxysomes**, found in plant cells, especially in seedlings, play a crucial role in the conversion of fat into carbohydrates during germination.
- The enzyme **catalase**, which is abundant in peroxisomes, breaks down hydrogen peroxide into water and oxygen, a critical reaction for cell protection against oxidative damage.

- Microbodies are **important for lipid metabolism**, playing a role in the biosynthesis of plasmalogens, which are important components of the myelin sheath of nerve cells.
- The study of microbodies and their enzymes has implications for understanding **human diseases**, such as X-linked adrenoleukodystrophy (X-ALD), which involves the accumulation of very long chain fatty acids due to a peroxisome biogenesis disorder.

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102. Answer: c

Explanation:

The correct answer is **Option 3**.

⭐ **Key Points**

- **Cooling Principles**
  - When attempting to cool something quickly, the effectiveness of heat transfer and the conditions that facilitate it are crucial.
  - A combination of conduction (direct contact with cooler substances) and convection (movement of air) will enable faster cooling.
- **Best Option: Bowl of Water with Fan**
  - Keeps the bowl of rice in a bowl of water at room temperature enhances heat transfer due to conduction between the rice and the cooler water.
  - Operating a ceiling fan (or table fan) at full speed promotes convection, where moving air helps to carry away the absorbed heat from the water.
  - This combination of conducting heat to the cooler water and removing this water's heat through airflow provides the most efficient cooling method among the given options.

⭐ **Additional Information**

- **Heat capacity of water:** Water has one of the highest specific heat capacities among common substances, which is why it is an excellent medium for cooling. This property allows water to absorb a lot of heat before its temperature rises significantly.

- **Conduction vs. Convection:**
  - **Conduction** is the process of heat transfer through direct contact between materials at different temperatures. It's very effective in cooling solid foods quickly when immersed in liquids.
  - **Convection** involves the movement of heat through fluids (liquids or gases) caused by molecular motion. While effective in air-cooling systems, its efficiency is highly dependent on the airflow and the surface area exposed to the cool air.
- **Food safety:** Rapid cooling of cooked foods is crucial in food safety. Bacteria grow most rapidly in the range of temperatures between **40°F and 140°F**, doubling in number in as little as 20 minutes. Quick cooling reduces the time food spends in this "**danger zone**".

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103. Answer: b

Explanation:

The correct answer is **Desert climate**

⭐ Key Points

Köppen Climate Classification

- The **Köppen climate classification** system categorizes the world's climates into five main groups: A (Tropical), B (Dry), C (Temperate), D (Continental), and E (Polar).
- Under this system, the letter **"B"** denotes dry climates, and the subsequent letter indicates a more specific climate type.
  - **"BW"** stands for **desert climate**, characterized by very low precipitation that does not meet the requirements to support most forms of vegetation.
  - **"BS"** signifies **steppe climate**, which is a semi-arid climate with slightly more precipitation than desert climates, allowing for some grasslands and shrublands to thrive.

- The **desert climate (BW)** is further divided based on temperature, such as hot deserts (BWh) and cold deserts (BWk).
- Steppe climates (BS), found on the edges of deserts, serve as a transition between the desert climate and more humid climates, showcasing a gradient of vegetation density.
- **Köppen's classification** is widely used for its simplicity and effectiveness in depicting climate zones based on vegetation, temperature, and precipitation patterns.

Hence, the correct option is Steppe climate.

⭐ Additional Information

- The **Köppen climate classification** system was first published by the German climatologist Wladimir Köppen in 1884 and has been updated several times to reflect new findings in climatology.
- This classification system is **essential for understanding global climate patterns** and their influence on the distribution of flora, fauna, and human societies.
- **Desert climates (BW)** are characterized by evaporation rates that exceed precipitation, leading to sparse water resources and vegetation. These regions include the Sahara Desert in Africa and the Arabian Desert in the Middle East.
- **Steppe climates (BS)** are often located at the margins of deserts, receiving slightly more rainfall, which supports a broader variety of life. Examples include the Great Plains in North America and the Steppes of Central Asia.
- Understanding these climate zones is **crucial for agriculture, urban planning, and managing water resources**, especially in regions prone to droughts or desertification.

