

Sardar Kaurey Khan Public Higher Secondary School Muzaffargarh



CLASS: 9TH

WINTER VACATION TASK

PHYSICS

MULTIPLE CHOICE QUESTION OF CHAPTER-6 IN ALL PUNJAB BOARD PAPERS-2013-2022

- 1- If the velocity of a body becomes three times greater then kinetic Energy will be:(3 Times)
(A) Three times (B) Nine times (C) Four times (D) Six times
- 2- SI unit of work is: (3 times)
(A) pascal (B) Newton (C) joule (D) watt
- 3- 10 joule work is done by machine in 5 seconds its power.
(A) 2 W (B) 10 W (C) 25 W (D) 50 W
- 4- The energy in the stretched bow is: (3 times)
(A) Elastic P.E (B) sound energy (C) Heat energy (D) K.E
- 5- The efficiency of solar cell is: (1 Time)
(A) 3% (B) 6% (C) 9% (D) 12%
- 6 One joule is equal to (2 times)
(a) $\frac{1N}{1m}$ (b) $1N \times 1m$ (c) $\frac{1m}{1N}$ (d) $\frac{1N^2}{1m^2}$
- 7 One Horse power is equal to: (3 Times)
(a) 740W (b) 746W (c) 750W (d) 756W
- 8 The major source of heat energy is: (2 Times)
(a) Moon (b) Earth (c) Nuclear fuels (d) Sun
- 9 The efficiency percentage of an electric lamp is: (2 Times)
(a) 5% (b) 10% (c) 15% (d) %20
- 10- Capability to do work is called:
(A) energy (B) power (C) torque (D) momentum
- 11 The work will be maximum when angle between force and displacement is: (5 times)
(A) 45° (B) 0° (C) 60° (D) 90°
- 2016**
- 12- The types of mechanical energy are:
(A) 10 (B) 8 (C) 2 (D) 4
- 2017**
- 13- Hammer raised up has energy:
(A) P.E (B) K.E (C) Sound Energy (D) Heat Energy
- 14- One kilo Joule is: (2 times)
(A) 10 J (B) 100 J (C) 1000 J (D) 10000 J
- 2018**
- 15- The unit of energy is: (2 times)
(A) Newton (B) Joule (C) Meter (D) Second
- 16- Formula of potential energy is:
(A) P.E = p m g (B) P.E = mgh (C) P.E = m g h (D) P.E = m ah
- 2019**
- 17- Speed of light is:
(A) $2 \times 10^8 \text{ ms}^{-1}$ (B) $2 \times 10^9 \text{ ms}^{-1}$ (C) $3 \times 10^8 \text{ kms}^{-1}$ (D) $3 \times 10^8 \text{ ms}^{-1}$
- 18- The formula of Power is:
(A) $P = Wt$ (B) $P = \frac{W}{t}$ (C) $P = mv$ (D) $P = ma$
- 19- The energy due to motion of body is called:
(A) Chemical energy (B) Potential energy (C) Nuclear energy (D) Kinetic energy
- 2021**

- 20- SI unit of power is
 (A) watt (B) second (C) ms^{-1} (D) ms^{-2}
- 21- A car having mass 400 kg, moving with velocity $2 ms^{-1}$. Its kinetic energy will be:
 (A) 100 J (B) 200 J (C) 800 J (D) 1600 J
- 22- The product of force and displacement is called
 (A) Acceleration (B) Momentum (C) Power (D) work
- 23- Efficiency of an ideal system is:
 (A) 34% (B) 75% (C) 201% (D) 100%
- 24- Potential energy (P.E.)=
 (A) wg (B) wm (C) gh (D) wh

ANSWERS

1	2	3	4	5	6	7	8	9	10	11	12	13
B	C	A	A	A	B	B	D	A	A	B	C	A
14	15	16	17	18	19	20	21	22	23	24		
C	B	C	D	B	D	A	C	D	D	D		

Chapter No.6: Exercise (MCQ's)

- 1- The work done will be zero when the angle between the force and the distance is:
 (A) 45° (B) 60° (C) 90° (D) 180° (4 Times)
- 2- If the direction of motion of the force is perpendicular to the direction of motion of the body, then work done will be:
 (A) maximum (B) minimum (C) zero (D) none of the above
- 3- If the velocity of a body becomes double, then its kinetic energy will:
 (A) remain the same (B) become double (C) become four times (D) become half
- 4- The work done in lifting a brick of mass 2 kg through a height of 5 m above ground will be:
 (A) 2.5 J (B) 10 J (C) 50 J (D) 100 J (2 Times)
- 5- The kinetic energy of a body of mass 2 kg is 25 J. Its speed is:
 (A) $5 ms^{-1}$ (B) $12.5 ms^{-1}$ (C) $25 ms^{-1}$ (D) $50 ms^{-1}$ (3 Times)
- 6- Which one of the following converts light energy into electrical energy?
 (A) electric bulb (B) electric generator (C) Photocell (D) Electric cell
- 7- When a body is lifted through a height h , the work done on it appears in the form of its:
 (A) kinetic energy (B) potential energy
 (C) elastic potential energy (D) geothermal energy
- 8- The energy stored in coal is:
 (A) heat energy (B) kinetic energy (C) chemical energy (D) nuclear energy (2 Times)
- 9- The energy stored in a dam is:
 (A) electric energy (B) potential energy (C) kinetic energy (D) thermal energy (3 Times)
- 10- Einstein's mass-energy equation, c is the:
 (A) speed of sound (B) speed of light (C) speed of electron (D) speed of Earth (2 Times)
- 11- Rate of doing work is called:
 (A) energy (B) torque (C) power (D) momentum (2 Times)

ANSWERS

1	2	3	4	5	6	7	8	9	10	11
C	C	C	D	A	C	B	C	B	B	C

SHORT QUESTION'S OF CHAPTER-6 Topic Wise IN ALL PUNJAB BOARD PAPERS-2013-2022

6.1 Work

1. On which factor, work depends. (2 Times)

Ans. The work depends upon following factors.

- i. Force acting on a body
- ii. displacement of the body and angle between them.

6.5 Forms of Energy:

2. Define mechanical energy and give two examples. (6 times)

Ans. Mechanical energy: Energy possessed by a body due to its motion or position is called mechanical energy.

Example: (i) A stretched bow (ii) A moving car

3. Differentiate between electrical energy and light energy. (3 Times)

Ans:

Electrical Energy	Light Energy
☆ Electrical energy can be supplied to any desired place through wires.	☆ Plants produces food in the presence of light.
☆ We get electrical energy from batteries and electric generators.	☆ We get light energy from, candles, sun, and burning fuel.

4. What is wind energy. Write its two uses. (2 Times)

Ans. Energy obtained from wind is called wind energy. It has been used by wind mills to grind grain and pump water.

It is also used to turn wind turbines to generate electricity.

5. Define chemical and Nuclear energy. (4 Times)

Ans **Chemical Energy:** Chemical energy is present in food, fuels and in other substances. The energy is released from these substances during chemical reactions.

Nuclear energy: Nuclear energy is the energy released in the form of nuclear radiations in addition to heat and light during nuclear fission and fusion reactions.

6. Define sound energy. (2 Times)

Ans: **Sound energy:** Energy obtained from sound is called sound energy. It is produced when a body vibrates.

7. Write two processes for the Emission of Nuclear Energy.

Ans: i) Fission reaction ii) Fusion reaction.

8. Define Fission reaction.

Ans: Breaking down of heavy nucleus into two smaller nuclei with release of huge amount of energy is called Fission reaction.

6.6 Interconversion of Energy:

9. What is soil erosion? (2 Times)

Ans. **Soil erosion:-** As rain water flows down, its kinetic energy changes into thermal energy while parts of k.E of flowing water is used to wash away soil particles of rocks known as soil erosion.

