Chapter 3: Atmosphere and Climate

Section A: Multiple Choice Questions.

1. The atmosphere is held around the Earth by:
   a) Wind b) Gravity c) Pressure d) Heat

2. Which gas is essential for breathing?
   a) Carbon dioxide b) Nitrogen c) Oxygen d) Helium

3. The word 'aurora' comes from which language?
   a) Latin b) Greek c) English d) French

4. Climate is measured over a period of:
   a) 10 years b) 20 years c) 30 years or more d) 5 years

5. Insolation decreases from:
   a) Poles to equator b) Equator to poles c) East to west d) North to south

6. The word 'monsoon' is derived from:
   a) Latin b) Greek c) Sanskrit d) Arabic

7. Each traditional season in India lasts for about:
   a) One month b) Two months c) Three months d) Four months

8. Meghadūtam was written around:
   a) 2nd century CE b) 5th century CE c) 8th century CE d) 10th century CE

9. Which of the following is a major cause of climate change?
   a) Planting trees b) Burning fossil fuels c) Saving water d) Recycling

10. Which gas is mainly responsible for climate change?
    a) Oxygen b) Nitrogen c) Carbon dioxide d) Hydrogen

Section B: Fill in the blanks using the help box given below.

southwest, human, ultraviolet, Moon, floods, Roman, Climate, gases, heat, precipitation

1. The atmosphere protects us from harmful _____ radiation.
2. The atmosphere is a mixture of various _____.
3. Aurora is named after the _____ goddess Aurora.
4. Rain is the most common form of _____.
5. The monsoon winds bring rainfall from the _____ direction.
6. Kṛiṣhiparāśhara's technique was based on the positions of the _____ and the Sun.
7. Mission Mausam aims to make India 'Weather Ready' and '_____ Smart'.
8. Climate change is caused mainly by _____ activities.
9. Greenhouse gases trap _____ in the atmosphere.
10. In 2025, Punjab experienced severe _____.

Section C: Write True or False in the space provided.

1. The atmosphere has no role in regulating Earth's temperature. [_____]
2. The troposphere contains most of the air we breathe. [_____]
3. Aurora Borealis occurs in the Southern Hemisphere. [_____]
4. Different gases produce different colours in auroras. [_____]
5. Climate refers to long-term conditions. [_____]
6. Traditionally, India experiences four seasons. [_____]
7. Kauṭilya's Arthaśhāstra includes records of rainfall measurements. [_____]
8. Climate change is a short-term phenomenon. [_____]
9. Methane is a greenhouse gas. [_____]
10. Standing water can spread diseases. [_____]

Section D: Match the Following.

Column A	**Column B**
1. Aurora	(A) Hour-to-hour or day-to-day state of the atmosphere
2. Stratosphere	(B) Sinks and creates high-pressure areas
3. Weather	(C) Reversal of wind directions over a year
4. Carbon Dioxide	(D) Dawn or morning light
5. Monsoon	(E) Greenhouse gas making up roughly 0.04% of air
6. Cold Air	(F) Ideal layer for flying commercial aeroplanes

Ans. _____, _____, _____, _____, _____,_____

Section E: Give Reasons Questions.

1. Air density decreases with altitude.

Ans. _____

_____

2. Aeroplanes fly in the stratosphere.

Ans. _____

_____

3. We do not feel the pressure of air on our bodies.

Ans. _____

_____

4. India is called a tropical monsoon country.

Ans. _____

_____

Section F: Short question answers.

1. What is the atmosphere? What is the composition of the atmosphere?

Ans. _____

_____

2. What is humidity?

Ans. _____

_____

3. What is precipitation?

Ans. _____

_____

4. How are winds named?

Ans. _____

_____

5. What is monsoon?

Ans. _____

_____

6. What is the importance of monsoon?

Ans. _____

_____

7. Mention two effects of climate change.

Ans. _____

_____

8. Why were people moved to relief camps during Punjab floods?

Ans. _____

_____

9. Which layer is important for weather changes and why?

Ans. _____

_____

10. What is global warming?

Ans. _____

_____

Section G: Long Answer Question.

1. Explain the structure of the atmosphere.

Ans. _____

_____

_____

_____

_____

2. Explain the elements of weather and climate.

Ans. _____

_____

_____

_____

_____

3. Explain land breeze and sea breeze.

Ans. _____

_____

_____

_____

_____

4. Explain the different seasons in India.

Ans. _____

_____

_____

_____

_____

5. Explain the causes and effects of climate change.

Ans. _____

_____

_____

_____

_____

6. Explain the northeast monsoon and its effects.
Ans. _____
_____
_____
_____
_____

Section H: Read the description carefully and write the correct term in the blank space provided.

