

CBSE Board Examination – 2025
GEOGRAPHY
Solved Paper
Class – 12th
Outside Delhi Sets | Series: W2XYZ

GENERAL INSTRUCTIONS: *Same as in Delhi Paper.*

Set-I

Q.P. Code: 64/2/1

SECTION - A

Question no. 1 to 17 are Multiple Choice Type Questions.

(17 x 1 = 17)

1. 'Human geography is the synthetic study of relationship between human societies and earth's surface.' This definition of human geography is given by _____. 1
(A) Vidal-de-la-Blache (B) Richard Hartshorne
(C) Ritter (D) Ratzel
2. Which one of the following is the core concern of geography as a discipline? 1
(A) To understand population distribution and the factors affecting the same.
(B) To understand the relationship between resource distribution and its utilisation.
(C) To understand the earth as the home of human beings and its sustainability.
(D) To understand the earth as the home of natural resources and their estimation.
3. The concept of 'Neodeterminism' was introduced by _____. 1
(A) Ehrlich (B) C. Semple
(C) Griffith Taylor (D) Humboldt
4. Read the following statements about ports carefully and choose the correct option: 1
(i) The ports provide the facilities of loading, unloading and storage of cargo.
(ii) The importance of ports is judged by the size of its hinterland.
(iii) The quantity of cargo handled by a port indicates the level of development of its hinterland.
(iv) Ports are the chief gateways of the world trade.
Options:
(A) only (i), (ii) and (iii) are correct.
(B) only (i), (iii) and (iv) are correct.
(C) only (i), (ii) and (iv) are correct.
(D) only (ii), (iii) and (iv) are correct.
5. Two statements are given below. They are Assertion (A) and Reason (R). Read both the statements carefully and choose the correct option: 1
Assertion (A): 'World Trade Organisation (WTO) is widening the gulf between rich and poor by making rich countries richer.'
Reason (R): 'The influential nations in the WTO focus on their own commercial interests.'
Options:
(A) Both (A) and (R) are correct and (R) is the correct explanation of (A).
(B) Both (A) and (R) are correct, but (R) is not the correct explanation of (A).
(C) (A) is correct, but (R) is incorrect.
(D) (A) is incorrect but (R) is correct.
6. Choose the correct option to fill the blank. 1
The act of opening up economies for trading is known as _____.
(A) Balanced trade (B) Unilateral trade
(C) Free trade (D) Bilateral trade
7. Arrange the following towns of India from the oldest to the newest order based on their historical evolution and choose the correct option: 1
(i) Jaipur (ii) Chandigarh
(iii) Madurai (iv) Jamshedpur
Options:
(A) (iii), (i), (ii), (iv) (B) (iii), (i), (iv), (ii)
(C) (i), (iii), (iv), (ii) (D) (i), (iii), (ii), (iv)
8. Read the following statements related to the objectives of smart city mission carefully and choose the correct option: 1
(i) To promote the city with clean and sustainable environment.
(ii) To provide decent quality of life to its citizens.
(iii) To provide employment to the job seekers.
(iv) To make the city less vulnerable to disasters.
Options:
(A) Only (ii), (iii) and (iv) are correct.
(B) Only (i), (iii) and (iv) are correct.

- (C) Only (i), (ii) and (iii) are correct.
(D) Only (i), (ii) and (iv) are correct.
9. Local names like Panna, Para, Palli, Nagla, Dhani etc. are examples of which of the following types of rural settlements in India? **1**
(A) Clustered settlement
(B) Semi-clustered settlement
(C) Hamleted settlement
(D) Dispersed settlement
10. Two statements are given below. They are Assertion (A) and Reason (R). Read both the statements carefully and choose the correct option: **1**
Assertion (A): 'The agriculturally rich states of Punjab, Haryana and western Uttar Pradesh are facing the crisis of groundwater depletion.'
Reason (R): 'More groundwater is utilised for irrigation than water-table recharge.'
Options:
(A) Both (A) and (R) are correct and (R) is correct reason of (A).
(B) Both (A) and (R) are correct, but (R) is not the correct reason of (A).
(C) (A) is not correct, but (R) is correct.
(D) (A) is correct, but (R) is not correct.
11. Read the following statements related to Indira Gandhi Canal Project carefully and choose the correct option: **1**
(i) Indira Gandhi Canal project was conceived by Kanwar Sain in 1950 and it was launched in 1961.
(ii) Introduction of canal irrigation has brought perceptible changes in the agricultural economy of the command area.
(iii) Spread of canal irrigation has led to increase in cultivated area and crop intensity.
(iv) Traditional crops of jowar, bajra has been replaced by rice and wheat etc.
Options:
(A) (i), (ii) and (iv) only are correct.
(B) (i), (ii) and (iii) only are correct.
- (C) (i), (iii) and (iv) only are correct.
(D) (ii), (iii) and (iv) only are correct.
12. Read the following statements related to international trade of India carefully and choose the correct option: **1**
(i) India has a long coastline surrounded by ocean from three sides.
(ii) Indian coasts have large number of well-developed sea ports.
(iii) Kandla port exports huge amount of iron-ore.
(iv) The transportation cost by water is very cheap for voluminous items.
Options:
(A) Only (i), (ii) and (iv) are correct.
(B) Only (i), (ii) and (iii) are correct.
(C) Only (i), (iii) and (iv) are correct.
(D) Only (ii), (iii) and (iv) are correct.
13. Why is it that slums are the areas of residence with least choice? Choose the correct options: **1**
(i) They have dilapidated houses with poor ventilation.
(ii) The basic facilities like lights and toilets are difficult to get.
(iii) Hygienic conditions and drinking water are improper.
(iv) Better drainage facilities are available.
Options:
(A) Only (i), (ii) and (iii) are correct.
(B) Only (ii), (iii) and (iv) are correct.
(C) Only (i), (iii) and (iv) are correct.
(D) Only (i), (ii) and (iv) are correct.
14. The watershed management programme in Jhabua district of Madhya Pradesh is funded by which one of the following ministries? **1**
(A) Rural Development
(B) Environment
(C) Transport
(D) Irrigation

Study the following table carefully and answer the Question No. 15 to 17:

Composition of India's export: 2009-2017 (Percentage share in exports)

Commodities	2009-10	2010-11	2015-16	2016-17
Agriculture and allied products	10.0	9.9	12.6	12.3
Ore and minerals	4.9	4.0	1.6	1.9
Manufactured goods	67.4	68.0	72.9	73.6
Crude and petroleum products	16.2	16.8	11.9	11.7
Other commodities	1.5	1.2	1.1	0.5

15. Under which one of the following category of commodities, increase in export is continuously observed? **1**
(A) Agriculture and allied products
(B) Ore and minerals
(C) Manufactured goods
(D) Other commodities
16. Under which one of the following category of commodities, maximum decline in export is recorded from 2015-16 to 2016-17? **1**

- (A) Agriculture and allied products
 (B) Ore and minerals
 (C) Crude and petroleum products
 (D) Other commodities
17. Under which one of the following categories of commodities, the increase in export is observed from 2010-11 to 2016-17? **1**
- (A) Agriculture and allied products
 (B) Ore and minerals
 (C) Crude and petroleum products
 (D) Other commodities

SECTION - B

Question no. 18 and 19 are Source-Based

Questions. **(2 × 3 = 6)**

18. Read the passage carefully and answer the questions that follow:

Hunting and Food Gathering

The earliest human beings depended on their immediate environment for their sustenance. They subsisted on: (a) animals which they hunted; and (b) the edible plants which they gathered from forests in the vicinity.

Primitive societies depended on wild animals.

