

# WINDS, STORMS AND RAIN

## 5 CHAPTER

### CONTENTS

- Wind
- Reason behind wind current
- Thunderstorms
- How a thunderstorm becomes a cyclone
- Tornadoes
- Safety Measures
- Role of Advanced Technology

#### ➤ WIND

When air moves, it is called wind.

*Air moves from the region where the air pressure is high to the region where the pressure is low. The greater the difference in pressure, the faster the air moves.*

In nature there are several situations, where warm air rises at a place. The air pressure at that place is lowered. The cold air from the surrounding areas rushes in to fill its place. This sets up convection in air, i.e. wind

#### ➤ REASON BEHIND WIND CURRENT

Wind currents are generated due to Uneven Heating on the Earth.

These situations are :

**(a) Uneven heating between the equator and the poles.**

Regions close to the equator get maximum heat from the Sun. The air in these regions gets warm. The warm air rises, and the cooler air from the regions in the 0–30 degrees latitude belt on either

side of the equator moves in. These winds blow from the north and the south towards the equator. At the poles, the air is colder than that at latitudes about 60 degrees. The warm air at these latitudes rises up and the cold wind from the polar regions rushes in, to take its place. In this way, wind circulation is set up from the poles to the warmer latitudes.

The winds would have flown in the north-south direction from north to south, or from south to north. A change in direction is however, caused by the rotation of the earth.

**(b) Uneven heating of land and water.**

regions In summer, near the equator the land warms up faster and most of the time the temperature of the land is higher than that of water in the oceans. The air over the land gets heated and rises. This causes the winds to flow from the oceans towards the land. These are monsoon winds.

In winter, the direction of the wind flow gets reversed; it flows from the land to the ocean.

The winds from the oceans carry water and bring rain. It is a part of the water cycle.

#### ➤ THUNDERSTORMS

Thunderstorms develop in hot, humid tropical areas like India very frequently. The rising temperatures produce strong upward rising winds. These winds carry water droplets upwards, where they freeze, and fall down again. The swift movement of the falling water droplets along with the rising air create lightning and sound. It is this event that we call a **thunderstorm**.

#### ➤ HOW A THUNDERSTORM BECOMES A CYCLONE

Before cloud formation, water takes up heat from the atmosphere to change into vapour. When water vapour changes back to liquid form as raindrops, this heat is released to the atmosphere.

The heat released to the atmosphere warms the air around. The air tends to rise and causes a drop in pressure. More air rushes to the centre of the storm. This cycle is repeated. The chain of events ends with the formation of a very low-pressure system with very high-speed winds revolving around it. It is this weather condition that we call a **cyclone**. Factors like wind speed, wind direction, temperature and humidity contribute to the development of cyclones.

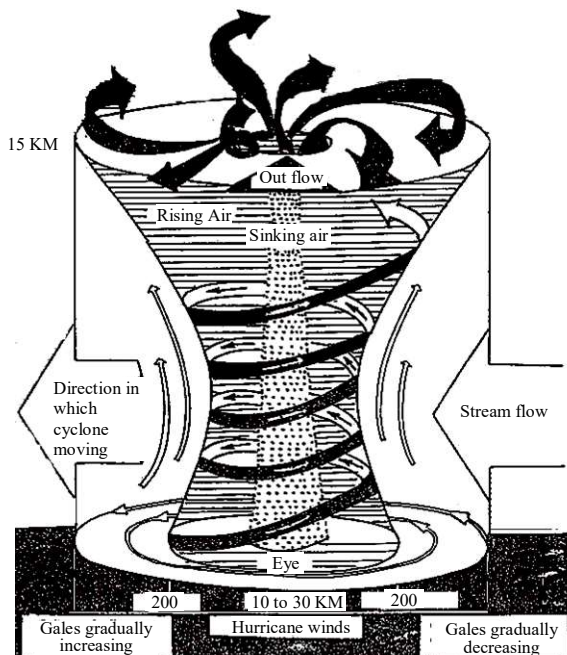


Fig. Formation of cyclone

A cyclone is known by different names in different parts of the world. It is called a ‘hurricane’ in the American continent. In Philippines and Japan it is called a ‘typhoon’

#### ◆ DESTRUCTION CAUSED BY CYCLONES

Cyclones can be very destructive. Strong winds push water towards the shore even if the storm is hundreds of kilometres away. These are the first indications of an approaching cyclone. The water waves produced by the wind are so powerful that a person cannot overcome them.