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104. **Answer: c**

Explanation:

The correct answer is Both 1 and 2.

⭐ Key Points

- The **Shanghai Cooperation Organisation (SCO)** is a significant multilateral organization aimed at fostering cooperation in political, economic, and security matters among its member states.
- One of the primary goals of the SCO is indeed to **promote a new democratic, fair, and rational international political and economic order**. This objective is aligned with the organization's broader vision to enhance mutual trust, neighborliness, and friendship among member countries.
    - **Hence, statement 1 is correct.**
- **Iran** has officially become a full member of the **Shanghai Cooperation Organisation** (SCO) during an **India-hosted virtual summit** of the influential grouping in **2023**.
    - **Hence, statement 2 is correct.**

⭐ Additional Information

- The SCO was **established in 2001** in Shanghai by the leaders of China, Russia, Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan.
- India and Pakistan **became full members** of the SCO in 2017, highlighting the organization's expanding influence and the growing interest of South Asian countries in participating in regional security and economic frameworks.
- The SCO focuses on several key areas, including **anti-terrorism, security, economic cooperation, and cultural exchange**. These priorities reflect the organization's comprehensive approach to fostering stable and prosperous relations among its members.
- The **Regional Anti-Terrorist Structure (RATS)** based in Tashkent, Uzbekistan, is a specialized SCO agency dedicated to promoting cooperation among member states against terrorism, separatism, and extremism.

---

105. Answer: c

Explanation:

The correct answer is ***lysozyme.***

⭐ Key Points

Antibacterial Enzyme in Saliva and Tears

- **Lysozyme** is a naturally occurring enzyme found in bodily secretions such as saliva, tears, and milk.
- It plays a crucial role in the body's immune system by **protecting against bacterial infection.**
- Lysozyme functions by **breaking down the cell walls of bacteria,** specifically targeting the peptidoglycan layer, leading to the lysis or dissolving of the bacterial cell.
- This enzyme is **significant in both innate and adaptive immunity** as it is one of the first lines of defense against microbial invasion.
- Its presence in tears and saliva is particularly important for protecting the eyes and oral cavity from bacterial infections.
- Lysozyme's antibacterial properties have been utilized in **food preservation, medicine, and veterinary science** to combat bacterial infections and preserve the shelf life of perishable goods.

Hence, the correct option is lysozyme.

⭐ Additional Information

- **Ribozyme** is a type of RNA that can catalyze chemical reactions, often involved in the synthesis and modification of RNA itself within the cell.
- **Lipase** is an enzyme that catalyzes the hydrolysis of fats into glycerol and free fatty acids, playing a critical role in digestion and lipid metabolism.
- **Isomerase** is an enzyme that catalyzes the conversion of a molecule from one isomer to another, including structural rearrangements within a molecule.
- The study of enzymes like lysozyme contributes significantly to our understanding of **immune system functioning** and provides insights into developing new therapeutic approaches for bacterial infections.
- Lysozyme's ability to lyse bacteria without harming human cells makes it an attractive component in creating **antibacterial treatments** that are less likely to contribute to antibiotic resistance, a growing concern in the medical community.

106. **Answer: c**

Explanation:

The correct answer is **1, 2 and 3**.

⭐ Key Points

- The **Marrakech Partnership for Global Climate Action** was established in 2016, during the COP22 climate conference held in Marrakech, Morocco, to enhance cooperation among parties and non-party stakeholders, including cities, regions, businesses, and investors, in the fight against climate change.
- **It is an intergovernmental partnership for global climate action,** aiming to strengthen collaboration and ambition to mitigate global warming. **Hence, statement 1 is correct.**
- **It also encompasses a broader collaboration between governments and other stakeholders,** such as cities, businesses, investors, and civil society, recognising the crucial role they play in achieving global climate goals. **Hence, statement 2 is correct.**
- The partnership's actions and initiatives are in alignment with and guided by the broader international frameworks, including the **2030 Agenda for Sustainable Development** and its Sustainable Development Goals (SDGs), highlighting the interconnectedness of climate action and sustainable development. **Hence, statement 3 is correct.**

⭐ Additional Information

- The **2030 Agenda for Sustainable Development** provides a shared blueprint for peace and prosperity for people and the planet, now and into the future, which was adopted by all **United Nations Member States in 2015**.
- The Marrakech Partnership for Global Climate Action plays a critical role in facilitating non-state actors' engagement in climate action, complementing the **nationally determined contributions (NDCs)** under the **Paris Agreement.**
- This partnership recognises the need for an inclusive approach to handling the climate crisis, whereby actions from every level of society are necessary to

meet the ambitious targets set by the international community to combat climate change and its impacts.