19. Study the following table carefully and answer the questions that follow: **3**

Composition of Total Cultivable Land

Agricultural Land use Categories	As a percentage of Reporting Area		As a percentage of total cultivable land	
	1950-51	2014-15	1950-51	2014-15
Culturable waste land	8.0	4.0	13.4	6.8
Fallow other than current fallow	6.1	3.6	10.2	6.2
Current fallow	3.7	4.9	6.2	8.4
Net area sown	41.7	45.5	70.0	78.4
Total Cultivable Land	59.5	58.0	100.00	100.00

(19.1) Mention the reason for the decrease in cultivable waste land in 2014-15 as compared to 1950-51.

(19.2) Mention the reason for the increase in current fallow during 2014-15 as compared to 1950-51.

(19.3) Explain the reason of continuous increase in net area sown.

SECTION - C

Question no. 20 to 23 are Short Answer Type Questions. **(4 × 3 = 12)**

20. (a) Examine the role of climate, water availability and soil fertility on the distribution of world population. **3**

OR

- (b) Examine three stages of demographic transition theory. **3**
21. Study the map of Rhine waterways and answer the questions that follow:

People located in very cold and extremely hot climates survived on hunting. The people in the coastal areas still catch fish though fishing has experienced modernisation due to technological development. Many species, now have become extinct or endangered due to illegal hunting (poaching). The early hunters used primitive tools made of stones, twigs or arrows so the number of animals killed was limited.

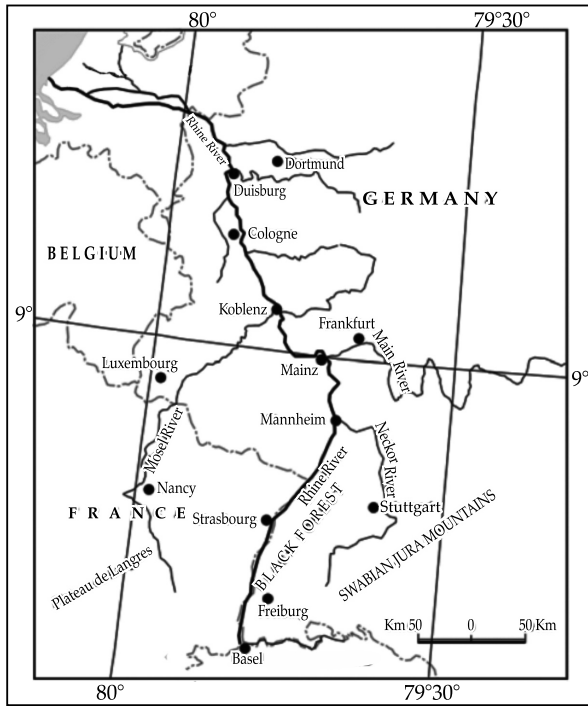
Gathering and hunting are the oldest economic activity known. These are carried out at different levels with different orientations.

Gathering is practised in regions with harsh climatic conditions. It often involves primitive societies, who extract, both plants and animals to satisfy their needs for food, shelter and clothing. This type of activity requires a small amount of capital investment and operates at very low level of technology. The yield per person is very low and little or no surplus is produced.

(18.1) Examine the impact of poaching on wild animals. **1**

(18.2) Why was hunting of animals limited in early times? Explain. **1**

(18.3) Why did early man depend upon his immediate natural environment? Explain. **1**



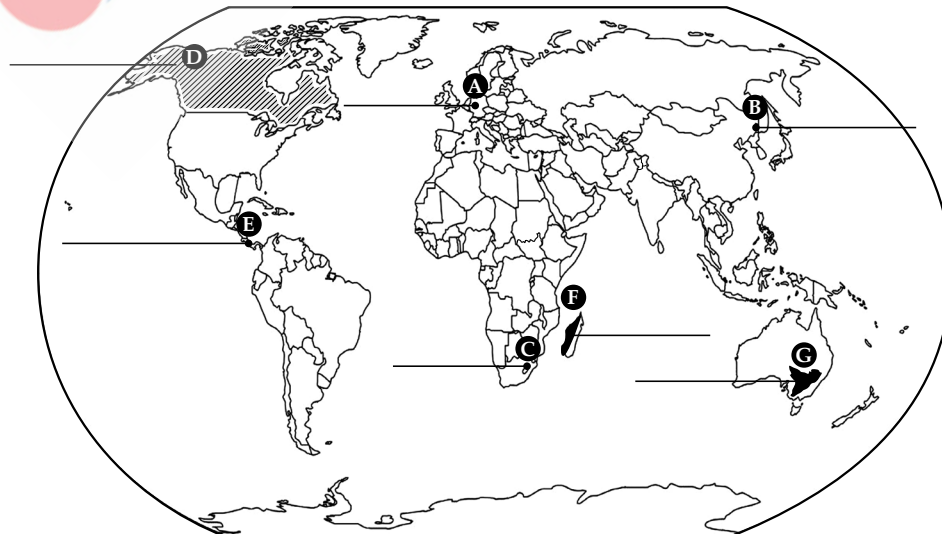
Rhine Waterway

- (21.1) Name the country in which most of Rhine river lies. 1
- (21.2) Name two countries whose industrial areas are connected by river Rhine. $\frac{1}{2} + \frac{1}{2} = 1$
- (21.3) Why is river Rhine world's most heavily used waterway? 1
- 22. Explain the main characteristics of rural roads in India. 3
- 23. Suggest the measures to achieve the objectives of 'Namami Gange Programme'. 3

SECTION - D

Question no. 24 to 28 are Long Answer Type Questions. (5 × 5 = 25)

- 24. Explain the concept of 'human development'. Examine four approaches to human development. 1 + 4 = 5



- 25. (a) Explain the main features of large scale manufacturing industries in the world. 5
OR
 (b) Explain the main features of 'High Tech' industries in the world. 5
- 26. (a) Assess the growth and significance of service sector in the development of the world economy. 5
OR
 (b) Assess the growth and significance of transport and communication services in the world economy. 5
- 27. (a) Analyse the rural-urban characteristics of Indian population. 5
OR
 (b) Analyse the main features of the composition of working population in India. 5
- 28. (a) 'Petroleum is an essential source of energy and many by products are associated with its refining.' Explain this statement with examples. 5
OR
 (b) 'The generation of energy through non-conventional sources is the need of the hour for sustainable development.' Explain the statement with examples. 5

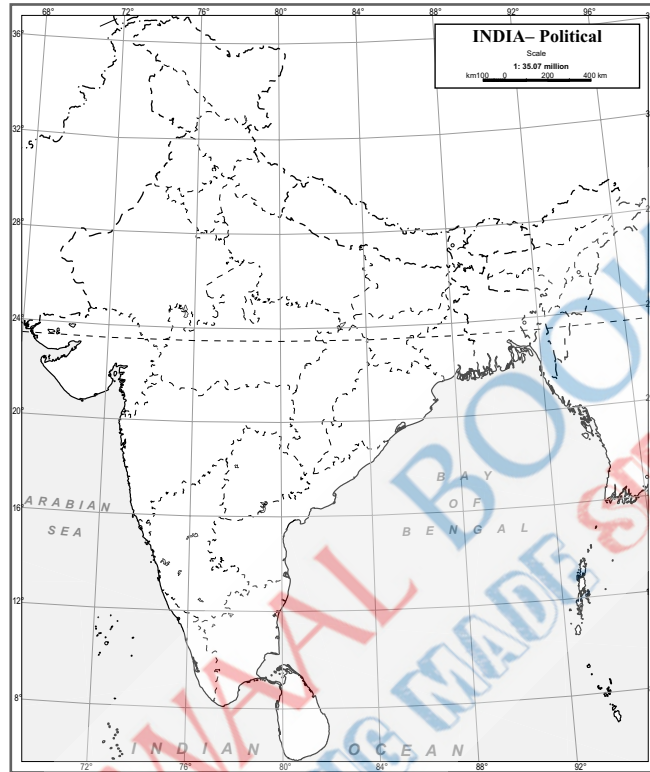
SECTION - E

Question no. 29 and 30 are Map Based Questions. (2 × 5 = 10)

- 29. On the outline political map of the world, seven geographical features have been marked as A, B, C, D, E, F and G. Identify any FIVE of them and write their names on the lines drawn near them: 5
 - A. Major sea port in Germany.
 - B. Terminal station of Trans-Siberian Railway.
 - C. An international airport.
 - D. An area of subsistence gathering.
 - E. An important waterway.
 - F. An area of 'Nomadic Herding'.
 - G. An area of extensive commercial grain farming.