The low pressure in the eye lifts water surface in the centre. The rising water may be as high as 3–12 metres. It appears like a water-wall moving towards the shore. As a result, the seawater enters the low-lying coastal areas, causing severe loss of

life and property. It also reduces the fertility of the soil.

Continuous heavy rainfall may further worsen the flood situation.

High-speed winds accompanying a cyclone can damage houses, telephones and other communication systems, trees, etc., causing tremendous loss of life and property.

#### ➤ TORNADOES

A tornado is a dark funnel shaped cloud that reaches from the sky to the ground. Most of the tornadoes are weak. A violent tornado can travel at speeds of about 300 km/h. Tornadoes may form within cyclones.

The whole coastline of India is vulnerable to cyclones, particularly the east coast. The west coast of India is less vulnerable to cyclonic storms both in terms of intensity and frequency of the cyclones.

#### ➤ SAFETY MEASURES

- ◆ A cyclone forecast and warning service must be there.
- ◆ Rapid communication of warnings to the construction of cyclone shelters in the cyclone prone areas, and Administrative arrangements for moving people fast to safer places.
- ◆ We should not ignore the warnings issued by the meteorological department through TV, radio, or newspapers.
- ◆ We should —
  - make necessary arrangements to shift the essential household goods, domestic animals and vehicles, etc. to safer places; avoid driving on roads through standing water, as floods may have damaged the roads; and keep ready the phone numbers of all emergency services like police, fire brigade, and medical centres.
- ◆ For do not drink water that could be contaminated. Always store drinking water for emergencies.
- ◆ Do not touch wet switches and fallen power lines.
- ◆ Do not go out just for the sake of fun.

- ◆ Do not pressurise the rescue force by making undue demands.
- ◆ Cooperate and help your neighbours and friends.

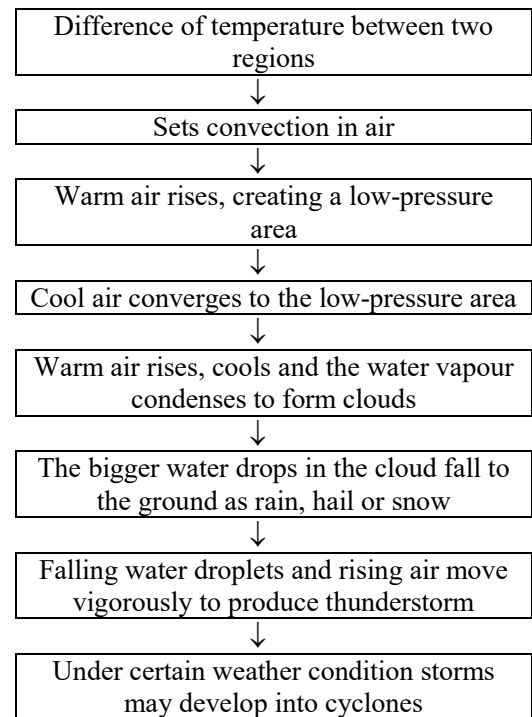
### ➤ ROLE OF ADVANCED TECHNOLOGY

These days we are better protected. In the early part of the last century, coastal residents may have had less than a day to prepare or evacuate their homes from an oncoming cyclone. The world today is very different. Due to satellites and radars, a **Cyclone alert** or **Cyclone watch** is issued 48 hours in advance of any expected storm and a **Cyclone warning** is issued 24 hrs in advance. The message is broadcast every hour or half hour when a cyclone is nearer the coast. Several national and international organisations cooperate to monitor the cyclone-related disasters.