- The approach of the Marrakech Partnership is representative of the shift in climate change governance towards a more **'polycentric'** model, where multiple levels of governance, including non-governmental actors, play a crucial role in addressing the complex challenge of climate change.

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107. Answer: a

Explanation:

The correct answer is ***The International Union for Conservation of Nature (IUCN)***.

⭐ **Key Points**

The International Union for Conservation of Nature (IUCN)

- The **IUCN** is an international organization working in the field of nature conservation and sustainable use of natural resources.
- It was **established in 1948**, making it one of the oldest global environmental organizations.
- The IUCN is best known for compiling and publishing the **IUCN Red List of Threatened Species**, which assesses the conservation status of species worldwide.
- This list categorizes species into nine groups, from **Least Concern to Extinct**, based on their population status, trends, and threats.
- It operates through a network of **member organizations** which includes governments, NGOs, and scientific institutions from around the world.
- The IUCN's work is vital for informing conservation policies, legislation, and actions at both the global and local levels.

Hence, the statement regarding the IUCN publishing the worldwide list of endangered species is correct.

⭐ **Additional Information**

- The **IUCN Red List** is a critical indicator of the health of the world's biodiversity. It provides information on the range, population size, habitat and ecology, use and/or trade, threats, and conservation actions that will help inform necessary conservation decisions.
- The IUCN also plays a significant role in the implementation of global conventions such as the **Convention on Biological Diversity (CBD)**, the **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)**, and the **World Heritage Convention**.
- Through its **Species Survival Commission (SSC)**, the IUCN has thousands of volunteers who contribute to its species assessment work.
- The organization's work extends beyond species assessment to include **protected area management**, **climate change mitigation**, and **environmental policy development**.
- The IUCN's headquarters is located in **Gland, Switzerland**, but it operates globally through its regional offices and member organizations.

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108. Answer: c

Explanation:

The correct answer is **Both 1 and 2.**

⭐ **Key Points**

The ICC under-19 Men's Cricket World Cup, 2024

- In the final, **Australia defeated India** by 79 runs to win their **fourth** Under-19 Cricket World Cup title.***Hence, statement 1 is correct.***
- The **2024 ICC Under-19 Men's Cricket World Cup** was an international limited-overs cricket tournament organized by the **International Cricket Council (ICC)**, that was held in **South Africa** from **19 January to 11 February 2024.** It was the **fifteenth edition** of the Under-19 Cricket World Cup. ***Hence, statement 2 is correct.***

⭐ **Additional Information**

- The **ICC under-19 Men's Cricket World Cup** is a pivotal event in the cricket calendar, offering a platform for young talents to showcase their skills on an international stage.
- This tournament has been instrumental in discovering **future stars of international cricket**.
- **South Africa** has previously hosted international cricket tournaments, including the **ICC under-19 Men's Cricket World Cup**, noted for its excellent cricketing infrastructure and history of successfully organizing major sports events.

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109. Answer: c

Explanation:

The correct answer is **Potato, onion, garlic**.

⭐ **Key Points**

- **Underground Stems/Modified Stems**
  - **Potato:** It is a tuber, which is a type of underground stem modified for the storage of nutrients.
  - **Onion:** It is a bulb, another type of underground stem where layers of modified leaves (scales) are arranged around a central stem.
  - **Garlic:** Similar to onion, garlic is also a bulb, and it consists of multiple cloves, each of which is a small bulb covered by a papery tunic.

⭐ **Additional Information**

- In the study of botany, **underground stems** such as tubers, rhizomes, corms, and bulbs play a critical role in asexual reproduction, nutrient storage, and the survival of the plant through unfavourable conditions.
- **Tubers** are characterized by the presence of eyes or buds, which can grow into new plants. The potato is the most common example, where each eye can give rise to a new plant.
- **Rhizomes** are also underground stems, running horizontally beneath the soil surface. Ginger and turmeric are examples of plants that have rhizomes.