6.7 Major Sources of Energy:

10. Differentiate between non-renewable and renewable sources of energy.

Ans. **Renewable sources of Energy:-** Sunlight and water power are renewable sources of energy. These can be regenerated so called renewable sources of energy.

Non renewable sources of Energy:- Fossil fuels and nuclear fuels are known non-renewable sources of energy because it took million of years for them to attain the present form.

11. What is bio mass and how energy is produced from it? (3 times)

Ans: Biomass is plant or animal wastes that can be burnt as fuel. Other forms of biomass are garbage, farm wastes, sugarcane and other plants.

12. What is meant by fossile fuels?

Ans: Fuels such as oil, coal and natural gases are known as fossil fuels they took million of years for their formation.

13. Write the names of important parts of Solar house heating system?

Ans: i) A collector ii) A Storage device iii) A distribution system.

14. Write two disadvantage of fossil fuels. (2 Times)

Ans: i. Fossil fuels release harmful waste products and harmful gases.
ii. They pollute the environment that causes serious health problems.

15. Write difference between solar cell and solar panel. (2 Times)

Ans: A solar cell also called photo cell is made from silicon wafer. It converts sun light into electrical energy directly. Solar cells are used in calculators, watches and toys. Large number of solar cells are wired together to form solar panels.

Solar panels can provide power to telephone booths, light houses and scientific research centres. Solar panels are also used in power satellites.

16. Write down the mathematical form of mass energy equation with the value of c.

Ans: The mathematical form of mass energy equation is $E = mc^2$ where $c = 3 \times 10^8 \text{ ms}^{-1}$ is speed of light.

17. By defining magma, describe geothermal energy. (3 Times)

Ans: The hot molten part deep in the earth is called magma. Water reaching close to magma changes to steam due to the high temperature of magma. This energy is called geothermal energy.

18. Write the names of major sources of Energy

Ans. 1- Fossil Fuels 2- Nuclear Fuels

6.8 Efficiency:

19. Define an ideal system and write its efficiency.

Ans: Ideal system gives output equal to total energy used by it. Its efficiency is 100%.

6.9 Power:

20. A machine does 9J of work in 3S. Calculate its power.

Ans.

$$t = 3 \text{ sec}, \quad W = 9 \text{ J}, \quad \text{power} = P = ?$$

$$P = \frac{W}{t} = \frac{9}{3} = 3 \text{ Js}^{-1}$$

$$P = 3 \text{ watt}$$

21. If a pump has power 1120 watt, convert it into horse power.

Ans: $P = 1120 \text{ watt}, 1 \text{ hp} = 746 \text{ watt} \Rightarrow P = \frac{1120}{746} \text{ hp} = 1.5 \text{ hp}$

2022

22. Define power and write its formula and unit. Also define its unit. Write the relation between watt and horse power.

Ans: The rate of doing work is called power. Its formula is $P = \frac{W}{t}$.

The unit of power is watt. **Watt:** Power will be one watt if a body does work at the rate of one joule per second. Its relation with horse power is given by: $746 \text{ watt} = 1 \text{ hp}$

23. Define Potential Energy and describe its two types.

Ans: The energy possessed by a body due to its position is known as its potential energy. Its two types are:

(i) **Elastic potential energy:**

A stretched bow has potential energy due to its stretched position. The energy present in the stretched bow is called elastic potential energy.

(ii) **Gravitational Potential Energy:** The potential energy possessed by a hammer is due to its height. The energy present in a body due to its height is called gravitational potential energy.

24. What is meant by nuclear fuels?

Ans: Heavy atoms, such as uranium atoms, are used as nuclear fuels. In nuclear power plants, we get energy as a result of fission reaction. During fission reaction, heavy atoms, such as Uranium atoms, split up into smaller parts releasing a large amount of energy.

25. What is meant by Solar house heating?

Ans: Solar house heating systems are successfully used in areas with a minimum amount of sunshine in winter. A heating system consists of:

- (i) A collector (ii) A storage device (iii) A distribution system

26. How biogas is prepared from biomass?

Ans: When animal dung, dead plants and dead animals decompose, they give off a mixture of methane and carbon dioxide (Biogas). Electricity can be generated by burning methane.

27. Define efficiency and write formula to find percentage efficiency.

Ans: The efficiency of a system is the ratio of required form of energy obtained from a system as output to the total energy given to it as input.

$$\text{Efficiency} = \frac{\text{required form of output}}{\text{total input energy}}$$

$$\% \text{ Efficiency} = \frac{\text{required form of output}}{\text{total input energy}} \times 100$$

28. Define and write the Einstein's mass energy equation.

Ans: Einstein predicted the interconversion of matter and energy. According to him, a loss in the mass of a body provides a lot of energy. This happens in nuclear reactions. The relation between mass m and energy E is given by Einstein's mass-energy equation.

$$E = mc^2 \text{ where } c = 3 \times 10^8 \text{ ms}^{-1} \text{ is speed of light.}$$

Solved Textbook Short Questions

6.2: Define work. What is its SI unit?

(4 Times)

Sol: Work is done when a force acting on a body displaces it in the direction of the force.

$$W = FS$$

SI unit of work:- SI unit of work is Joule.

Joule :- Amount of work is one Joule when a force of one newton displaces a body through one meter in the direction of force.

6.3: When does a force do work? Explain.

Sol: Work is done when a force acting on a body displaces it in the direction of the force.

6.4: Why do we need energy?

(2 Times)

Sol: We need energy to do work, walk and play. We get it from the food that we eat.

6.5: Define energy, give two types of mechanical energy.

(2 Times)

Sol: A body possesses energy if it is capable to do work.

Types of mechanical energy.

i. Kinetic Energy.

ii. Potential Energy.

6.6: Define K.E. and write its relation.

(3 Times)

Sol: **Kinetic Energy:**

Energy possessed by a body due to its motion is called kinetic energy.

Its relation is $K.E = \frac{1}{2}mv^2$.

6.7: Define potential energy and write its relation. (3 Times)

Sol: Potential Energy:

Energy possessed by a body due to its position is called potential energy.

Its relation is P.E. = mgh

6.8: Why are fossil fuels called non-renewable form of energy?

Sol: Fossil fuels and nuclear fuels are known non-renewable sources of energy because it took million of years for them to attain the present form.

6.9: Which form of energy is most preferred and why? (3 Times)

Ans. Solar energy is most preferred forms of energy because it does not pollute the environment in any way.

6.10: How is energy converted from one form to another? Explain.

Sol: Energy can not be destroyed however it can be converted from one form to another form. By rubbing hands mechanical energy is converted into heat energy.

6.11: Name any five devices that convert electrical energy into mechanical energy.

Sol: Washing machine, juicer machine, motors, water pump and cream separator.

6.12: Name a device that converts mechanical energy into electrical energy.

Sol: The electrical generator converts mechanical energy into electrical energy.

6.13: What is meant by the efficiency of a system? (4 Times)

Sol: The efficiency of a system is the ratio of required form of energy obtained from a system as output to the total energy given to it as input.

6.14: How can you find the efficiency of a system? (3 Times)

Sol: We can find the efficiency of a system by following formula.

$$\text{Efficiency} = \frac{\text{required form of output}}{\text{total input energy}}$$

$$\% \text{ Efficiency} = \frac{\text{required form of output}}{\text{total input energy}} \times 100$$

6.15: What is meant by the term power? (2 Times)

Sol: The rate of doing work is called power. Its formula is $P = \frac{W}{t}$ and its unit is watt.

6.16: Define watt. (2 Times)

Sol: The unit of power is watt. Watt: Power will be one watt if a body does work at the rate of one joule per second.

Conceptual Short Questions

1. On which factor, work depends? (2 Times)

Ans. The work depends upon following factors.

i. Force acting on a body

ii. displacement of the body and angle between them.

2. What is bio mass and how energy is produced from it? (3 times)

Ans. Biomass is plant or animal wastes that can be burnt as fuel. Other forms of biomass are garbage, farm wastes, sugarcane and other plants.