### ➤ IMPORTANT POINT

- ◆ Air around us exerts pressure.
- ◆ Air expands on heating and contracts on cooling.
- ◆ Warm air rises up, whereas comparatively cooler air tends to sink towards the earth's surface.
- ◆ As warm air rises, air pressure at that place is reduced and the cooler air moves to that place.
- ◆ The moving air is called wind.
- ◆ Uneven heating on the earth is the main cause of wind movements.
- ◆ Winds carrying water vapour bring rain.
- ◆ High-speed winds and air pressure difference can cause cyclones.

- ◆ It has become easier to monitor cyclones with the help of advance technology like satellites and radars.
- ◆ Self-help is the best help. Therefore it is better to plan in advance and be ready with defence against any approaching cyclone.
- ◆ The following flow chart will help you to understand the phenomena that lead to the formation of clouds and falling of rain and creation of storms and cyclones :



## EXERCISE - 1

### A. Very Short Answer Type Questions

- Q.1 What causes winds ?
- Q.2 What does a barometer measure ?
- Q.3 What is a storm surge ?
- Q.4 What is the low-pressure centre of a cyclone called ?
- Q.5 In which direction do winds swirl around the centre of a cyclone in the northern hemisphere ?
- Q.6 What causes planetary winds ?

### B. Short Answer Type Questions

- Q.7 What is air pressure ? How does it determine the kind of weather a place will have ?
- Q.8 How does a thunderstorm develop ?
- Q.9 What are cyclones in the Atlantic and Pacific called ? Why are cyclones given names ?
- Q.10 What are the trade winds ? How are they caused ?
- Q.11 Explain why roofs get blown off during a storm.

### C. Long Answer Type Questions

- Q.12 What is a tornado ? How does it form and what impact does it have ?
- Q.13 How does a cyclone develop ? Describe its impact briefly.
- Q.14 What safety measures can one take to protect oneself from a cyclone ?
- Q.15 Write briefly about the winds that carry rain to most parts of our country between June and September.

### D. Fill in the blanks

- Q.16 Twister and whirlwind are alternative names for a .....
- Q.17 An anemometer measures .....
- Q.18 High pressure indicates ..... weather.
- Q.19 A tornado over the sea is called a .....
- Q.20 Scientists who study weather are called .....
- Q.21 The best place to be in during a tornado is the .....
- Q.22 The cold, dry winds that blow over northern India in winter are called the .....

## EXERCISE - 2

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### Single Correct Answer type Questions

- Q.1** Which one of the following place is unlikely to be affected by a cyclone ?  
(A) Chennai (B) Manglore  
(C) Amritsar (D) Puri
- Q.2** Which of the statements given below is correct ?  
(A) In winter the winds flow from the land to the ocean  
(B) In summer the winds flow from the land towards the ocean.  
(C) A cyclone is formed by a very high-pressure system with very high-speed winds revolving around it  
(D) The coastline of India is not vulnerable to cyclones
- Q.3** Wind is ..... air  
(A) Moving  
(B) Resting  
(C) Moving or resting  
(D) None of these
- Q.4** Winds are generated due to ..... heating on the earth .  
(A) Direct  
(B) Indirect  
(C) Direct or Indirect  
(D) One of these
- Q.5** Near the earth's surface ..... air rises up whereas ..... air comes down :  
(A) Hot, cold (B) Cold, hot  
(C) Cold, cold (D) Hot, hot
- Q.6** The energy possessed by wind is  
(A) Kinetic energy  
(B) Potential energy  
(C) Thermal energy  
(D) Sound energy
- Q.7** The cause of formation of cyclones is  
(A) Air rotates at low pressure with high speed  
(B) Air rotates at high pressure with high speed  
(C) Air rotates at high pressure with low speed  
(D) None of these
- Q.8** Air moves from a region of ——— pressure to a region of ——— pressure.  
(A) High , low (B) Low, high  
(C) High, high (D) Low, low

# ANSWER KEY

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## EXERCISE-2

<b>Ques.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
<b>Ans.</b>	A	A	A	A	A	A	A	A