- **Corms** are short, vertical, swollen underground plant stems that serve as storage organs to help the plant survive winter and other adverse conditions, examples include crocuses and gladiolus.
- **Bulbs**, like onions and garlic, are another form of modified stems, consisting of a short stem with fleshy leaves or leaf bases that function as food storage organs during dormancy.

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110. Answer: c

Explanation:

The correct answer is ***1, 2 and 3.***

⭐ Key Points

- The **Special Marriage Act, 1954** in India provides a legal framework for the marriage of individuals irrespective of their religion or faith. It allows for interreligious marriages without the need for converting to one another's religion.
  - This Act lays down the procedures and conditions for a valid marriage, including notice period, age of consent, and others, ensuring legal recognition of such marriages. **Hence, statement 1 is correct.**
- The **Right to marry a person of one's choice** is indeed recognized as an integral aspect of the **Right to Life and Personal Liberty** under **Article 21** of the **Constitution of India**.
  - The Supreme Court of India has affirmed that choosing a life partner is a person's inviolable freedom under Article 21. This underscores the protection of individual autonomy in personal relationships. **Hence, statement 2 is correct.**
- The **Universal Declaration of Human Rights (UDHR)**, adopted by the United Nations in 1948, articulates the fundamental rights and freedoms to which all human beings are entitled.
  - Article 16 of the UDHR specifically addresses the right to marry and to found a family, stating that men and women of full age have the right to marry and to found a family, without any limitation due to race,

nationality, or religion. They are entitled to equal rights as to marriage, during marriage, and at its dissolution. **Hence, statement 3 is correct.**

⭐ Additional Information

- The **Special Marriage Act** is particularly significant for couples in interfaith or intercaste marriages, providing a secular form of marriage registration and certification.
    - It represents an important recognition of the multicultural and pluralistic society of India, ensuring that marriage, a fundamental social institution, is accessible and equitable for all citizens, regardless of their religious or social backgrounds.
- **Article 21** of the Constitution of India is one of the most comprehensive rights, providing the basis for a wide range of rights related to life and personal liberty. This includes the right to privacy, the right to live with human dignity, and the right to environmental protection, among others.
- The **Universal Declaration of Human Rights** serves as a foundational document for international human rights law.
    - It has inspired numerous international treaties, national constitutions, and legal frameworks worldwide, emphasizing the inherent dignity and the equal and inalienable rights of all members of the human family.

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111. Answer: c

Explanation:

The correct answer is ***The Brahmaputra, Sadiya-Dhubri.***

⭐ Key Points

National Waterway No. 2

- **National Waterway No. 2** is situated on the **Brahmaputra river**, stretching from Sadiya in the east of Assam to Dhubri in the west of Assam, covering a distance of about **891 km**.

- This waterway plays a **crucial role in the transportation** of goods and passengers in the North-Eastern region of India, enhancing the connectivity within the region.
- It is **strategically important** for not just the economic development of the region but also for improving the logistic efficiency and reducing the transportation cost.
- The Brahmaputra river, being one of the major rivers in India, offers a **navigable water route** which is environmentally friendly and cost-effective.
- Development and maintenance of National Waterway No. 2 is undertaken by the **Inland Waterways Authority of India (IWAI)**, which aims at facilitating inland water transport.
- The waterway is also seen as a significant step towards leveraging the **Act East Policy**, promoting trade links with neighboring countries through water transport.

Hence, statement 3 is correct.

⭐ Additional Information

- The concept of **National Waterways** in India is aimed at developing the inland waterways for the effective transportation of goods and passengers across the country, ensuring minimal environmental impact.
- India has several **designated National Waterways**, each identified for its potential to enhance the overall logistic network and to promote regional development.
- The **Inland Waterways Authority of India (IWAI)** is the statutory authority in charge of the waterways in India. Its role includes the development and regulation of the inland waterways for navigation and transport.
- The use of inland waterways is seen as a step towards sustainable development by promoting **eco-friendly modes** of transportation, which also helps in decongesting road and rail networks.
- **Act East Policy** of India emphasizes improving economic ties, transportation links, and promoting cultural bonds with East and Southeast Asian countries. The development of National Waterways, including Waterway No. 2, aligns with this policy, facilitating trade and connectivity with countries such as Bangladesh, Myanmar, and beyond.