3. How can you describe geothermal energy by defining magma? (3 Times)

Ans: The hot molten part deep in the earth is called magma. Water reaching close to magma changes to steam due to the high temperature of magma. This energy is called geothermal energy.

4. How biogas is prepared from biomass?

Ans: When animal dung, dead plants and dead animals decompose, they give off a mixture of

5.

Ans.

6.

Ans.

7.

Ans.

8.

Ans.

9.

Ans.

10.

Ans.

methane and carbon dioxide(Biogas). Electricity can be generated by burning methane.

5. **When does a force do work?**

Ans. Work is done when a force acting on a body displaces it in the direction of the force.

6. **Why do we need energy?**

(2 Times)

Ans. We need energy to do work, walk and play. We get it from the food that we eat.

7. **Why are fossil fuels called non-renewable form of energy?**

Ans. Fossil fuels and nuclear fuels are known non-renewable sources of energy because it took million of years for them to attain the present form.

8. **Which form of energy is most preferred and why?**

(3 Times)

Ans. Solar energy is most preferred forms of energy because it does not pollute the environment in any way.

9. **How is energy converted from one form to another?**

Ans. Energy can not be destroyed however it can be converted from one form to another form. By rubbing hands mechanical energy is converted into heat energy.

10. **How can you find the efficiency of a system?**

(3 Times)

Ans. We can find the efficiency of a system by following formula.

$$\text{Efficiency} = \frac{\text{required form of output}}{\text{total input energy}}$$

$$\% \text{ Efficiency} = \frac{\text{required form of output}}{\text{total input energy}} \times 100$$

SECTION II (Topic wise)

	Kinetic Energy:	
1	Define kinetic energy and prove that $K.E = \frac{1}{2}mv^2$	5 times
	Potential Energy:	
2	Define potential energy and derived its formula $P.E = mgh$	3 times
	Main Sources of Energy:	
3	Write a note on non-renewable sources of energy.	2 times
4	Write a note on solar house heating system.	3 times
	Examples:	
5	Example. 6.1: A girl carries a 10kg bag upstairs to a height of 18 steps, each 20cm high. Calculate the amount of work she has done to carry the bag.	2 times
6	Example. 6.4: A force of 200N acts on a body of mass 20kg. The force accelerates the body from rest until it attains a velocity of 50ms^{-1} . Through what distance does the force act?	3 times
	Numericals:	
7	Numerical. 6.1: A man pulled a car through 35 m by applying a Force of 300 N. Find the work done by man.	3 times
8	Numerical. 6.2: A block weighing 20N is lifted 6m vertically upward. Calculate the potential energy stored in it.	3 times
9	Numerical. 6.4: A 500g stone is thrown up with a velocity of 15ms^{-1} . Find its P.E at its maximum height	2 times
10	Numerical. 6.7: A man pulls a block with a force of 300N through 50 m in 60 seconds. Find the power used by him to pull the block.	3 times

potential energy equal to the work done in lifting it to height "h".

Thus Potential energy P.E = $F \times h$

$$P.E = w \times h$$

$$P.E = mgh \quad (\text{Here weight of the body} = w = mg)$$

MULTIPLE CHOICE QUESTIONS OF CHAPTER-7 IN ALL PUNJAB BOARD PAPERS-2013-2022

- 1- At sea level, the atmospheric pressure is about. (2 times)
(A) 101300 Pa (B) 110300 Pa (C) 103100 Pa (D) 100130 Pa
- 2- The ratio between Stress and Tensite Strain is:
(A) Elastic Modulus (B) Bulk Modulus (C) Young's Modulus (D) Shear Modulus
- 3- Density = (2 times)
(A) $\frac{\text{Mass}}{\text{Volume}}$ (B) $\frac{\text{Weight}}{\text{Volume}}$ (C) $\frac{\text{Weight}}{\text{Mass}}$ (D) $\frac{\text{Mass}}{\text{Time}}$
- 4- The fourth state of matter is called
(A) solid (B) liquid (C) gas (D) plasma
- 5- In SI system unit of density is: (4 times)
(A) Kg m^{-1} (B) Kg m^{-3} (C) Kg m^{-2} (D) Kg m
- 6- Hydraulic press works on: (2 times)
(A) Newton's (B) Pascal's law (C) Archimedes principle (D) Hook's law
- 7- $\frac{\text{Stress}}{\text{Strain}} = \text{Constant}$ is:
(a) Pascal's Law (b) Newton's Law (c) Archimedes principle (d) Hooke's Law
- 8- In SI system, the unit of young's modulus is:
(a) Nm (b) Nm^{-1} (c) Nm^{-2} (d) Nm^{-3}
- 9- One cubic meter is equal to:
(a) 100 liter (b) 1000 liter (c) 10000 liter (d) $\frac{1}{1000}$ liter
- 2016
- 10- Mass of unit volume of any body:
(A) area (B) density (C) force (D) pressure
- 11- Liquid pressure at depth h is equal to:
(A) ρgh^2 (B) ρgh^3 (C) ρgh (D) $\frac{\rho}{gh}$
- 2017
- 12- Stress is equal to:
(A) Force/Area (B) Area/Force (C) Length/Area (D) Area/Length
- 13- 5 litre is equal to: (2 Times)
(A) $5 \times 10^{-3} \text{ m}^3$ (B) $5 \times 10^3 \text{ m}^3$ (C) $5 \times 10^{-3} \text{ cm}^3$ (D) $5 \times 10^3 \text{ cm}^3$
- 2018
- 14- Water exists in the states:

- (A) one (B) Two (C) Three (D) Four

2019

- 15- In S.I system, the unit of stress is:
 (A) Nm^{-1} (B) Nm^{-2} (C) NS (D) Nm
- 16- Density of Air in kgm^{-3} is:
 (A) 1 (B) 1.1 (C) 1.2 (D) 1.3
- 17- Density of ice is:
 (A) 900kgm^{-3} (B) 910kgm^{-3} (C) 920kgm^{-3} (D) 930kgm^{-3}

2021

- 18- The formula of pressure is
 (A) $F = PA$ (B) $P = \frac{F}{A}$ (C) $P = \frac{A}{F}$ (D) $P = AF$
- 19- The density of aluminium is:
 (A) 2500Kgm^{-3} (B) 920Kgm^{-3} (C) 7900Kgm^{-3} (D) 2700Kgm^{-3}

2022

- 20- Density of a solid can be determined by equation:
 (A) $D = \frac{w_2}{w_1 - w_2} \times \rho$ (B) $D = \frac{w_1}{w_1 - w_2} \times \rho$ (C) $D = \frac{w_1 - w_2}{w_1} \times \rho$ (D) $D = \frac{w_1}{w_2 - w_1} \times \rho$
- 21- According to Pascal's law, $F_2 =$ _____:
 (A) $F_1 \times \frac{A}{a}$ (B) $F_1 \times \frac{a}{A}$ (C) $a \times \frac{A}{F_1}$ (D) $\frac{a}{A \times F_1}$

ANSWERS

1	2	3	4	5	6	7	8	9	10	11
A	C	A	D	B	B	D	C	B	B	C
12	13	14	15	16	17	18	19	20	21	
A	A	C	B	D	C	B	D	B	A	

Chapter No.7: Exercise (MCQ's)

- 1- In which of the following state molecules do not leave their position? (3 Times)
 (A) solid (B) liquid (C) gas (D) plasma
- 2- Which of the substances is the lightest one? (5 Times)
 (A) copper (B) mercury (C) aluminum (D) lead
- 3- SI unit of pressure is pascal, which is equal to: (3 Times)
 (A) 10^4Nm^{-2} (B) 1Nm^{-2} (C) 10^2Nm^{-2} (D) 10^3Nm^{-2}
- 4- What should be the approximate length of a glass tube to construct a water barometer? (3 Times)
 (A) 0.5 m (B) 1 m (C) 2.5 m (D) 11 m
- 5- According to Archimedes, upthrust is equal to: (3 Times)
 (A) weight of displaced liquid (B) volume of displaced liquid
 (C) mass of displaced liquid (D) none of these
- 6- The density of a substance can be found with the help of: (5 Times)
 (A) Pascal's law (B) Hooke's law

