7

Heat transfer in Nature

Chapter Notes:

In this chapter, we explore how heat moves in nature through **three key processes — conduction, convection, and radiation**. We also examine the role of heat in daily life, the **water cycle**, and how groundwater is formed and stored.

1. Conduction

- Heat transfer in solids.
- Particles do not move; they only transfer heat.
- Metals are good conductors (e.g., steel, copper).
- Wood, glass, air are poor conductors or insulators.

2. Convection

- Transfer of heat in liquids and gases by movement of particles.
- Hot fluids rise, cool ones sink — setting up a convection current.
- Examples: Boiling water, smoke rising, sea and land breeze.

3. Radiation

- Heat transfer without any medium.
- Sun's heat reaches Earth by radiation.
- Dark surfaces absorb more heat; light ones reflect it.

4. Applications in Daily Life

- Cooking utensils use metals for better conduction.
- Woolen clothes trap air (an insulator) to keep warm.
- Hollow bricks and mud walls used in extreme climates.

5. Water Cycle

- Steps: Evaporation, Transpiration, Condensation, Precipitation, Infiltration, and Storage.
- Maintains balance of water in nature.

6. Groundwater and Aquifers

- Water seeps into the ground (infiltration) and collects in aquifers.
- Gravel allows faster seepage than clay.

Fill in the blanks

1. Heat transfer in solids takes place by _____.
2. Woolen clothes keep us warm by_____ air.
3. The _____ is the main source of heat and light on Earth.
4. Sea breeze blows from the _____ during the day.
5. The process of water soaking into the ground is called_____.
6. Materials like glass and wood are _____ of heat.
7. _____ does not need any medium to transfer heat.
8. _____ are layers of rocks that store groundwater.

Multiple Choice Questions (MCQs)

1. Which of the following is a good conductor of heat?

(a) Wood (b) Plastic
(c) Copper (d) Glass

2. In which form does the Sun transfer heat to Earth?

(a) Conduction (b) Radiation
(c) Convection (d) Evaporation

3. Which material will allow water to seep through the fastest?

(a) Clay (b) Sand
(c) Gravel (d) Cement

4. Which of the following is NOT an example of convection?

(a) Sea breeze (b) Land breeze
(c) Heating water in a pot (d) Feeling warm near a heater

5. What is the process of water soaking into soil called?

(a) Condensation (b) Evaporation
(c) Precipitation (d) Infiltration

6. What type of heat transfer takes place in solids?

(a) Radiation (b) Convection
(c) Conduction (d) Reflection

True or False

1. Heat can travel through vacuum by radiation.
2. Convection happens in solids.
3. Dark surfaces reflect most of the heat.
4. Clay allows more seepage than gravel.
5. The water cycle helps in replenishing groundwater.

Questions Answer

Q1: How does the Sun help in the water cycle?

Ans: _____

_____

Q2: Why are cooking utensils made of metals?

Ans: _____

_____

Q3: What happens when air or water is heated?

Ans: _____

_____

Q4: Explain why tea remains hot in a porcelain cup for longer time.

Ans: _____

_____

Q5: What is radiation? Give one real-life example.

Ans: _____

_____

More Questions

Q1: What is the role of air in keeping us warm in winter clothing?

Ans: _____

_____

_____

Q2: What are aquifers?

Ans: _____

_____

_____

Q3: Why does sea breeze occur during the day?

Ans: _____

_____

_____

Q4: Give examples where all three methods of heat transfer occur.

Ans: _____

_____

_____

Q5: What is the importance of aquifers?

Ans: _____

_____

_____

Q6: Why is heat transfer necessary in nature?

Ans: _____

_____

_____

Q7: How does convection help in boiling water?

Ans: _____

_____

_____

Q8: What is infiltration?

Ans: _____

_____

_____

Q9: How does the presence of air in hollow bricks help in insulation?

Ans: _____

_____

Answers

Fill in the Blanks

1. conduction	2. trapping	3. Sun	4. sea to land
5. infiltration	6. poor conductors	7. Radiation	8. Aquifers

Multiple Choice Questions (MCQs)

1. (c) Copper	2. (b) Radiation	3. (c) Gravel
4. (d) Feeling warm near a heater	5. (d) Infiltration	6. (c) Conduction

True or False

1. → True	2. → False	3. → False
4. → False	5. → True	

Question Answer

Ans 1: The Sun heats up water in oceans, rivers, and lakes, causing it to evaporate into water vapor. This is the starting point of the water cycle.

Ans 2: Metals are good conductors of heat, so they allow heat to pass quickly and evenly, making cooking more efficient.

Ans 3: When air or water is heated, it expands, becomes lighter, and rises. Cooler particles move in to take their place, creating a convection current.

Ans 4: Porcelain is a poor conductor of heat, so it does not allow heat to escape quickly, keeping the tea hot for a longer time.

Ans 5: Radiation is the transfer of heat without a medium. Example: We feel the Sun's heat even though space has no air.

Extra Question

Ans 1 : Air is a poor conductor of heat. It gets trapped in the woolen fabric or between layers and prevents heat loss from our body, keeping us warm.

Ans 2: Aquifers are underground layers of soil, rock, or gravel that store water in their pores. This water is called groundwater.

Ans 3: During the day, land heats up faster than water. Hot air rises from the land and cool air from the sea moves in to take its place, creating a sea breeze.

Ans 4: When we heat water in a metal pan:

1. Heat reaches pan by radiation. 2. Pan gets hot by conduction. 3. Water heats up by convection.

Ans 5: Aquifers store groundwater, which is a crucial source of water for drinking, irrigation, and other uses.

Ans 6: Heat transfer helps in maintaining temperature balance in the environment, driving processes like the water cycle, weather patterns, and biological activities.

Ans 7: Heat is transferred from the flame to the bottom of the vessel. The heated water becomes lighter and rises, while cooler water sinks, creating a circular flow and gradually heating the entire volume.

Ans 8: Infiltration is the process by which surface water seeps into the soil and gets stored underground as groundwater.

Ans 9: Air is a poor conductor of heat. Hollow bricks trap air, which helps in preventing heat from entering or leaving, thus keeping houses warm in winter and cool in summer.