30. On the given political outline map of India, locate and label any five of the following geographical features with appropriate symbols. 5 x 1 = 5

- 30.1 Important iron ore mines in Odisha. 30.2 An important seaport in Kerala.
 30.3 A copper mine in Rajasthan. 30.4 An oil refinery in Bihar.
 30.5 An international airport in Punjab. 30.6 A state with highest density of population.
 30.7 A state leading in the production of jute.



Set-II

Q.P. Code: 64/2/2

In this set, all questions are identical to those in Set-1, except for the following.

SECTION - A

Multiple Choice Type Questions.

4. Read the following statements regarding inland ports carefully and choose the correct option: 1
- (i) These ports are located away from the sea coast.
 (ii) These ports are linked to sea by inland water bodies.
 (iii) These ports are accessible by flat bottomed ships or barges.
 (iv) Kochchi, Aden and Honolulu are some of the examples of inland port.
- Options:**
- (A) Only (i), (ii) and (iii) are correct.
 (B) Only (i), (ii) and (iv) are correct.
 (C) Only (i), (iii) and (iv) are correct.
 (D) Only (ii), (iii) and (iv) are correct.
5. Two statements are given below. They are Assertion (A) and Reason (R). Read both the statements carefully and choose the correct option: 1
- Assertion (A):** 'International trade may prove to be detrimental to nations.'
- Reason (R):** 'It may lead to dependence on other nations causing exploitation.'
- Options:**
- (A) Both (A) and (R) are correct and (R) is correct explanation of (A).
 (B) Both (A) and (R) are correct, but (R) is not the correct explanation of (A).
 (C) (A) is correct, but (R) is not correct.
 (D) (A) is incorrect but (R) is correct.
6. Choose the correct option to fill the blank: 1
- 'In modern times, trade is the basis of the world's economic organisation and is related to the _____ of nations.'
- (A) bilateral trade policy
 (B) multi-lateral trade policy
 (C) foreign trade policy
 (D) internal need policy
7. Arrange the following towns of India as per their historical evolution from the oldest to the newest order and choose the correct option: 1
- (i) Chennai (ii) Gandhinagar
 (iii) Patna (iv) Lucknow

SECTION - C**Short Answer Type Questions.**

22. Explain the main features of State Highways in India. 3
23. Suggest the measures to solve the problems of urban waste disposal in India. 3

SECTION - D**Long Answer Type Questions.**

24. Explain the approach suggested by Amartya Sen to increase human development and examine the four major aspects of human development. 5
28. (a) 'Although India is richly endowed with a variety of mineral resources yet distribution of minerals over space is highly uneven.' Evaluate the statement. 5

OR

- (b) 'For the sustainable development, there is urgent need for the conservation of mineral resources.' Evaluate the statement. 5

Set-III**Q.P. Code: 64/2/3**

In this set, all questions are identical to those in Set-1, except for the following.

SECTION - A**Multiple Choice Type Questions.**

4. Read the following statements regarding outports carefully and choose the correct option: 1
- (i) These are deep water ports.
- (ii) They are built away from the actual ports.
- (iii) These ports are also known as ferry ports.
- (iv) Piraeus is an example of outport for Athens in Greece.

Options:

- (A) Only (i), (ii) and (iii) are correct.
- (B) Only (i), (ii) and (iv) are correct.
- (C) Only (i), (iii) and (iv) are correct.
- (D) Only (ii), (iii) and (iv) are correct.

5. Two statements are given below. They are Assertion (A) and Reason (R). Read both the statements carefully and choose the correct option:

Assertion (A): 'The chief gateways of the world are harbours and ports.'

Reason (R): 'Cargoes and travellers are transported through them.'

Options:

- (A) (A) is correct, but (R) is incorrect.
- (B) (A) is incorrect but (R) is correct.
- (C) Both (A) and (R) are correct and (R) is the correct explanation of (A).
- (D) Both (A) and (R) are correct, but (R) is not the correct explanation of (A).

6. Choose the correct option to fill the blank. 1
- _____ were originally developed for refuelling, watering and collecting food items.

- (A) Entrepôts
- (B) Ports of Call
- (C) Packet Stations
- (D) Comprehensive Ports

7. Arrange the following towns of India as per their location from north to south direction and choose the correct option: 1

- (i) Nagpur (ii) Hyderabad
- (iii) Madurai (iv) Lucknow

Options:

- (A) (i), (iv), (ii), (iii) (B) (i), (iv), (iii), (ii)
- (C) (iv), (i), (iii), (ii) (D) (iv), (i), (ii), (iii)

8. Read the following statements regarding medieval towns in India carefully and choose the correct option: 1

- (i) About 100 of the existing towns have their roots in medieval period.
- (ii) Varanasi, Madurai and Prayag are some of its examples.
- (iii) Most of the towns were developed as headquarters of the kingdoms.
- (iv) These are mostly fort towns built on ruins of ancient towns.

Options :

- (A) Only (i), (ii) and (iii) are correct.
- (B) Only (i), (ii) and (iv) are correct.
- (C) Only (i), (iii) and (iv) are correct.
- (D) Only (ii), (iii) and (iv) are correct.

SECTION - C**Short Answer Type Questions.**

22. Explain the main features of National Highways in India. 3
23. Suggest the measures to solve the problems of slums in India. 3

SECTION - D**Long Answer Type Questions.**

27. (a) Analyse the growth of population in India since 1921. 5

OR

- (b) With respect to adolescent population, analyse the challenges of Indian society. 5
28. (a) In the Indian context, the non-conventional sources of energy are more equitably distributed and are environment friendly.' In the context of this statement, analyse the future prospect of India in meeting its clean energy demand. 5

OR

- (b) 'Nuclear energy has emerged as a viable source in recent times.' Analyse the statement in context of India. 5



Answers

Set-I

Q.P. Code: 64/2/1

SECTION - A

1. *Correct Option:* (D) Ratzel

Explanation: This definition of human geography was attributed to Friedrich Ratzel. Ratzel, a German geographer, is viewed as one of the originators of human geography.

2. *Correct Option:* (C) To understand the earth as the home of human beings and its sustainability.

Explanation: Geography as a discipline is concerned with studying the Earth as the home of human beings, analysing the interaction between people and their environment as well as ensuring sustainability.

3. *Correct Option:* (C) Griffith Taylor

Explanation: The concept of 'Neodeterminism' was introduced by Griffith Taylor, which stands for the middle road between environmental determinism and possibilism.

4. *Correct Option:* (B) only (i), (iii) and (iv) are correct.

Explanation: (ii) Incorrect: Port location has an impact on the urban area size, but it is not the most centralised factor, which indicates the importance of this type of city infrastructure in the world trade network and the conflict level.

5. *Correct Option:* (A) Both (A) and (R) are correct, and (R) is the correct explanation of (A).

Explanation: (R) explains (A)- Because influential nations focus on their own commercial gains, trade policies often favour richer nations, making them wealthier while limiting growth opportunities for poorer countries.

6. *Correct Option:* (C) Free trade

Explanation: Free trade refers to the policy of reducing or eliminating barriers such as tariffs, quotas and restrictions to allow unrestricted trading between nations.