112. **Answer: b**

Explanation:

The correct answer is ***2 only.***

⭐ **Key Points**

Bharat Ratna Award

- The **Bharat Ratna** is the highest civilian award of the Republic of India.
- It was instituted in the year **1954**, not in 1972 as incorrectly mentioned in statement 1.
  - This award is given in recognition of exceptional service/performance of the highest order in any field of human endeavour. ***Hence, statement 1 is incorrect.***
- The award **does not carry any monetary grant** with it, just a medallion and a citation.
  - It is a recognition by the nation of the recipient's exceptional service/contribution. ***Hence, statement 2 is correct.***
- Any person without distinction of race, occupation, position, or sex is eligible for these awards.

⭐ **Additional Information**

- It is interesting to note that the **Bharat Ratna** and all other civilian awards were **suspended from July 1977 to January 1980** and subsequently from August 1992 to December 1995.
- The recommendation for Bharat Ratna is made by the **Prime Minister** to the **President of India**, with a maximum of three nominees being awarded per year.
- The recipients receive a certificate signed by the President and a medallion. The award does not include any cash allowance or reward.
- Notable recipients include **C. Rajagopalachari, Sarvepalli Radhakrishnan, and C.V. Raman** who were the **first recipients** of the Bharat Ratna in 1954.
- The award has been conferred upon a diverse range of individuals, including scientists, politicians, artists, and social workers.

- The **criteria for awarding the Bharat Ratna** have evolved over the years, and it has been awarded for achievements in the arts, literature, science, and public services, as well as for service of the highest order in any field of human endeavour.
- **Posthumous** awards have also been made. For example, former **Prime Minister Lal Bahadur Shastri** was awarded the Bharat Ratna posthumously in **1966**.

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113. Answer: a

Explanation:

The correct answer is ***1 and 2 only.***

⭐ **Key Points**

- The **weighted average lending rate** refers to the average rate of interest that banks charge on loans and advances, adjusted by the relative size of each loan. It is a critical indicator for assessing how changes in policy rates (such as the repo rate set by the central bank) affect lending rates offered to customers.
  - ***Hence, statement 1 is correct.***
- The **weighted average domestic term deposit rate** is the average rate that banks offer to depositors for fixed deposits, again weighted by the amount of each deposit. This rate is significant for understanding the transmission of policy rate changes to deposit rates, which in turn can influence savings and investment decisions in the economy.
  - ***Hence, statement 2 is correct.***
- The **1-year median Marginal Cost of Funds based Lending Rate (MCLR)** is a reference rate set by banks below which they cannot lend, except in some cases allowed by the central bank. It is designed to more accurately reflect the current cost of funds, making it a crucial measure of the monetary transmission mechanism. However, it is not explicitly mentioned in the context of this question.
  - ***Hence, statement 3 is not highlighted as a correct option.***

- The **Standing Deposit Facility (SDF) rate** is a rate at which the central bank absorbs liquidity without providing collateral. It's a tool for managing excess liquidity in the banking system and influences short-term interest rates, but it is not directly used to observe the monetary transmission mechanism in the context of this question.
    - ***Hence, statement 4 is not highlighted as a correct option.***

⭐ Additional Information

- The **monetary transmission mechanism** describes how policy decisions made by the central bank, such as changes in the policy interest rate, are passed on through the banking sector to influence the real economy. This process involves changes in bank rates, asset prices, exchange rates, and ultimately impacts spending and investment decisions by households and firms.
- **Policy rates** like the repo rate or reverse repo rate are critical tools for central banks to control liquidity and manage inflation. Changes in these rates signal the central bank's stance on monetary policy, influencing economic activity.
- The effectiveness of the monetary transmission mechanism depends on various factors, including the structure of the financial system, the level of development of financial markets, and the degree of financial inclusion among the population.
- In countries like **India**, where the banking sector plays a significant role in the financial system, indicators such as the weighted average lending rate and the weighted average domestic term deposit rate are particularly important for observing the impact of monetary policy changes.