1. The force of attraction between objects: _____
2. The element regulated by the atmosphere on Earth: _____
3. The most abundant gas in the atmosphere: _____
4. The gas that protects from UV rays: _____
5. The heat received from the Sun is called: _____
6. Division of the sky into 27 parts: _____
7. Author of Meghadūtam: _____
8. Region where monsoon onset was mentioned in classical texts: _____
9. The natural seasonal phenomenon described in ancient Indian literature: _____
10. Ministry responsible for meteorological services and weather forecasting in India: _____

Section I: Read the given text carefully and answer the questions that follow.

"In 2022, the state of Assam in India experienced severe floods due to heavy monsoon rains and the overflowing of the Brahmaputra River and its tributaries. Large parts of the state were submerged under water, affecting millions of people. Villages, roads, bridges, and agricultural lands were badly damaged. Many families lost their homes and had to move to relief camps.

The floods also caused serious damage to crops such as rice and vegetables, leading to economic losses for farmers. Wildlife in Kaziranga National Park was also affected, with many animals displaced or killed. Stagnant floodwater led to the spread of diseases like cholera and diarrhea. The government and relief agencies provided food, shelter, and medical aid to the affected people."

Questions:

1. What were the main causes of the floods in Assam (2022)?
Ans. _____
_____

2. How did the floods affect the people of Assam?
Ans. _____
_____

3. What was the impact of the floods on agriculture?
Ans. _____
_____

4. How did the floods affect wildlife in Assam?
Ans. _____
_____

5. Why do floods lead to health problems?
Ans. _____
_____

6. Why were relief camps important during the floods?
Ans. _____
_____

Section J: Assertion–Reason Questions.
Directions: In the following questions, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option from the choices given below:
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

1. Assertion (A): Climate change leads to rising global temperatures.
   Reason (R): Greenhouse gases trap heat in the atmosphere.
Ans. _____

2. Assertion (A): Winds are named after the direction they blow to.
   Reason (R): A wind blowing from the west is called a westerly.
Ans. _____

3. Assertion (A): Varāhamihira used nakṣhatras to predict rainfall.
   Reason (R): Nakṣhatras are lunar mansions.
Ans. _____

4. Assertion (A): Air density decreases with altitude.
   Reason (R): The amount of air molecules decreases at higher altitudes.
Ans. _____

5. Assertion (A): Greenhouse gases include carbon dioxide and methane.
   Reason (R): These gases help in cooling the Earth.
Ans. _____

Answer

Section A: Multiple Choice Questions.

1. b) Gravity	2. c) Oxygen	3. a) Latin	4. c) 30 years or more
5. b) Equator to poles	6. d) Arabic	7. c) Three months	8. b) 5th century CE
9. b) Burning fossil fuels	10. c) Carbon dioxide		

Section B: Fill in the blanks.

1. ultraviolet	2. gases	3. Roman	4. precipitation
5. southwest	6. stars	7. Climate	8. human
9. heat	10. floods		

Section C: Write True or False in the space provided.

1. False	2. True	3. False	4. True	5. True
6. True	7. True	8. False	9. True	10. True

Section D: Match the Following.

1 ➔ (D), 2 ➔ (F), 3 ➔ (A), 4 ➔ (E), 5 ➔ (C), 6 ➔ (B)

Section E: Give Reasons Questions.

1. Air density decreases with altitude because the amount of air decreases as we go higher, making the air thinner.
2. Aeroplanes fly in the stratosphere because it has stable air with very little weather disturbance, making flying smooth and safe.
3. We do not feel the pressure of air on our bodies because the pressure is balanced by the air inside our body.
4. India is called a tropical monsoon country because its climate is mainly influenced by monsoon winds that bring seasonal rainfall.

Section F: Short question answers.