(C) Archimedes principle

(D) Principle of floatation

7- According to Hooke's law:

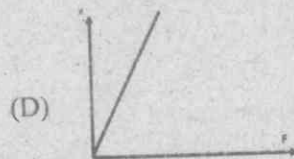
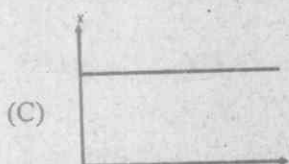
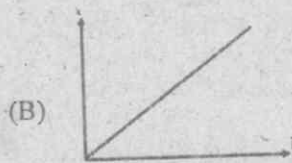
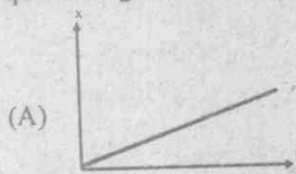
(A) stress \times strain = constant

(B) stress / strain = constant

(C) strain / stress = constant

(D) stress = strain

The following force-extension graphs of a spring are drawn on the same scale. Answer the questions given below from (viii) to (x).



8- Which graph does not obey Hooke's law?

(A) (B) (C) (D)

9- Which graph gives the smallest value of spring constant?

(A) (B) (C) (D)

10- Which graph gives the largest value of spring constant?

(A) (B) (C) (D)

CHAPTER NO. 7

1	2	3	4	5	6	7	8	9	10
A	C	B	D	A	C	B	C	D	A

SHORT QUESTION'S OF CHAPTER-7 Topic Wise IN ALL PUNJAB BOARD PAPERS-2013-2022

7.1 Kinetic Molecular Model of Matter:

1. Write two properties of plasma (fourth state of matter). (2 times)

Ans. i. Ionic state of matter ii. It is highly conducting state of matter.

2. Write some important features of kinetic molecular model of matter. (6 times)

Ans. The kinetic molecular model of matter has some important features. These are

☆ Matter is made up of particles called molecules.

☆ Molecules attract each other. ☆ Molecules remain in continuous motion.

7.2 Density:3. (7.1): The mass of 200 cm^3 of stone is 500 g. Find its density.

$$m = 500 \text{ g}, v = 200 \text{ cm}^3$$

$$\text{Ans: } d = \frac{m}{v} = \frac{500}{200} = 2.5 \text{ gcm}^{-3}$$

7.3 Pressure:

4. Is pressure a scalar or vector? Write its S.I unit.

Ans: Pressure is a scalar quantity. Its S.I unit is Pascal (N/m^2).**7.4 Atmospheric Pressure:**

5. What is meant by Atmospheric Pressure?

(2 times)

Ans. The earth is surrounded by a cover of air called atmosphere. Pressure exerted by cover of air is called atmospheric pressure. Its value is 101300 Nm^{-2} at sea level.

7.5 Pressure in Liquids:

6. On what factors pressure of liquid depends?

Ans. Pressure of a liquid depends upon

(i) Density of the liquid. (ii) Depth 'h' in a liquid.

$$\text{As } P = \rho gh$$

7. Write applications of Pascal's law?

Ans: Pascal's law is applicable on auto mobiles, hydraulic brake system, hydraulic Jack, hydraulic press etc.

7.8 Elasticity:

8. Differentiate between stress and strain

(14 times)

Ans. **Stress:** The force acting on unit area at the surface of a body is called stress. Its SI unit is Nm^{-2} .

Strain: The ratio of change of length, volume or shape with the original length, volume or shape is called strain. Strain has no unit as it is simply a ratio between two similar quantities.

9. Define deforming force.

Ans: The applied force that changes shape, length and volume of a substance is called deforming force. If deforming force is removed the body return to its original position.

2022

10. Describe that when the objects float on water and when sink into it?

Ans: An object sinks in water if its weight is greater than the upthrust acting on it. An object floats on water if its weight is equal or less than the upthrust.

11. Define Plasma. What is its relation with electric current?

Ans: Plasma is called the fourth state of matter in which a gas occurs in its ionic state. Positive ions and electrons get separated in the presence of electric or magnetic fields. Plasma also exists in neon and fluorescent tubes when they glow. Most of the matter that fills the universe is in plasma state. In stars such as our Sun, gases exist in their ionic state. Plasma is highly conducting state of matter. It allows electric current to pass through it.

12. What is Hydrometer and write its uses.

Ans: Hydrometer is a glass tube with a scale marked on its stem and heavy weight in the bottom. It is partially immersed in a fluid, the density of which is to be measured. One type of hydro meter is used to measure the concentration of acid in a battery. It is called acid meter.

13. Differentiate between ships and submarines.

Ans: Ships and boats carry passengers and goods over water. It works on the principle of floatation. It would sink in water if its weight including the weight of its passengers and goods becomes greater than the upthrust of water. A submarine can travel over as well as under water. It also works on the principle of floatation. It floats over water when the weight of water equal to its volume is greater than its weight. As soon as its weight becomes greater than the upthrust, it dives into water and remains under water.

14. Differentiate between stress and Tensile strain.

Ans: **Stress:** The force acting on unit area at the surface of a body is called stress. Its SI unit is Nm^{-2} .

Tensile strain: If stress produces a change in the length of an object then the strain is called tensile strain.

15. What is meant by 'Young's modulus? Write its unit in SI.

Ans: **Young's Modulus:**

Ratio between stress and tensile strain is called Young's Modulus.

$$\text{Young's Modulus} = \frac{\text{Stress}}{\text{Tensile Strain}} \quad \text{The unit of Young's Modulus is } \text{Nm}^{-2}.$$

16. Define pressure and write its two units.

Ans: The force acting normally on unit area at the surface of a body is called pressure. Its formula is:

$$P = \frac{F}{A} \text{ . Its unit are Pascal. } (N/m^2) \text{ and atmosphere (atm), } 1 \text{ atm} = 101325 \text{ Pa}$$

Solved Textbook Short Questions

7.2: How is kinetic molecular model of matter helpful in differentiating various states of matter? (2 times)

Sol: Properties of Solids:

- In solid, the molecules are held close together
- Solids have fixed shape
- Solids have no pressure

Properties of Gases:

- In gases, Molecules are farther apart.
- Gases have no fixed shape.
- Gases exert pressure

Properties of liquids:

- The distance between the molecules of a liquid are more than in solid.
- The liquid can flow easily.
- It attains the shape of container in which it is kept.

7.3: Does there exist a fourth state of matter? What is that? (3 Times)

Sol: Yes, there exists a fourth state of matter. It is plasma state (ionic state) of matter.

7.4: What is meant by density? What is its SI unit? (2 Times)

Sol: Density: Mass per unit volume is called density. Its SI unit is kgm^{-3} . Its formula is (Density = mass / volume).

7.5: Can we use a hydrometer to measure the density of milk?

Sol: Yes, we can use a hydrometer to measure the density of milk.

7.6: Define the term pressure. (6 Times)

Sol: The force acting normally on unit area at the surface of a body is called pressure. Its formula is:

$$P = \frac{F}{A} \text{ . Its unit is Pascal. } (N/m^2)$$

7.7: Show that atmosphere exerts pressure.

Sol: Let a girl makes soap bubbles. The soap bubbles have spherical shape because atmospheric pressure acts equally in all directions. Soap bubbles expand till pressure of air in them is equal to atmospheric pressure.

7.8: It is easy to remove air from a balloon but it is very difficult to remove air from a glass bottle. Why?

Sol: Air flows easily from high pressure to low pressure. It is very difficult to remove air from bottle because its air pressure is less than atmospheric pressure.