7. *Correct Option:* (B) (iii), (i), (iv), (ii)

Explanation: • **Madurai:** One of the oldest cities in India. It was an important centre of the Pandya dynasty.

- **Jaipur:** Founded in 1727 by Maharaja Sawai Jai Singh II.
- **Jamshedpur:** Established in 1919 by the Tata Group.
- **Chandigarh:** Designed by architect Le Corbusier and officially developed in the 1950s.

8. *Correct Option:* (D) Only (i), (ii) and (iv) are correct.

Explanation: The Smart City Mission was launched by the Government of India to improve urban infrastructure and governance. While economic growth may be a by product of smart cities, employing job seekers is not a core objective.

9. *Correct Option:* (C) Hamleted settlement

Explanation: Local names like Panna, Para, Palli, Nagla and Dhani refer to hamlets, which are smaller units of a village found in different parts of India. Such habitats are most

frequently detected in eastern Uttar Pradesh, Madhya Pradesh and sections of Rajasthan.

10. *Correct Option:* (A) Both (A) and (R) are correct, and (R) is the correct reason for (A).

Explanation: (R) correctly explains (A): The overuse of groundwater for intensive farming, especially for water-intensive crops like rice and wheat, is the main cause of groundwater depletion in these regions.

11. *Correct Option:* (D) (ii), (iii), and (iv) only are correct.

Explanation: Kanwar Sain conceived the idea in 1940, not 1950, and the canal project was launched in 1958, not 1961.

12. *Correct Option:* (A) Only (i), (ii), and (iv) are correct.

Explanation: (iii) Incorrect - Kandla Port does not export a huge amount of iron ore. Instead, it mainly handles crude oil, petroleum products, fertilisers and salt exports.

13. *Correct Option:* (A) Only (i), (ii), and (iii) are correct.

Explanation: (iv) Incorrect - Slums generally lack proper drainage facilities, leading to waterlogging, unhygienic conditions and the spread of waterborne diseases.

14. *Correct Option:* (A) Rural Development

Explanation: The watershed management programme in Jhabua district, Madhya Pradesh, is funded by the Ministry of Rural Development under various schemes like Integrated Watershed Management Programme (IWMP) and Drought Prone Areas Programme (DPAP).

15. *Correct Option:* (A) Agriculture and allied products

Explanation: Agriculture and allied products increased from 9.9% (2010-11) to 12.3% (2016-17).

16. *Correct Option:* (C) Manufactured goods

Explanation: Manufactured goods show a continuous increase from 67.4% (2009-10) to 73.6% (2016-17).

17. *Correct Option:* (D) Other commodities

Explanation: The share of other commodities decreased from 1.1% (2015-16) to 0.5% (2016-17), showing the highest decline.

SECTION - B

(18.1) Impact of Poaching on Wild Animals

- Leads to the eradication and endangerment of a large number of species.
- Deprives the ecosystem of its normal functioning, because the populations of various animals are decreasing.
- Not even tigers and elephants are safe and are hunted for their skins, tusks and bones.

(18.2) Reasons Why Hunting Was Limited in Early Times

The early human beings hunted using primitive weapons like stones, sticks and natural arrows, which was rather difficult.

(18.3) Reasons Why Early Humans Depended on Their Immediate Natural Environment

- They did not have new cultivating skills; thus, they had to eat what the nature gave them.
- Forests and rivers were the locations that gave them the food such as plants, animals and fish to live on.
- They could not preserve and carry food with them; therefore, they had to eat what they could find in their nearby area.

(19.1) Reason for the Decrease in Culturable Waste Land (2014-15 vs. 1950-51): Large-scale land reclamation, afforestation projects, irrigation expansion, modern agricultural techniques, population pressure and government initiatives are transforming wasteland into agricultural land.

(19.2) Reason for the Increase in Current Fallow (2014-15 vs. 1960-61): Continuous cultivation leads to soil exhaustion, causing farmers to leave land fallow for natural fertility restoration, causing uncertain rainfall patterns and increasing water scarcity in some regions.

(19.3) Reason for the Continuous Increase in Net Area Sown: The Green Revolution has led to increased land utilisation, increased irrigation through canals, wells and tube wells, and the introduction of High-Yielding Variety seeds.

SECTION - C

20. (a) Role of Climate, Water Availability, and Soil Fertility in Population Distribution: Climate, water availability, and soil fertility are decisive for the human population in determining distribution. Areas of temperate climate, which have enough rain, can support a lot of people. In contrast, very hot, very cold, or very dry climates (deserts, polar regions) are where people are least likely to settle. Water is vital for drinking, irrigation, and industry; hence, it is why valleys of the rivers (for example, Nile, Ganges) are full of people. If the soil is rich in minerals, more and more settlers will occupy the 'granary of the world' as happens in the Indo-Gangetic Plain. Conversely, infertile or dry lands (Sahara, Siberia) have sparse populations. Thus, favourable environmental conditions are an impetus for the increase in human population, and harsh conditions can be an obstacle to the development of an area.

OR

(b) Three Stages of Demographic Transition Theory: The theory of demographic transition is the process of population changes over time in three stages:

- **High Birth and Death Rates:** In the early industrial societies, both the birth and the death rates are high because of the diseases, poor healthcare and food shortages, which result in slow population growth.
- **Declining Death Rate, High Birth Rate:** The improvement in healthcare, sanitation and food production leads to the drop of death rates while birth rates are kept high, hence benefiting the rapid growth of the population.

- **Low Birth and Death Rates:** In highly developed societies, birth rates diminish owing to the shift to cities, education, and family planning, which in turn has a stabilising effect on the population's growth rate.

(21.1) The Rhine River mostly lies in Germany.

(21.2) The industrial areas of Germany and the Netherlands are connected by the Rhine River.

(21.3) The Rhine River is the world's most heavily used waterway because:

- It serves as a major transportation route for goods and raw materials.
- It connects industrial regions of Germany, France, Switzerland and the Netherlands to the North Sea.
- It has a well-developed port system, including Rotterdam, one of the world's busiest ports.

22. Main Characteristics of Rural Roads in India:

- **Connectivity:** Rural roads form a network to villages, connecting them to the nearest large towns and cities. Thus, they can access resources such as markets, schools and healthcare.

- **PMGSY:** Looking at the road construction plans under the Pradhan Mantri Gram Sadak Yojana, the scheme aims to provide good connectivity to all villages through all-weather roads and unconnected villages will also be linked.

- **Low Traffic Intensity:** As rural roads are usually less crowded than highways and urban roads, there is a reduction in the number of vehicles moving on them. Unpaved, Wider Roads – The lanes are unpaved and also called kachcha. They are smaller than the highways within national and state roads.

- **Economic and Social Impact:** As a result of the improvement of rural roads, agricultural practices have seen trade, employment and overall rural development rise to a higher level than in the past.

- **Challenges in Maintenance:** Lacking adequate funding and facing rough climate, rural roads are usually victims of mushrooming faults and degradation.

23. Measures to Achieve the Objectives of 'Namami Gange Programme':

- **Sewage Treatment Plants (STPs):** Installing contemporary STPs to clean wastewater before it reaches the Ganga.

- **Industrial Effluent Control:** A stringent policy of watching and regulating industries is necessary to prevent the discharge of untreated waste.

- **Riverfront Development:** Construction of ghats and crematoriums will reduce direct pollution of the river.

- **Solid Waste Management:** Stopping the garbage and plastic waste that are polluting the river.

- **Afforestation:** Planting trees on the riverbanks prevents soil erosion.

- **Biodiversity Conservation:** Marine life preservation and protection are important for our ecological balance and the aquatic life of the Gangetic dolphin.

- **Improving Rural Sanitation:** At the same time, apart from the promotion of toilets in rural areas to avoid open defecation near riverbanks.