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114. Answer: c

Explanation:

The correct answer is ***Both 1 and 2***.

⭐ Key Points

The International Court of Justice (ICJ)

- The ICJ, also known as the **World Court**, is the **principal judicial organ of the United Nations (UN)**.
- It was **established in 1945** by the Charter of the **United Nations** and began work in 1946.
- The court's role is to settle, in accordance with **international law**, legal disputes submitted by states, and to give advisory opinions on legal questions referred to it by authorized UN organs and specialized agencies.
- The Court consists of **15 judges**, elected for terms of office of **nine years** by the United Nations General Assembly and the Security Council. These two bodies vote simultaneously but independently of each other, and candidates need to obtain an absolute majority in both to be elected.
- **No two judges may be nationals of the same country** at the time of their election, ensuring the representation of the main forms of civilization and the principal legal systems of the world. ***Hence, statement 1 is correct.***
- The General Assembly and the Security Council are involved in the election process of the ICJ judges. They proceed independently of one another to elect the members of the Court. This unique voting arrangement was designed to ensure the independence of the judiciary from the political organs of the United Nations. ***Hence, statement 2 is correct.***

⭐ <u>Additional Information</u>

- The **ICJ** is located in the **Peace Palace in The Hague (Netherlands)**.
- It is the only **one of the six principal organs of the United Nations** not located in New York City.
- This setting underscores its **independence** from the **political operations** of the United Nations.
- Only **countries (states)** may be **parties** in cases before the ICJ, which has led to a significant body of case law on issues such as **land disputes, maritime boundaries, and diplomatic relations**.
- The **ICJ's advisory role** also plays a critical function in the development and interpretation of international law. Advisory opinions have covered a wide range of legal issues, including the legality of nuclear weapons, the legality of the threat or use of nuclear weapons, and the legal consequences of the **construction of a wall in the Occupied Palestinian Territory**.

115. **Answer: d**

Explanation:

The correct answer is 'Land that has been left fallow for more than five years'

⭐ Key Points

- **Culturable Wasteland:**
  - Culturable wasteland refers to land that is not currently being cultivated but can potentially be brought under cultivation.
  - This land has been left fallow for a period exceeding five years, which means it has not been tilled, sown, or used for agricultural production during this period.
  - Such land can be made productive again through interventions such as soil improvement, irrigation, and other agricultural practices.
  - Identifying and rehabilitating culturable wasteland is important for increasing agricultural productivity and ensuring food security.

⭐ Additional Information

- Other types of fallow land:
  - **Land that has been left fallow in the last four years:** This does not qualify as culturable wasteland as the period of being left uncultivated is shorter than five years. Such land might still retain fertility and require minimal intervention to return to agricultural use.
  - **Land left fallow between one and two years:** Known as current fallow, this land is often left unused to regain fertility and does not fall into the category of culturable wasteland.
  - **Land left fallow for less than one year:** This land is usually left uncultivated for a short period as part of crop rotation and soil management practices, and is not considered culturable wasteland.

⭐ Important Point

- **Reclamation of Culturable Wasteland**: Efforts to bring culturable wastelands under cultivation may include measures like soil improvement, irrigation development, and the introduction of sustainable farming practices. These efforts contribute to land conservation and agricultural expansion.
- **Government Initiatives:** In many countries, including India, government programs aim to identify, reclaim, and develop culturable wastelands to boost agricultural output and support rural livelihoods. These initiatives often involve collaboration between government agencies, local communities, and international organizations.
- **Sustainable Development Goals (SDGs)**: Addressing the issue of culturable wastelands aligns with the United Nations Sustainable Development Goals, particularly SDG 2 (Zero Hunger) and SDG 15 (Life on Land), which emphasize sustainable agriculture practices and land use management.
- **Technological Interventions:** Advances in remote sensing and geographic information systems (GIS) technology have improved the capability to identify, map, and monitor culturable wastelands, facilitating targeted interventions for their reclamation and productive us

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116. **Answer: c**

Explanation:

The correct answer is **Both 1 and 2.**

⭐ **Key Points**

- The **Global Innovation Index (GII)** is an annual ranking that measures the innovation capabilities and performance of countries around the world. It is published by the **World Intellectual Property Organisation (WIPO).**
- In the **Global Innovation Index-2023**, India has been placed at **40th rank**. This positioning reflects the country's ongoing efforts to become a hub of innovation, supported by government initiatives and a burgeoning startup ecosystem.
    - **Hence, statement 1 is correct.**

- Over the years, India has shown a **consistent improvement** in its ranking on the Global Innovation Index. From a longer-term perspective, since 2015, India has indeed been on a **rising trajectory** in terms of its innovation capabilities and output.
    - **Hence, statement 2 is correct.**

⭐ Additional Information

- The **Global Innovation Index** is a critical tool for policymakers to understand the innovation ecosystem of their countries and to identify areas of strength and weakness.
- The Index evaluates countries based on **various parameters** including institutions, human capital and research, infrastructure, market sophistication, business sophistication, knowledge and technology outputs, and creative outputs.
- India's improvement in the GII rankings over the years is a testament to the country's **enhanced focus on innovation**, primarily driven by improvements in the quality of institutions, higher education, and research, among other factors.
- Key initiatives by the Indian government such as the **Start-up India** campaign, **Atal Innovation Mission**, and increased spending on research and development have played a significant role in improving India's innovation ecosystem.
- The rise in India's rank in the Global Innovation Index is also indicative of the growing **international recognition** of the country's potential to contribute to global innovation and technology development.

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117. Answer: c

Explanation:

The correct answer is ***Both 1 and 2.***

⭐ Key Points

- The **Standing Deposit Facility (SDF) rate** was indeed introduced in April 2022 by the Reserve Bank of India (RBI). This facility allows banks to park their excess

funds with the RBI without the need for providing securities as collateral.
    - **Hence, statement 1 is correct.**
- The **SDF** replaced the **Fixed Rate Reverse Repo (FRRR)** as the floor of the LAF corridor.
- The **SDF** rate is set at **25 basis points (bps)** below the policy repo rate.
    - **Hence, statement 2 is correct.**

⭐ Additional Information

- The **Liquidity Adjustment Facility (LAF)** is a monetary policy tool used by the Reserve Bank of India (RBI) to regulate the liquidity and the short-term interest rates in the economy. It consists of two main components:
    - **Repo rate:** The rate at which the RBI lends to commercial banks.
    - **Reverse repo rate:** The rate at which the RBI borrows from commercial banks.
- The introduction of the **SDF** provides the RBI with an additional lever to absorb liquidity without the need for collateral, thereby offering the RBI greater flexibility in its liquidity management operations.
- The **policy corridor** formed by the difference between the repo rate and the reverse repo rate is crucial for maintaining short-term interest rates within a target range. This corridor helps in controlling inflation and stabilizing the currency.
- The **Monetary Policy Committee (MPC)** of the RBI is responsible for fixing the benchmark policy interest rate (repo rate) to control inflation within a specified target level.

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118. Answer: c

Explanation:

The correct answer is **Both 1 and 2**.

⭐ Key Points

- **Bhoonidhi Vista** is a forward-looking initiative that embodies the growing trend of utilizing spatial technology and geospatial data for environmental

observation and management.

- **It is indeed a data visualisation service of Bhoonidhi** that empowers users by providing full resolution mosaicked data visualization capability through Web Map Service. This feature significantly enhances the accessibility and utility of remote sensing data, catering to a wide range of applications from academic research to policy-making. **Hence, statement 1 is correct.**
- The platform being **enabled for ResourceSat-2/2A, Sentinel 1 and 2 satellites** is indicative of its comprehensive coverage and flexibility. ResourceSat satellites are known for their utility in resource monitoring, whereas the Sentinel series, part of the European Space Agency's Copernicus program, are pivotal in Earth observation which includes land, ocean, and atmospheric monitoring. The inclusion of data from these satellites allows Bhoonidhi Vista to serve a broad spectrum of environmental and climatic research needs with high-resolution imagery. **Hence, statement 2 is correct.**

⭐ Additional Information

- **Data visualisation** services like Bhoonidhi Vista play a critical role in the current era of data-driven decision making. By transforming raw data into graphical or pictorial format, these services make complex data sets understandable and actionable for non-experts, enabling broader participation in environmental stewardship.
- **Web Map Service (WMS)** is an important standard in the realm of geospatial data sharing and visualization, facilitating the easy online access and manipulation of map images generated from geospatial data.
- The capacity to integrate data from **different satellite sources** into a single platform like Bhoonidhi Vista not only exemplifies the technological advancements in remote sensing data management but also significantly enhances the scope and accuracy of environmental monitoring and analysis.
- Projects such as **Bhoonidhi Vista** underscore the importance of geospatial technology in tackling contemporary challenges such as climate change, deforestation, and urban planning, among others, by providing crucial data that informs better decision-making and policy formulation.