7.9: What is a barometer? (3 Times)

Sol: Barometer is an instrument which is used to measure atmospheric pressure.

7.10: Why is water not suitable to be used in a barometer? (4 Times)

Sol: Water has low density and 13.6 times lighter than mercury so water is not suitable to be used in barometer but Mercury has all the required properties to be used in a barometer.

7.11: What makes a sucker pressed on a smooth wall sticks to it?

Sol: Larger atmospheric pressure makes a sucker pressed on a smooth wall sticks to it.

7.12: Why does the atmospheric pressure vary with height? (4 Times)

Sol: As we go up, the atmospheric pressure decreases because density of air decreases. At certain height where there is no air, atmospheric pressure becomes zero.

7.13: What does it mean when the atmospheric pressure at a place fall suddenly?

Sol: When atmosphere pressure of any place suddenly falls there occur a storm, rain and typhoon in few hours.

7.14: What changes are expected in weather if the barometer reading shows a sudden

increase?

Sol: A sudden increase barometer reading indicating poor weather ahead.

7.15: State Pascal's law. (3 Times)

Sol: Liquids transmit pressure equally in all directions. This is called Pascal's law.

7.17: What is meant by elasticity? (6 Times)

Sol: Elasticity is the property of matter by virtue of which matter resists any force which tries to change its length, shape or volume.

7.18: State Archimedes principle. (2 Times)

Sol: **Archimedes Principle:** When an object is totally or partially immersed in a liquid, an upthrust acts on it equal to the weight of the liquid displaced by the object.

7.19: What is upthrust? Explain the principle of floatation. (6 Times)

Sol: The fluids (liquids) exert the force in upward direction when some object is immersed into fluids. This force is called upthrust force.

Principle of Floatation:- A floating object displaces a fluid having weight equal to the weight of object".

7.20: Explain how a submarine floats on the water surface and dives down into water.

Sol: A submarine has a system of tanks which can be filled and emptied with sea water. When these tanks are filled with seawater, its weight increase and it dives into water and remain under water. To come up on the surface the tanks are emptied from seawater.

7.21: Why does a piece of stone sink in water but a ship with a huge weight floats? (3 Times)

Sol: When piece of stone is placed in the water, then upward thrust is less than the weight of piece of stone and it sinks. Whereas the shape of ship is made such that upward thrust is greater than the weight of ship and it floats.

7.22: What is Hooke's law? What is meant by elastic limit? (4 Times)

Sol: **Hooke's Law:** The strain produced in a body is directly proportional to stress within the elastic limit of the body. $\text{stress} \propto \text{strain} \Rightarrow \text{stress} = \text{constant} \times \text{strain} \Rightarrow \frac{\text{stress}}{\text{strain}} = \text{constant}$

Elastic limit: It is limit within which a body restores its original size and shape when external force is removed.

Conceptual Short Questions

1. Is pressure a scalar or vector? What is its S.I unit?

Ans: Pressure is a scalar quantity. Its S.I unit is Pascal (N/m^2).

2. Describe that when the objects float on water and when sink into it?

Ans: An object sinks in water if its weight is greater than the upthrust acting on it. An object floats on water if its weight is equal or less than the upthrust.

3. Does there exist a fourth state of matter? What is that? (3 Times)

Ans: Yes, there exists a fourth state of matter. It is plasma state (ionic state) of matter.

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Ans: Yes, we can use a hydrometer to measure the density of milk.

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Ans: Air flows easily from high pressure to low pressure. It is very difficult to remove air from bottle because its air pressure is less than atmospheric pressure.

6. Why is water not suitable to be used in a barometer? (4 Times)

Ans: Water has low density and 13.6 times lighter than mercury so water is not suitable to be used in barometer but Mercury has all the required properties to be used in a barometer.

7. What makes a sucker pressed on a smooth wall sticks to it?

Ans: Larger atmospheric pressure makes a sucker pressed on a smooth wall sticks to it.

8. Why does the atmospheric pressure vary with height? (4 Times)

Ans: As we go up, the atmospheric pressure decreases because density of air decreases. At certain height where there is no air, atmospheric pressure becomes zero.

9. What does it mean when the atmospheric pressure at a place fall suddenly?

Ans: When atmosphere pressure of any place suddenly falls there occur a storm, rain and typhoon in few hours.

10. What changes are expected in weather if the barometer reading shows a sudden increase?

Ans: A sudden increase barometer reading indicating poor weather ahead.

11. How a submarine floats on the water surface and dives down into water?

Sol: A submarine has a system of tanks which can be filled and emptied with sea water. When these tanks are filled with seawater, its weight increase and its dives into water and remain under water, To come up on the surface the tanks are emptied from seawater.

12. Why does a piece of stone sink in water but a ship with a huge weight floats? (3 Times)

Ans: When piece of stone is placed in the water, then upward thrust is less than the weight of piece of stone and it sinks. Whereas the shape of ship is made such that upward thrust is greater than the weight of ship and it floats.

SECTION II (Topic wise)

Pressure in Liquids:		
1	Derive a formula to find pressure in liquids.	3 times
2	Define Pascal's law with the help of hydraulic press. Explain Pascal law.	3 times
Archimedes Principle:		
3	State archimedes principle and derive the equation of upthrust of liquid.	3 times
Hook's Law:		
4	Define young's modulus and also derive its equation.	2 times
Examples:		
5	7.3: A wooden cube of sides 0.1 m each has been dipped completely in water. Calculate the upthrust of water acting on it.	5 times
6	7.4: The weight of a metal spoon in air is 0.48 N, while its weight in water is 0.42 N. Find its density.	3 times
7	7.6: A barge 40 m long and 8 m broad, whose sides are vertical, floats partially loaded in water. If 125000 N of cargo is added, how many meters will it sink?	2 times
8	7.7: A steel wire 1m long and cross sectional area $5 \times 10^{-5} \text{m}^2$ is stretched through 1mm by a force of 10000N. Find the young's modulus of wire.	3 times
Numericals:		
9	7.1: A wooden block measuring 40cm×10cm×5cm has a mass 850g. Find the density of wooden block.	3 times
10	7.3: Calculate the volume of an iron sphere of mass 5kg, the density of iron is 8200kgm^{-3} .	2 times
11	7.4: The density of air is 1.3Kgm^{-3} . Find the mass of air in a room measuring 8m x 5m x 4m.	2 times
12	7.5: A student press her palm by her thumb with a force of 75N. How much would be the pressure under her thumb having contact area 1.5cm^2 .	2 times
13	7.6: The head of pin is a square of side 10mm. Find the pressure on it due to a force 20N.	6 times

$$P = \frac{F_1}{a} \quad \text{and} \quad F_1 = Pa \quad \text{-----(ii)}$$

$$\text{Now } \frac{F_2}{F_1} = \frac{PA}{Pa} = \frac{A}{a} \quad \text{As } A > a \quad \text{so, } F_2 > F_1$$

Force Multipliers:

Hydraulic systems working in this way are called force multipliers.

Explain Pressure in liquids and derive its formula. ($P = \rho gh$)

Consider a surface of area A in a liquid at a depth " h " as shown.

length of the cylinder of liquid over this surface will be " h ". If " ρ " is the density of the liquid and " m " is mass of liquid above the surface, then

$$\text{Mass of the liquid cylinder } m = \text{volume} \times \text{density} = (Ah) \times \rho$$

$$\text{Force acting on area } A \quad F = Ah\rho g$$

$$P = \frac{F}{A} = \frac{Ah\rho g}{A} \Rightarrow P = \rho gh$$

What is meant by Young's Modulus and derive its equation.

(3 Times)

Young's Modulus:

Ratio between stress and tensile strain is called Young's Modulus.