- **Strengthening Law Enforcement:** The river cannot reduce its pollutants if the country does not amplify its reliance on stiffer penalties.

SECTION - D

24. Concept of Human Development: Human development is the passage of expanding every single person's freedom, alternatives and happiness. Improvement of the quality of life is its focal point, which encompasses better access to education, healthcare, income and basic human rights. The concept was pioneered by the United Nations Development Programme (UNDP) and it has become more identified with human well-being rather than economic growth only.

Four Approaches to Human Development

A. Income Approach:

- Means of human development are attributed to economic growth and per capita income.
- Improved income leads to more easily available healthcare, education and a higher standard of living.

B. Welfare Approach:

- In this regard, the government's involvement in the provision of basic needs such as food, healthcare and education is critical.
- Is biased toward social security/welfare policies that might be a key tool to help people realise better living conditions.

C. Basic Needs Approach:

- Enforced by the International Labour Organisation (ILO) it guarantees that people can get more such basic services as food, housing, health and education.
- For instance, economic growth does not lead to less welfare. Conversely, public social services should be provided to everyone.

D. Capability Approach:

- The capability approach was developed by Amartya Sen, who emphasised the increase of short as well as long-term capabilities.
- Development should thus, in the process of sustainable human development, give everyone the freedom they need to reach their full functionality.

Although each approach contributes to the creation of policies for human progress, the result is that sustainable development of such human practices is not only necessary but it is also inclusive.

25. (a) Main Features of Large-Scale Manufacturing Industries in the World

- **Mass Production:** The fact of the matter is that these industries furnish goods on a grand scale with the aid of modern equipment and automatic processes.

- **Capital Intensive:** Such activities require huge investments in machines, technology and infrastructure.

- **Skilled and Semi-Skilled Workforce:** The important thing is the presence of a variety of skilled engineers who, along with technicians and semi-skilled workers, allow production to run as smooth as silk.

- **Use of Raw Materials:** Big industries rely heavily on bulk raw materials that are supplied from diverse parts of the world.

- **Export-Oriented:** Large-scale industries, among the 60%, produce both local market goods and goods for export.

- **Industrial Clusters:** These sectors are common in industrial zones, like the one in Europe named Rhine-Ruhr (Germany) and also the Great Lakes region (USA).

- **Environmental Impact:** In large-scale manufacturing operations, pollution is caused by the destruction of natural resources and air pollution, which is the reason for the strict environmental policies.

- **Technological Advancement:** The issue over here is about machines and processes that get regular improvements for better performance and cheaper production costs.

OR

(b) Main Features of High-Tech Industries in the World

- **Technology-driven:** These industries are characterised by their utilisation of advanced technology, automation, and research and development (R&D) in order to innovate and produce.

- **Highly Skilled Workforce:** High-end technologies require the workforce in science, engineering, and IT to be highly skilled.

- **Capital Intensive:** They are businesses based on machines, infrastructure and research scales, thus requiring significant monetary investments to remain competitive.

- **Knowledge-Based Production:** The main goal is on precision, efficiency and the latest innovation over the traditional materials in this case.

- **Clustered Development:** Technology parks, industrial hubs, or innovation clusters such as Silicon Valley (USA) and Bengaluru (India) are usually the places where such industries are.

- **Diverse Product Range:** These include products such as biotechnology, robotics, electronics, aerospace and pharmaceuticals.

- **Sustainable Practices:** Many high-tech enterprises are concerned about ecologically friendly production technologies; therefore they use energy-efficient systems and products.

- **Global Market Reach:** Products from the high-tech business are produced and widely regarded internationally since many of them are trendy innovation-driven items.

26. (a) Growth and Significance of the Service Sector in the World Economy

• Growth of the Service Sector:

Rapid Expansion: The service sector has been experiencing remarkable economic growth by way of globalisation, technological advancements and urbanisation.

• **Dominant Contributor:** The service sector makes up 70% and more of the GDP of developed economies and in underdeveloped countries, it is already the leading sector, which is expanding at huge speeds.

• **Diversification:** It encompasses such fields as finance, healthcare, education, IT, tourism, and entertainment that in turn, provide a wide selection of occupations.

• **Technological Advancements:** The surge in the mobile and internet sectors and the induction of digital services, automation and e-commerce to the economy have been the root causes of the global service sector growth.

• **Global Outsourcing:** Various countries, for example India, the Philippines and the like, have become centres of outsourcing for IT and customer support services.

Significance of the Service Sector:

• **Major Employment Provider:** The services administration creates work in many sectors, thus decreasing the dependence on agriculture and the manufacturing sector.

• **Economic Growth Driver:** The service sector is a key player in the GDP, contributing the most in trade, financial sector and digital development.

• **Improved Living Standards:** The fact that healthcare, education and financial services contribute to the human development and an improved quality of life cannot be denied.

• **Innovation and Productivity:** The other industries are undergoing several improvements, like with the case of R&D, IT and consulting services, which are now making them operate more efficiently.

• **Global Integration:** The services, in particular, are the things with the help of which international trade, tourism and communication are at constant increase from time to time, thus making the world economies interconnected more and more.

OR

(b) Growth and Significance of Transport and Communication Services in the World Economy

• Growth of Transport and Communication Services:

Technological Advancements: Improvement through technology such as high-speed trains, air travel possibilities and the ability to communicate with others remotely, have opened the world to global development.

• **Expansion of Global Trade:** Current transport systems, such as the roads, railways, ports and airports, have provided the basis of international trade and commerce, which has, in turn, contributed to economic development.

• **Rise of Digital Networks:** This kind of network is now made with things like mobile communication, and technology such as satellite, the internet, that allows people and businesses to easily communicate around the whole universe, are the key features that have changed the old-fashioned models into new ones.

• **Infrastructure Development:** As the goal for many countries in this century is smart transport systems, logistics hubs and broadband networks for seamless connectivity, most of them are heavily investing in such projects.

• **Urbanisation and Mobility:** The process of urbanisation and the trend to high mobility of the world of the future will require solutions for public transportation and mobility.

Significance of Transport and Communication Services:

• **Facilitates Trade and Commerce:** By establishing transportation networks, the quick movement of goods is ensured, thus cutting expenditures and creating gains for companies.

• **Boosts Industrial and Service Sectors:** The industrial sector is thriving due to speedy transport for raw materials, and communication is making e-commerce and tourism easy and smart.

• **Enhances Global Connectivity:** The communication services are of a high standard, enabling the instant movement of information or communication among business, education and governance.

• **Employment Generation:** Considerably, the number of persons who work in the above transportation (aviation, logistics, shipping) and communication (telecom, IT) categories runs into millions.

• **Disaster Management and Security:** Timely communication and adequacy of transport are crucial in the context of the emergency response, disaster relief and national security.

27. (a) Rural-Urban Characteristics of Indian Population

• **Domination of Rural Population:** Almost 65% of the Indian population resides in the countryside, and the most important occupations are farming and animal husbandry.

• **Rapid Urbanisation:** The urban population is growing due to the migration of the villagers in search of employment, education and a better living standard.

• **Urban-Rural Disparities:** Cities are more developed in terms of infrastructure and have facilities for healthcare and employment. However, rural places are less developed in terms of basic facilities.

• **Employment Differences:** Rural parts of the country are the main sources of income for the workers in the primary sector (farming, fishing) and urban sectors are the main sources of income for some types of industry, services and technology.

• **Cultural and Lifestyle Variations:** The rural areas have kept to the traditional lifestyles and practices while the urban centres have been on the process of modernisation and acceptance of other influences.

- **Urban Slums and Overcrowding:** Migration to the cities causes ill-planned settlements and thus, gives rise to problems such as congestion, pollution and insufficient service delivery in cities.

OR

(b) Main Features of the Composition of Working Population in India

- **Sectoral Division:**

(i) **Primary Sector (Agriculture and Allied Activities):** Over 40% of the workforce is involved in it.