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119. **Answer: c**

Explanation:

The correct answer is ***Both 1 and 2.***

⭐ Key Points

Understanding Angular and Linear Velocity

- **Angular velocity** refers to the rate at which an object rotates or revolves relative to another point, essentially how fast an object spins around its axis. For the Earth, this means how quickly it rotates on its axis.
    - The Earth completes one rotation about its axis in approximately 24 hours, making the angular velocity constant for all locations on Earth's surface. ***Hence, statement 1 is correct.***
- **Linear velocity**, on the other hand, indicates the rate at which an object moves along a path. For any point on the Earth's surface, this is determined by the rotational velocity and the distance from the axis of rotation.
    - Since the Earth is wider at the equator, points on the equator travel a greater distance in one rotation (24 hours) compared to points near the poles, resulting in higher linear velocities at the equator and lower at the poles. ***Hence, statement 2 is correct.***

⭐ Additional Information

- The concept of **angular velocity** is fundamental in various fields such as astronomy, physics, and engineering, explaining phenomena like day and night cycles, seasonal changes, and the functioning of various mechanical and navigational instruments.
    - It is crucial for understanding the dynamics of rotating systems in space, such as galaxies, solar systems, and planets.
- **Linear velocity** has practical applications in areas like aviation, where it helps in calculating the speed required for aircraft to take off or land depending on their direction of movement relative to the Earth's rotation.
- **Equatorial bulge** is a phenomenon associated with the Earth's rotation, where the equator experiences a slight outward bulge due to centrifugal force. This bulge affects the Earth's gravitational field slightly but is significant enough to influence satellite orbits and sea levels.

- The differences in **linear velocity** across the Earth's surface have implications for phenomena such as the Coriolis effect, which influences weather patterns, ocean currents, and even the flight paths of long-distance projectiles.

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120. Answer: b

Explanation:

The correct answer is ***1 and 2 only.***

⭐ **Key Points**

Green Credit Initiative

- The **Green Credit Initiative** is designed as a response to the challenge of climate change, aiming to encourage sustainable environmental practices by offering incentives for preserving and expanding green cover.
  - It supports actions that mitigate climate change effects, making it a crucial step towards a sustainable future. ***Hence, statement 1 is correct.***
- This initiative promotes plantations on wasteland and river catchment areas, which are vital for maintaining ecological balance, preventing soil erosion, enhancing water retention, and increasing biodiversity.
  - By focusing on these areas, the initiative seeks to rehabilitate degraded lands and improve water quality and availability. ***Hence, statement 2 is correct.***
- However, the claim that it is a scheme of the Government of India to replace kerosene oil with solar power used by the rural poor does not directly relate to the Green Credit Initiative.
  - This statement seems to confuse the initiative with other government programs aimed at promoting renewable energy sources. ***Hence, statement 3 is incorrect.***

⭐ **Additional Information**

- The concept of **green credits** revolves around the idea of assigning a monetary value to environmental conservation efforts, such as tree planting

or restoration of natural habitats.
    - These credits can be traded, bought, or sold, providing a financial mechanism to support and incentivize conservation activities.
- Initiatives like the Green Credit Initiative are essential in the context of **global climate change mitigation efforts**, as they offer tangible incentives for environmental conservation, supporting global targets such as those outlined in the **Paris Agreement**.
    - Such initiatives contribute to the broader goals of reducing greenhouse gas emissions and promoting sustainable development.
- **Wastelands and river catchment areas** play a crucial role in the ecosystem.
    - Rehabilitating these areas not only contributes to biodiversity conservation but also supports livelihoods by providing ecosystem services such as clean water and fertile soil for agriculture.