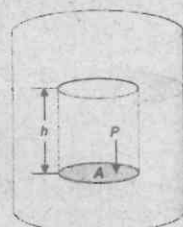
Equation of Young's Modulus:

Let a bar has length " L_0 " and cross sectional area ' A '. When force " F " is applied its length becomes L . Then $\Delta L = L - L_0$.

$$\text{Stress} = \frac{F}{A}, \quad \text{Tensile strain} = \frac{\Delta L}{L_0}$$

$$\text{Young's Modulus} = \frac{\text{Stress}}{\text{Tensile Strain}}$$

$$Y = \frac{F/A}{\Delta L/L_0} = \frac{FL_0}{A\Delta L}$$



Pressure of a liquid

MULTIPLE CHOICE QUESTIONS OF CHAPTER-8 IN ALL PUNJAB BOARD PAPERS-2013-2022

Complete the equation $T(K) =$

(1 Time)

- (A) $273 + C$ (B) $273 - C$ (C) $273 + F$ (D) $273 - F$

Absolute zero temperature is:

- (A) 0°C (B) 100 K (C) 100°C (D) -273°C

Latent heat of fusion of 1 kg of ice at 0°C is:

- (A) $33.6 \times 10^5 \text{ Jkg}^{-1}$ (B) $3.36 \times 10^5 \text{ Jkg}^{-1}$ (C) $3.36 \times 10^4 \text{ Jkg}^{-1}$ (D) $336 \times 10^5 \text{ Jkg}^{-1}$

The specific heat of iron in joules per kilogram per Kelvin is

- (A) 387.0 (B) 920.0 (C) 470.0 (D) 903.0

The specific heat of water is.

(3 times)

- (a) $800 \text{ Jkg}^{-1}\text{K}^{-1}$ (b) $4200 \text{ Jkg}^{-1}\text{K}^{-1}$ (c) $2500 \text{ Jkg}^{-1}\text{K}^{-1}$ (d) $1760 \text{ Jkg}^{-1}\text{K}^{-1}$

The boiling point of water is:

(2 times)

- (A) 98°C (B) 78°C (C) 100°C (D) 90°C

On celsius scale, the temperature 300K will be:

- (A) 26°C (B) 25°C (C) 24°C (D) 27°C

8- _____ of crocus is natural thermometer.:

- (A) Flower (B) Seed (C) Stem (D) Root

9- Unit of heat is:

- (A) Joule (B) Joule per second (C) Kelvin (D) Meter per second

10- Specific heat of _____ is maximum:

- (A) Copper (B) Ice (C) Water (D) Mercury

2017

11- Mercury freezes at:

- (A) 0 °C (B) -357 °C (C) -39 °C (D) -100 °C

12- Coefficients of linear expansion and volume expansion are related: (3 Times)

- (a) $\beta = \alpha$ (b) $\beta = 2\alpha$ (c) $\beta = 3\alpha$ (d) $\beta = 4\alpha$

13- The water converts into ice at a temperature:

- (A) 0 °F (B) 32 °F (C) -273 K (D) 0 K

2018

14. Boiling point of gold is equal to:

- (A) 2595 °C (B) 2450 °C (C) 2660 °C (D) 1750 °C

15. 50 °C is equal to:

- (A) 110 °F (B) 120 °F (C) 122 °F (D) 130 °F

16- Co-efficient of volume expansion of aluminium is:

- (A) $4.2 \times 10^{-5} K^{-1}$ (B) $7.2 \times 10^{-5} K^{-1}$ (C) $2.4 \times 10^{-5} K^{-1}$ (D) $6 \times 10^{-5} K^{-1}$

2019

17- The range of clinical thermometer is:

- (A) 20 °C - 42 °C (B) 25 °C - 42 °C (C) 30 °C - 42 °C (D) 35 °C - 42 °C

18- The thermometer is used to measure:

- (A) Temperature of body (B) Force (C) Length (D) Time

19- The Crocus Flower opens at:

- (A) 21 °C (B) 22 °C (C) 23 °C (D) 24 °C

20- The Formula of specific heat is:

- (A) $c = \frac{\Delta Q}{m\Delta t}$ (B) $c = \frac{m\Delta Q}{\Delta t}$ (C) $c = \frac{\Delta Q\Delta t}{m}$ (D) $c = \frac{\Delta tm}{\Delta Q}$

21- The boiling point of lead is:

- (A) 1750 °C (B) 1751 °C (C) 1752 °C (D) 1753 °C

22- The formula of Latent heat of fusion is:

- (A) $\Delta Q = mH_f$ (B) $\Delta Q = CHf$ (C) $\Delta Q = \pi Cf\Delta T$ (D) $\Delta Q = mCf$

2021

23- If "m" is the mass of a body and "c" is its specific heat, then its heat capacity is given by:

- (A) $\frac{m}{c}$ (B) $\frac{c}{m}$ (C) mc (D) mc^2

24- In symbols, co-efficient of volume expansion is defined as:

- (A) $\beta = \frac{\Delta T}{V\Delta T}$ (B) $\beta = \frac{\Delta V}{\Delta T}$ (C) $\beta = \frac{\Delta T}{\Delta V}$ (D) $\beta = \frac{\Delta V}{V_o\Delta T}$

25- In S.I the unit of Specific Heat is:

- (A) $JKg^{-1}k$ (B) $JKgk^{-1}$ (C) $J^{-1}Kkg$ (D) $JKg^{-1}k^{-1}$

26- The value of latent heat of vaporization is:

- (A) $2.26 \times 10^5 JKg^{-1}$ (B) $2.26 \times 10^6 JKg^{-1}$ (C) $2.26 \times 10^6 Nm$ (D) $2.26 \times 10^8 J$

27- Volume thermal expansion (V) =

- (A) $V_o(1+\Delta T)$ (B) $V_o(1+\beta\Delta T)$ (C) $V_o(\beta\Delta T)$ (D) $V_o(1-\beta\Delta T)$

28- Linear thermal expansion in solids (L)= :

- (A) $T_o(1+\alpha\Delta L)$ (B) $L_o(1+\alpha\Delta T)$ (C) $T_o(\alpha\Delta L)$ (D) $L_o(1-\alpha\Delta T)$

29- The specific heat of sand is:

- (A) $835 \text{ Jkg}^{-1}\text{K}^{-1}$ (B) $2100 \text{ Jkg}^{-1}\text{K}^{-1}$ (C) $4200 \text{ Jkg}^{-1}\text{K}^{-1}$ (D) $900 \text{ Jkg}^{-1}\text{K}^{-1}$

2022

30- What will be the temperature on Kelvin scale when it is 20°C on Celsius scale?

- (A) 273K (B) 293K (C) 300K (D) 373K

31- Latent Heat of Fusion is represented by:

- (A) H_v (B) H_m (C) H_f (D) H_i

ANSWERS

1	2	3	4	5	6	7	8	9	10
A	D	B	C	B	C	D	A	A	C
11	12	13	14	15	16	17	18	19	20
C	C	B	C	C	B	D	A	C	A
21	22	23	24	25	26	27	28	29	30
A	A	C	D	D	B	B	B	A	B
31.									
D									

Chapter No.8: Exercise (MCQ's)

- 1- Water freezes at: (4 Times)
 (A) 0°F (B) 32°F (C) -273 K (D) 0 K
- 2- Normal human body temperature is: (6 Times)
 (A) 15°C (B) 37°C (C) 37°F (D) 98.6°C
- 3- Mercury is used as thermometric material because it has:
 (A) uniform thermal expansion (B) low freezing point
 (C) small heat capacity (D) all the above properties
- 4- Which of the following materials has large specific heat? (3 Times)
 (A) copper (B) ice (C) water (D) mercury
- 5- Which of the following materials has large value of temperature coefficient of linear expansion? (3 Times)
 (A) aluminum (B) gold (C) brass (D) steel
- 6- What will be the value of β for a solid for which α has value of $2 \times 10^{-5} \text{ K}^{-1}$? (2 Times)
 (A) $2 \times 10^{-5} \text{ K}^{-1}$ (B) $6 \times 10^{-5} \text{ K}^{-1}$ (C) $8 \times 10^{-15} \text{ K}^{-1}$ (D) $8 \times 10^{-5} \text{ K}^{-1}$
- 7- A large water reservoir keeps the temperature of nearby land moderate due to:
 (A) low temperature of water (B) low specific heat of water
 (C) less absorption of heat (D) large specific heat of water
- 8- Which of the following affects evaporation? (2 Times)
 (A) temperature (B) surface area of the liquid
 (C) wind (D) all of the above