(ii) **Secondary Sector (Manufacturing and Industries):** About 25% of the workforce works there.

(iii) **Tertiary Sector (Services and IT):** The number has been increasing year by year, with about 35% of the workforce now employed in these sectors.

- **High Informal Employment:** Most of the workers are involved in informal sectors where wages are low and there is job insecurity amongst them.

- **Gender Disparity:** Female labour force participation is less than that of men, as social and economic factors and culture influence the decision-making of females.

- **Rise of Gig Economy:** The rise of self-employment, freelancing and online platforms are some employment trends that are emerging.

- **Regional Variations:** Southern and western states have more industrial and service sector employment, and this is where the southerners and young women work mostly, while the eastern and northern states have more agricultural employment.

- **Youth Employment Challenges:** The problem of unemployment and underemployment persists for educated youths.

28. (a) Petroleum: An Essential Source of Energy and Its By-products

- **Primary Energy Source:** Petroleum is a vital fossil fuel for the transportation sector, electricity generation and industrial applications; hence, it is crucial to the running of these industries. Thus, it makes vehicles, aircraft, ships, trains and other machines move.

- **Refining Process:** Crude oil is the raw material that it refines in refineries to produce different by-products, which converts it into a product of high value.

Key By-products and Uses:

- **Petrol and Diesel:** This is the main source of energy used in automobiles, and it is also known as Petrol and Diesel.

- **Kerosene:** A vital resource employed in cooking and aviation is kerosene.

- **LPG (Liquefied Petroleum Gas):** LPG (Liquefied Petroleum Gas), while in the household, is a basic fuel for home and workplaces.

- **Bitumen:** It is made up of the mixture of mineral particles, crushed rock and asphalt in the construction of roads and waterproofing.

- **Petrochemicals:** It is used in the making of plastics, and the production of synthetic fibres, fertilisers and medications, among other things, with the aid of petrochemicals.

- **Economic Importance:** Petroleum is used to subsidise the industries that boost global trade and growth for the stable functioning of the economy, and in case of a disruption, it is a strategic resource.

OR

(b) Need for Non-Conventional Energy for Sustainable Development

- **Environmental Concerns:** The use of such traditional fuels, however, as coal and oil, causes environmental pollution, the creation of greenhouse gases, and thus global warming.

- **Renewable and Sustainable:** Renewable energy comes from natural sources found in the air, water and beneath the ground, such as the sun, wind, water, geothermal energy and biomass. These resources can recharge themselves and do not harm the environment.

Examples of Non-Conventional Energy Sources:

- **Solar Energy:** Used in devices such as a solar panel to generate solar power for homes and solar water heaters.

- **Wind Energy:** Wind turbines harness the wind by using its energy to turn blades that convert it to electricity, thereby decreasing the consumption of fossil fuels.

- **Hydropower:** The electricity produced by dams is renewable and is the kind of energy that hydropower is concerned with making.

- **Biogas:** A bio-digester is the right device to produce biogas for source living conditions if there is organic waste that is available.

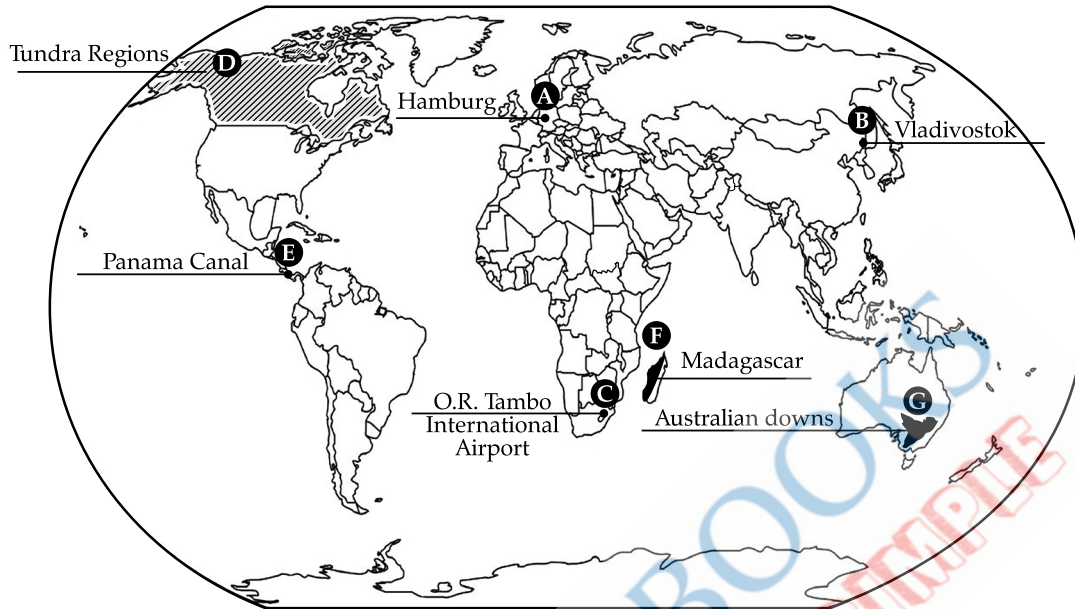
- **Energy Security and Rural Electrification:** The renewable resources of energy are cheaper and thus are less dependent on the imports and also the process of rural electrification is faster.

- **Government Initiatives:** India actively supports wind, hydro and solar energy projects in the country. These are anticipated to bring about a significant change in the energy sector through pollution-free generation of power through the utilisation of these inexhaustible sources.

Utilising non-conventional renewable energy resources is the best way to preserve the present as well as future generations and also have a clean source of energy which at the same time protects the environment.

SECTION - E

29.



29.1 Major seaport in Germany: Hamburg

29.2 Easternmost terminal station of Trans-Siberian Railway: Vladivostok

29.3 International airport in South Africa: O.R. Tambo International Airport (Johannesburg)

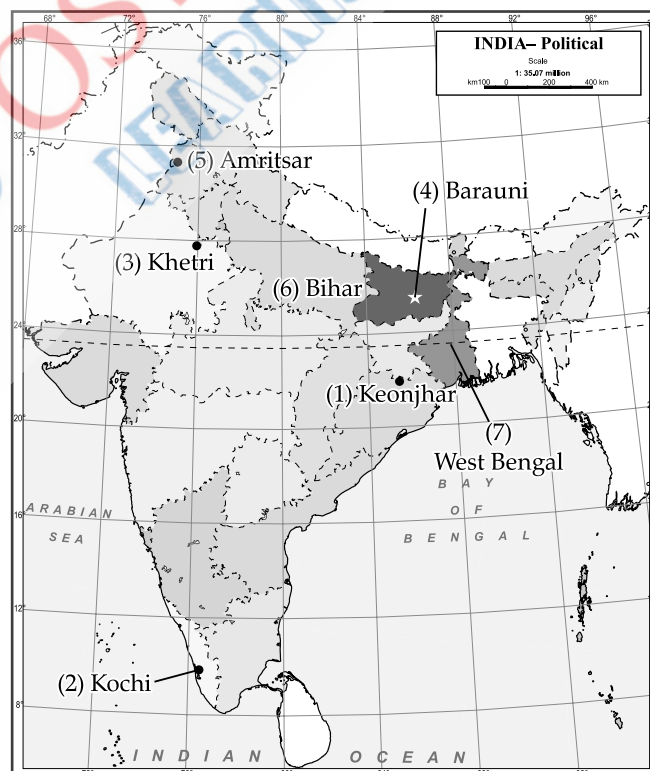
29.4 Area of subsistence gathering in Canada: Northern Canada (Boreal Forest and Tundra regions)

29.5 Important waterway of Egypt: Suez Canal

29.6 Area of nomadic herding in Africa: Sahel region (covering parts of Chad, Sudan, Mali, and Niger)

29.7 Area of extensive commercial grain farming in Australia: Wheat Belt of Western Australia and New South Wales

30.