1. The atmosphere is the blanket of gases surrounding the Earth. It is composed mainly of nitrogen (78%), oxygen (21%), and small amounts of carbon dioxide, argon, and other gases.
2. Humidity is the amount of water vapour present in the air. It indicates how moist or dry the air is.
3. Precipitation is any form of water that falls from clouds to the Earth, such as rain, snow, sleet, or hail.
4. Winds are named based on the direction from which they blow. For example, a wind blowing from the north is called a north wind.
5. Monsoon is a seasonal wind that changes its direction and brings heavy rainfall, especially in South Asia.
6. Monsoon is important because it provides water for agriculture, fills rivers and reservoirs, and supports the livelihood of people.
7. Two effects of climate change are rising temperatures (global warming) and melting of glaciers, which leads to rising sea levels.
8. People were moved to relief camps for safety as their homes were flooded. The camps provided shelter, food, and medical help.
9. The troposphere is important for weather changes because all weather phenomena like clouds, rain, and storms occur in this layer.
10. Global warming is the gradual increase in the Earth's average temperature due to the increase of greenhouse gases in the atmosphere.

Section G: Long Answer Question.

1. The atmosphere is divided into five vertical layers based on temperature variations:

- Troposphere: The lowest layer where all weather phenomena (clouds, rain) occur.
- Stratosphere: Contains the protective ozone layer and is ideal for flying commercial aeroplanes.
- Mesosphere: The coldest layer where most meteorites burn up upon entering from space.
- Thermosphere: Contains the ionosphere, which helps in radio transmission; temperature rises rapidly here.
- Exosphere: The outermost layer which gradually merges with outer space.

2. Weather and climate are determined by five interactive atmospheric elements:
- Temperature: The degree of hotness or coldness of the air.
- Atmospheric Pressure: The force exerted by the weight of air on the Earth's surface.
- Wind: The movement of air from high-pressure areas to low-pressure areas.
- Humidity: The total amount of water vapour present in the air at any given time.
- Precipitation: The falling of moisture on the ground in the form of rain, snow, or sleet.

3. Land and sea breezes are local winds caused by differential heating of land and water:
- Sea Breeze: During the day, the land heats up faster than the sea. The warm air over the land rises, creating low pressure. Cool air from the sea blows toward the land to take its place.
- Land Breeze: At night, the land cools down faster than the sea. High pressure develops over the land, while the sea remains relatively warm with low pressure. As a result, cool air blows from the land toward the sea.

4. India experiences four main agricultural and meteorological seasons:
- The Cold Weather Season (Winter): Characterized by clear skies, low temperatures, and pleasant weather (December to February).
- The Hot Weather Season (Summer): Characterized by rising temperatures and dry winds like 'Loo' (March to May).
- The Advancing Monsoon Season (Rainy): Driven by southwest monsoon winds that bring widespread rainfall across most of the country (June to September).
- The Retreating Monsoon Season (Post-Monsoon): A transitional period where winds reverse, clear skies return, and parts of the southeastern coast receive rainfall (October and November).

5. The causes and effects of climate change:
- Causes: Climate change is primarily driven by human activities like burning fossil fuels, deforestation, and industrial pollution. These actions release excessive greenhouse gases (like carbon dioxide and methane) that trap heat in the atmosphere.
- Effects: It leads to rising global temperatures, melting glaciers, rising sea levels, and an increase in extreme weather events such as severe floods (like Punjab 2025 and Assam 2022), prolonged droughts, and unpredictable monsoon patterns.

6. The Northeast Monsoon (or Retreating Monsoon) occurs from October to December. During this period, cold winds blow from the high-pressure landmass of Central Asia toward the low-pressure oceanic regions in the south.
- Effects: As these dry winds cross the Bay of Bengal, they pick up moisture and bring vital, heavy winter rainfall to India's southeastern coast, particularly the state of Tamil Nadu, Andhra Pradesh, and parts of Kerala.

Section H: Answer in one word.

1. Gravity	2. Temperature	3. Nitrogen	4. Ozone	5. Insolation
6. Nakshatras	7. Kālidāsa	8. Central	9. Monsoon	10. Earth Sciences

Section I: Case study.

1. Heavy monsoon rains and the overflowing of the Brahmaputra River and its tributaries.
2. Many people lost their homes, were displaced, and had to move to relief camps. Roads, bridges, and villages were also damaged.
3. Crops like rice and vegetables were destroyed, causing economic losses to farmers.
4. Wildlife in Kaziranga National Park was displaced or killed due to flooding.
5. Floods create stagnant water, which spreads diseases like cholera and diarrhea.
6. Relief camps were important because they provided shelter, food, and medical aid to affected people.

Section J: Assertion–Reason Answers

1. - (a)	2. - (c)	3. - (b)	4. - (a)	5. - (c)