CHAPTER NO. 8

1	2	3	4	5	6	7	8
B	B	D	C	A	B	D	D

Linear thermal expansion in solids (L)= :

- (A) $L_0(1+\alpha\Delta L)$ (B) $L_0(1+\alpha\Delta T)$ (C) $L_0(\alpha\Delta L)$ (D) $L_0(1-\alpha\Delta T)$

The specific heat of sand is:

- (A) $835 \text{ Jkg}^{-1}\text{K}^{-1}$ (B) $2100 \text{ Jkg}^{-1}\text{K}^{-1}$ (C) $4200 \text{ Jkg}^{-1}\text{K}^{-1}$ (D) $900 \text{ Jkg}^{-1}\text{K}^{-1}$

2022

What will be the temperature on Kelvin scale when it is 20°C on Celsius scale?

- (A) 273K (B) 293K (C) 300K (D) 373K

Latent Heat of Fusion is represented by:

- (A) H_v (B) H_m (C) H_v (D) H_f

ANSWERS

1	2	3	4	5	6	7	8	9	10
A	D	B	C	B	C	D	A	A	C
11	12	13	14	15	16	17	18	19	20
C	C	B	C	C	B	D	A	C	A
21	22	23	24	25	26	27	28	29	30
A	A	C	D	D	B	B	B	A	B
31									
D									

Chapter No.8: Exercise (MCQ's)

Water freezes at:

- (A) 0°F (B) 32°F (C) -273 K (D) 0 K (4 Times)

Normal human body temperature is:

- (A) 15°C (B) 37°C (C) 37°F (D) 98.6°C (6 Times)

Mercury is used as thermometric material because it has:

- (A) uniform thermal expansion (B) low freezing point
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What will be the value of β for a solid for which α has value of $2 \times 10^{-5} \text{ K}^{-1}$? (2 Times)

- (A) $2 \times 10^{-5} \text{ K}^{-1}$ (B) $6 \times 10^{-5} \text{ K}^{-1}$ (C) $8 \times 10^{-15} \text{ K}^{-1}$ (D) $8 \times 10^{-5} \text{ K}^{-1}$

A large water reservoir keeps the temperature of nearby land moderate due to:

- (A) low temperature of water (B) low specific heat of water
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Which of the following affects evaporation? (2 Times)

- (A) temperature (B) surface area of the liquid
(C) wind (D) all of the above

CHAPTER NO. 8

1	2	3	4	5	6	7	8
B	B	D	C	A	B	D	D

SHORT QUESTION'S OF CHAPTER-8 Topic Wise IN ALL PUNJAB BOARD PAPERS-2013-2022

8.1 Temperature and Heat:

1. Define thermal equilibrium.

Ans. Heat flows from hot body to cold body until reached a equilibrium condition, called thermal equilibrium.

2. What are the factors on which internal energy depends?

Ans: Internal energy of a body depends on many factors such as the mass of the body, kinetic and potential energies of molecules etc.

8.2 Thermometer:

3. Define lower and upper fixed points. (7 times)

Ans. **Lower fixed point:-** Lower fixed point is marked to show the position of liquid in thermometer when it is placed in ice.

Upper fixed point:- Upper fixed point is marked to show the position of liquid in thermometer when it is placed in steam at standard pressure above boiling water.

4. What is thermometer? Write a use of clinical thermometer? (3 times)

Ans. **Thermometer:-** A device that is used to measure the temperature of a body is called thermometer.

Use of clinical Thermometer: It is used to measure the temperature of human body it has narrow range from 35°C to 42°C

5. Convert 15 °C into temperature in Fahrenheit scale.

$$\text{Ans } C = 15^{\circ}\text{C} \Rightarrow F = (1.8C + 32) \Rightarrow F = (1.8 \times 15 + 32)$$

$$F = (27.0 + 32) \Rightarrow F = 59^{\circ}\text{F}$$

6. Define absolute zero and give its value.

Ans: The minimum temperature that can be achieved or the temperature at which an ideal gas has zero volume. Its value is 0 K or -273.16 °C.

7. How many scale for the measurement of temperature? Write their names?

Ans: There are three scales for measuring of temperature.

i) Celsius scale or centigrade scale (0 - 100)°C

ii) Fahrenheit scale (32 - 212) °F iii) Kelvin scale (273 - 373)K

8. What is freezing and melting point? (2 Times)

Ans: a) The temperature at which a liquid freezes is called freezing point. It is 0°C for water.

b) The temperature at which a solid melts is called melting point. It is 0°C for ice.

8.3 Specific Heat Capacity:

9. Define Heat Capacity? (6 times)

Ans: **Heat capacity:** Heat capacity of a body is the quantity of thermal energy absorbed by it for one kelvin increase in its temperature. It is the product of mass and specific heat. Its unit is $\text{JKg}^{-1}\text{K}^{-1}$. Heat capacity = mc.

8.7 The Evaporation:

10. Does Water and Spirit evaporate at the same rate? Explain.

Ans: No, water and spirit do not evaporate at same rate. Spirit evaporates faster than water at same temperature. Evaporation depends upon the nature of the substance.

11. Give two uses of cooling effect by evaporation.

Ans: (a) Cooling effect by evaporation is used in refrigerator to produce cooling.

(b) Sweating occurs in human and animals and produce cooling.

12. What is the effect of surface area on the evaporation?

Ans. Larger is the surface area of a liquid, larger is the evaporation and vice versa.

3. How wind affects Evaporation?**(1 Time)**

Ans. Wind blowing over the surface of a liquid sweeps away the liquid molecules that have just escaped out. This increases the chance for more liquid molecules to escape out.

4. How does the nature of a liquid affect evaporation?

Ans. Different liquids evaporate at different rate. Evaporation rate of ether or spirit is greater than water.

5. What is the effect of temperature on evaporation?

Ans. At higher temperature, more molecules of a liquid move with high velocities. Thus, more molecules escape from its surface. Thus, evaporation is faster at high temperature than at low temperature.

3.8 Thermal Expansion:**16. Write two uses of Bimetallic Strip.****(3 Times)**

Ans. Bimetal strips are used to measure temperature. It is used to control the temperature of heater coil in an electric iron and some other appliances.

17. Why gaps are left in railway tracks?**(2 Times)**

Ans. In Hot summer days railway track expands due to thermal expansion that is why gaps are left in railway tracks. If gaps are not left in railway tracks, they would be damaged due to expansion.

18. Write the names of types of Thermal volume expansion for liquids.

Ans. There are two types of thermal volume expansion for liquids:

(i) Apparent volume expansion (ii) Real volume expansion

19. What is meant by anomalous expansion of water?**(2 Times)**

Ans. Water on cooling below 4°C begins to expand until it reaches 0°C. On further cooling its volume increase suddenly as it changes into ice at 0°C. On further it contracts, its volume decreases like solids. This unusual expansion of water is called anomalous expansion of water.

2022**20. Why wet clothes dry up more quickly in summer than in winter?**

Ans. Wet clothes dry up more quickly in summer than in winter because at higher temperature, more molecules of a liquid are moving with high velocities. Thus, more molecules escape from its surface.