- 30.1 Important iron ore mining area in Odisha: Keonjhar (Barbil-Joda region)
 30.2 Main Sea port of Kerala: Kochi (Cochin Port)
 30.3 Copper mining area of Rajasthan: Khetri
 30.4 Place of an oil refinery in Bihar: Barauni
 30.5 Place with an international airport in Punjab: Amritsar (Sri Guru Ram Dass Jee International Airport)
 30.6 State with highest density of population: Bihar
 30.7 Leading state in the production of jute: West Bengal

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SECTION - A

4. *Correct Option:* (A) Only (i), (ii) and (iii) are correct.

Explanation: (iv) Incorrect – Kochchi (Cochin), Aden and Honolulu are coastal ports, not inland ports. Examples of inland ports include Kolkata (India) and Hamburg (Germany).

5. *Correct Option:* (A) Both (A) and (R) are correct, and (R) is the correct explanation of (A).

Explanation: Reason (R) is correct and explains (A) – The reliance of other countries on vital resources or goods may impel the exploitation, the price fixing or the political pressure towards one country, making its economy and sovereignty vulnerable.

6. *Correct Option:* (C) Foreign trade policy

Explanation: In modern times, trade plays a crucial role in the world's economic organisation, and it is directly related to the foreign trade policy of nations. International trade policy is governed by the imports, exports and relationships with other countries. It is the influencing factor in economic growth, market access and international cooperation in the world.

7. *Correct Option:* (B) (iii), (iv), (i), (ii)

Explanation: • **Patna (Ancient Period):** Historically known as Pataliputra, it dates back to the Magadh Empire (around 490 BCE).

- **Lucknow (Medieval Period):** It has historical significance from the Mughal period.
- **Chennai (Colonial Period):** Established by the British in 1639 as Madras as a port city.
- **Gandhinagar (Modern Period):** Developed as the capital of Gujarat in 1960s.

8. *Correct Option:* (C) Only (ii), (iii), and (iv) are correct.

Explanation: (i) Incorrect: Not all urban settlements are manufacturing centres. They may also serve as commercial, administrative, educational and service hubs.

SECTION - C

22. Main Features of State Highways in India:

- **Connectivity:** State Highways provide the connection between district headquarters, state capitals and the most important cities in the state.
- **Managed by State Governments:** These highways are conceived, developed, constructed, operated and

maintained by state public works departments (PWDs) and the relevant state authorities.

- **Traffic Flow:** They are important roads through which people can travel between the districts and the cities.
- **Paved Roads:** The majority of state highways are the kind that are well-paved to ensure problem-free passage of transportation and goods.
- **Link to National Highways:** They serve as main roads and transport commuters living in smaller towns or rural areas to the National Highway network.

23. Measures to Solve Urban Waste Disposal Problems in India:

- **Segregation at Source:** Waste should be separated into biodegradable and non-biodegradable.
- **Improved Waste Collection System:** One must make door-to-door waste collection more efficient.
- **Recycling and Waste Processing:** By creating more recycling businesses and waste composting plants, the percentage of solid waste to be dumped at a landfill decreases.
- **Strict Waste Management Laws:** The controls put on waste disposal and also the management of industrial waste have to be very strong, but they should also be implemented.
- **Public Awareness Campaigns:** The education efforts would mostly consist of speaking with the citizens about their duties and the existential threat of waste pollution.
- **Use of Modern Technology:** Three main ways of waste processing are incineration, waste-to-energy plants and biogas production.
- **Expanding Landfill Management:** Landfills should be constructed and managed according to the scientific methods to avoid any potential threats to the environment.

SECTION - D

24. Amartya Sen's Approach to Human Development and Its Four Major Aspects:

Amartya Sen is known for advocating the capability approach to human development. He argued that the growth of the economy is not the only indicator of development but the expansion of freedom and capability of the people. His approach is aimed primarily at health care, education and jobs as leverage to the quality of life of individuals.

Four Major Aspects of Human Development:

- **Equity:** Ensuring equal provision of resources and opportunities to everyone irrespective of gender, caste or income level.
- **Sustainability:** Development which does not meet the present at the expense of the future.
- **Productivity:** It is where people increase their skills and knowledge, thus can contribute positively to their growth.
- **Empowerment:** It is the art of helping people choose and be part of a community in which they can decide how things are accomplished.

This approach to people's overall well-being guarantees that the development is inclusive and sustainable.

28. (a) Uneven Distribution of Mineral Resources in India

i. **Regional Concentration:** The abundance of minerals in India is spread across a few states, mainly in the Peninsula Plateau, while other regions are less endowed.

ii. **Major Mineral-Rich States:** Jharkhand, Odisha, Chhattisgarh:

- Surplus in coal, iron ore, and bauxite are their wealth assets.
- **Rajasthan:** Loved for its limestone, copper, and zinc.
- **Karnataka, Goa:** Top suppliers of iron ore and gold besides production of copper.
- **Madhya Pradesh:** Carries a reserve of diamond and manganese.

iii. **Scarcity in Northern and Coastal Regions:**

- There is an absence of large mineral resources in the Indo-Gangetic Plains due to sedimented formations.
- Coastal areas have few minerals except for the offshore oil and gas fields.

iv. **Impact on Industrial Growth:**

- Unequal resource distribution leads to the reliance of industrial zones on the transport system.

- Results in the discrepancy of regional economic development.

v. **Need for Balanced Resource Utilisation:** Mining policies that are less destructive and fair allocation methods may reduce the inequalities.

OR

(b) Need for Conservation of Mineral Resources for Sustainable Development

• **Finite and Non-renewable Nature:** Minerals take millions of years to form and mining on a large scale can exhaust the limited set of resources.

• **Economic Significance:** For example, shortages in construction, energy and manufacturing, such as cement and steel, can reduce the speed of national economic growth. **Environmental Concerns:** The mining industry is the cause of deforestation, soil erosion and air/water pollution. The habitat will have to be destroyed, and biodiversity loss will have to take place if the exploitation of these natural resources is not regulated.

• **Sustainable Utilisation Methods:**

★ **Recycling:** Which also serves as the retention of metal resources like copper, aluminum and steel.

★ **Advanced Mining Technologies:** The advancements in the technology of mining are superb at not only the saving of natural resources but are also better at preserving the environment.

★ **Alternative Resources:** We can use the synthetic materials instead, which are cheaper.

• **Government Policies and Regulations:** Add eco-friendly mining practices and also create stipulations for the offenders of the laws that govern the world of mining to control them.

• **Global Responsibility:** Another global responsibility is to keep the utilisation of resources safe and eco-friendly.

That minerals will be available for a long time to keep the industrial fields running, and still pollution will be minimised is a good thing.

Outside Delhi Set-III**Q.P. Code: 64/2/3****SECTION - A**

4. *Correct Option:* (B) Only (i), (ii) and (iv) are correct.

Explanation:

Seaports handle cargo and accommodate large ships for international destinations, with some passenger terminals. But ferry ports are designed for passenger transport, often across short distances, carrying people and vehicles.

5. *Correct Option:* (C) Both (A) and (R) are correct and (R) is the correct explanation of (A).

Explanation:

• **Assertion (A):** Ports and harbours are the primary way to send and receive goods and services and provide communication among different corners of the Earth.

• **Reason (R):** Ports and harbours transport cargo (things) and people across countries through them, providing world interaction and connectivity, which makes them vital.

6. *Correct Option:* (B) Ports of Call

Explanation:

• Ports of Call were originally developed as stopping points for ships to refuel, take on water, and collect food supplies during long voyages.

7. *Correct Option:* (D) (iv), (i), (ii), (iii)

Explanation:

(i) Lucknow is located in Uttar Pradesh.

(ii) Nagpur is in Maharashtra and is south of Lucknow.

(iii) Hyderabad is in Telangana and is south of Nagpur

(iv) Madurai is in Tamil Nadu and is the farthest south.

8. *Correct Option:* (C) Only (i), (iii), and (iv) are correct.

Explanation:

(ii) Incorrect: Varanasi, Madurai and Prayag are ancient towns, not medieval towns.

SECTION - C

22. Main Features of National Highways in India:

- **Primary Road Network:** These are the roads in India that run across the major cities, states, and industrial hubs.
- **Managed by NHAI:** Because it is directed by the National Highways Authority of India, it looks after the development and upkeep of this project.
- **Well-Constructed and Wide:** Their main focus is to be run at exerted speed and the lanes are long enough to cover the entire distance from the start to the end of the road.
- **Golden Quadrilateral and Corridors:** Includes major projects like the Golden Quadrilateral and north-south and East-West Corridors.
- **Systematic Numbering:** Even-numbered highways run east-west and odd-numbered highways run north-south.
- **Boosts Economic Growth:** Facilitates trade, transportation and connectivity to ports and remote areas.

23. Measures to Solve the Problems of Slums in India:

- **Affordable Housing:** Schemes that include primary amenities like clean water, electricity and proper drainage may be launched in urban centres to those who coexist with slums.
- **Slum Redevelopment:** Implement in-situ rehabilitation schemes to improve the living conditions of the slum dwellers.
- **Basic Infrastructure:** The overall improvement, however, to provide clean drinking water, sanitation, electricity and drainage systems would also have to be considered.
- **Employment Opportunities:** A project that entails stimulating and promoting skill acquisition as well as jobs, consequently leading to revenue increases.
- **Discipline in Urban Planning:** Construct a better city planning so that the possibility of slum expansion is minimised.
- **Public Awareness:** Integrate the unwanted waste disposal technique and the valuable lifestyle into schools' curriculum as part of the school sanitation programs for students.
- **Government Initiatives:** Introduce and enhance policies like the PMAY (Pradhan Mantri Awas Yojana) for the redevelopment

SECTION - D

27. (a) Growth of Population in India Since 1921

The period from 1921 to 1951 was a turning point in the demographic history of India due to increased population growth. There are four distinct stages of the growth long-term trend which are given below:

- **Stagnant Growth (1901—1921):** High birth rate, but high death rate due to famines, epidemics, and poor healthcare. Population slightly increased through that time, with some ups and downs.
- **Steady Growth (1921—1951):** The main reason was the decreasing death rates that were the result of fewer

epidemics and medicine improvements, while the birth rates were still relatively high. The growth rate of the population became more and more steady, as the death rates fell, and infant mortality, aside from the birth of children, continued to rise.

- **Rapid Growth (1951—1981):** The period following the Indian independence witnessed rapid increase in the population due to the advance of health, cleanliness, and food security in the territory. Besides the continuous existence of high birth rates, however, there was a dramatic decline in the death rate, especially the child mortality rate.

- **Moderate Growth (1981—Present):** The fertility rate of women decreased as they became more conscious of birth control, various government family planning programs, and the population became more literate along with the fact that many people moved from rural areas to the urban environment.

India is now going through a demographic transition; demographic changes are characterised by a larger working-age population, which creates a favourable scenario for economic development, yet at the same time shows threats of it.

OR

(b) Challenges of Adolescent Population in India

Adolescents (10—19 years) form a significant portion of India's population. However, they face multiple challenges:

- **Health and Nutrition Issues:** Malnutrition, anemia, and stunted growth due to inadequate nutrition. Rise in lifestyle diseases due to unhealthy eating habits and lack of exercise.
- **Education and Skill Development:** Dropout rates, particularly among girls, due to financial constraints and societal norms. Lack of vocational training and skill development programs.
- **Mental Health and Emotional Well-being:** Rising stress, anxiety and depression due to academic pressure and social media influence. Lack of awareness and support for mental health issues.
- **Gender Disparities:** Early marriages, child labour, and discrimination against girls in education and opportunities. Gender-based violence and safety concerns.
- **Unemployment and Economic Challenges:** Many adolescents struggle to find employment due to skill gaps and lack of job opportunities. Informal employment leads to exploitation and poor working conditions.

28. (a) Future Prospects of India in Meeting Clean Energy Demand - India is rich in solar, wind, hydro and biomass energy resources, which are non-conventional (renewable) and therefore have vast potential for the future.

Future Prospects:

- **Abundant Solar Energy Potential:** India's potential for solar energy is unlimited as it gets 5000 trillion kWh of solar radiation in a year and solar energy is the major source of renewable energy. Organisations like International Solar Alliance (ISA) as well as government initiatives such as PM-KUSUM are pushing for the use of solar energy.

• **Expanding Wind Energy Infrastructure:** India is the world's fourth-largest wind power producer with great wind power potential available in coastal and desert areas. Wind energy projects are being implemented in coastal and desert regions for higher efficiency.

• **Hydropower and Biomass Energy Growth:** The implementation of small and large-scale hydropower stations will help meet the rural electricity needs. The use of biomass and bio-energy will provide sustainable and efficient solutions for the countryside, as well as in industry.

• **Government Initiatives and Policies:** India aims to have 500 GW of energy from non-fossil fuels by 2030 to achieve Net-Zero emissions by 2070. Green hydrogen in solar cells, etc., is another clean fuel option the mission is to create.

• **Employment and Economic Growth:** Renewable power investments not only create employment but also substantially enhance energy security. India's Made in India policy is designed to support local production of solar panels and wind turbines to boost renewable energy in the country.

Challenges:

- High initial investment and economics of scale.
- More integration of renewable sources into the grid through better grid infrastructure.

Despite its hardships, India's dedication to developing renewable energy and technology is its primary strength, making it better able to support future clean energy demands.

OR

(b) Nuclear Energy as a Viable Source in India

With the development of nuclear power, India has become a renewable energy source of high efficiency and reliability, due to high energy output, low carbon emissions and fuel availability.

Why Nuclear Energy is Viable for India?

• **Energy Demand and Base Load Supply:** The growing energy needs in India cannot be met with just sporadic power generation; rather, a stable base load supply is

needed. Nuclear power plants are in operation 24/7 due to their inability to depend on weather conditions, unlike solar or wind, which work by the weather.

• **Abundant Thorium Reserves:** India has the largest thorium reserves globally. These reserves can be used in advanced nuclear reactors. There is a Uranium and Thorium nuclear reactor under development, which uses thorium instead of Uranium, reduces the dependence on uranium imports, thus reducing the trade deficit through oil saving.

• **Reduced Carbon Footprint:** Among various options, nuclear energy is the most environmental-friendly with virtually zero greenhouse gas emissions, which makes it an extremely sustainable option. One of the benefits of this is reaching India's Net-Zero goal by 2070.

• **Government Initiatives and Expansion Plans:** India's Nuclear program, which is one of the top 10 global programs, operates 22 nuclear reactors with 7,480 MW capacity, and some new plants are under construction. The capacity of nuclear power will be increased to 22 GW by 2031.

• **Technological Advancements:** The country, in collaboration with partners like Russia, the US, and France, has implemented new reactor technologies. Fast Breed Reactors (FBRs), and small modular reactors (SMRs) are being developed.

Challenges:

- The first drawback is the high capital cost and long gestation period for setting up nuclear plants.
- Speaking of safety concerns, the disposal of radioactive waste and the effect of disasters such as Chernobyl and Fukushima are still a big issue.
- Resistance, alongside environmental causes, also exists among the public.

Even though we are all faced with endless issues to deal with in India, nothing can be as important as a country's plan to use national nuclear technology and to cooperate overseas as a guiding force for nuclear energy in its future.