21. Change 300K on Kelvin scale into Celsius scale of temperature.

Ans. $K = 300$ K, $K = C + 273 \Rightarrow C = K - 273 = 300 - 273 = 27^\circ \text{C}$

22. Why gaps are left in bridges with roller?

Ans. Bridges made of steel girders also expand during the day and contract during night. They will bend if their ends are fixed. To allow thermal expansion, one end is fixed while the other end of the girder rests on rollers in the gap left for expansion.

23. Write down applications of thermal expansion.

Ans. Thermal expansion is used in our daily life. (i) In thermometers, thermal expansion is used in temperature measurements. (ii) To open the cap of a bottle that is tight enough, immerse it in hot water for a minute. Metal cap expands and becomes loose. It would now be easy to turn it to open.

(iii) Iron rims are fixed on wooden wheels of carts. Iron rims are heated. Thermal expansion allows them to slip over the wooden wheel. Water is poured on it to cool. The rim contracts and becomes tight over the wheel.

Solved Textbook Short Questions**8.2: Why does heat flow from hot body to cold body?****(4 Times)**

Sol: Heat flows from hot body to cold body to attain condition of thermal equilibrium.

8.3: Define the terms heat and temperature.**(6 Times)**

Sol: The form of energy that is transferred from a hot body to a cold body is called **Heat**. The degree of hotness or coldness of a body is called **Temperature**.

8.4: What is meant by internal energy of a body?**(10 times)**

Sol: **Internal Energy**:- The sum of kinetic energy and potential energy associated with atoms, molecules and particles of a body is called its internal energy.

8.5: How does heating affect the motion of molecules of a gas? (2 Times)

Sol: Motion, pressure and volume of gas molecules increase by heating the gas.

8.6: What is a thermometer? Why mercury is preferred as a thermometric substance? (3 Times)

Sol: A device which measures temperature of body is called thermometer. Mercury is preferred as a thermometric substance because: (i) It is visible. (ii) It has low freezing point.
iii) It has high boiling point.

8.7: Define volumetric thermal expansion.

Sol: The expansion along volume of a body is called Volume Thermal Expansion.

8.8: Define specific heat. How would you find the specific heat of a solid? (3 Times)

Sol: The specific heat of a substance is the amount of heat required to raise the temperature of 1kg mass of that substance through 1K.

Specific heat of any substance can be found out by using following formula:

$$c = \frac{\Delta Q}{m\Delta T}$$

8.9: Define latent heat of fusion. (3 Times)

Sol: At constant temperature, heat that changes unit mass of solid into liquid state at its melting point without any change in its temperature is called Latent heat of fusion. Its unit is JKg^{-1} .

8.10: Define latent heat of vaporization. (3 Times)

Sol: The quantity of heat that changes unit mass of a liquid completely into gas at its boiling point without any change in its temperature is called its latent heat of vaporization.

8.11: What is meant by evaporation? On what factors the evaporation of a liquid depends? Explain how cooling is produced by evaporation. (7 times)

Sol: Changing of liquid into vapour (gases) state from the surface of liquid at any temperature without heating is known as evaporation.

The rate of evaporation is affected by following factors.

(i) Temperature (ii) Surface area (iii) Wind (iv) Nature of liquid.

During evaporation, molecules that have low kinetic energies are left behind. This lowers the temperature of the liquid. So, evaporation causes cooling.

Conceptual Short Questions

1. What are the factors on which internal energy depends?

Ans: Internal energy of a body depends on many factors such as the mass of the body, kinetic and potential energies of molecules etc.

2. Does Water and Spirit evaporate at the same rate?

Ans: No, water and spirit do not evaporate at same rate. Spirit evaporates faster than water at same temperature. Evaporation depends upon the nature of the substance.

3. How wind affects Evaporation? (1 Time)

Ans: Wind blowing over the surface of a liquid sweeps away the liquid molecules that have just escaped out. This increases the chance for more liquid molecules to escape out.

4. How does the nature of a liquid affect evaporation?

Ans: Different liquids evaporate at different rate. Evaporation rate of ether or spirit is greater than water.

5. What is the effect of temperature on evaporation?

Ans: At higher temperature, more molecules of a liquid move with high velocities. Thus, more molecules escape from its surface. Thus, evaporation is faster at high temperature than at low temperature.

6. Why gaps are left in railway tracks? (2 Times)

Ans: In Hot summer days railway track expands due to thermal expansion that is why gaps are left in railway tracks. If gaps are not left in railway tracks, they would be damaged due to expansion.

7. Why wet clothes dry up more quickly in summer than in winter?

Ans: Wet clothes dry up more quickly in summer than in winter because at higher temperature, more molecules of a liquid are moving with high velocities. Thus, more molecules escape from its surface.

8. Why gaps are left in bridges with roller?

Ans. Bridges made of steel girders also expand during the day and contract during night. They will bend if their ends are fixed. To allow thermal expansion, one end is fixed while the other end of the girder rests on rollers in the gap left for expansion.

9. How does heating affect the motion of molecules of a gas? (2 Times)

Ans: Motion, pressure and volume of gas molecules increase by heating the gas.

10. How cooling is produced by evaporation? (7 times)

Ans: During evaporation, molecules that have low kinetic energies are left behind. This lowers the temperature of the liquid. So, evaporation causes cooling.

SECTION II (Topic wise)

Evaporation:		
1	Define evaporation, also write the various factors on which rate of evaporation depends.	7 times
Thermal Expansion:		
2	Define linear thermal expansion in solids. Derive its formula.: $L = L_0(1 + \alpha\Delta T)$	2 times
3	Define Volume Thermal Expansion. Derive the equation $V = V_0(1 + \beta\Delta T)$.	4 times
Examples:		
4	Example. 8.4: Convert 100°F into the temperature on Celsius scale.	2 times
5	Example. 8.5: A container has 2.5 liters of water at 20°C. How much heat is required to boil the water? Specific heat of water = 4200 J kg ⁻¹ K ⁻¹	5 times
6	Example. 8.6: A brass rod is 1m long at 0°C. Find its length at 30°C. Coefficient of linear expansion of brass = 1.9 × 10 ⁻⁵ K ⁻¹	3 times
Numericals:		
7	Numerical. 8.1: Temperature of water in a beaker is 50°C. What is its value in fahrenheit scale.	3 times
8	Numerical. 8.2: Normal human body temperature is 98.6°F. Convert it into Celsius and kelvin scale	4 times
9	Numerical. 8.5: How much heat is required to increase the temperature of 0.5kg of water from 10°C to 65°C?	4 times
10	Numerical. 8.7: How much ice will melt by 50000j of heat? While latent heat of fusion of ice is 336000jkg ⁻¹ .	2 times
11	Numerical. 8.9: How much heat is required to change 100g of water at 100°C into steam while latent heat of vaporization of water is 2.26 × 10 ⁶ JKg ⁻¹ ?	2 times
2022		
12	What is thermometer? Also write the characteristics of liquid used in thermometer.	
13	Define specific heat capacity. Describe the importance of large specific heat capacity of water.	
14	An electric heater supplies heat at the rate of 1000 Joules per second. How much time is required to raise the temperature of 200g of water from 20°C to 90°C?	

Solved Textbook Examples

8.1: What will be the temperature on Kelvin scale of temperature when it is 20°C on Celsius scale? (2 Times)

Sol: C = 20°C, K = C + 273 = 20 + 273 = 293 K

and prove that $\beta = \Delta V / V_0 \Delta T$.

Sol: Volume Thermal Expansion:

The expansion along volume of a body is called Volume Thermal Expansion.

Equation of Volume Thermal Expansion:

Consider a solid of volume " V_0 " at temperature " T_0 ". On heating at temperature " T ", its volume becomes " V ".

Change in Volume $\Delta V = V - V_0$

Change in temperature $\Delta T = T - T_0$

It is found Experimentally that $\Delta V \propto V_0 \Delta T$

$$\Delta V = \beta V_0 \Delta T \quad \text{-----(i)}$$

$$V - V_0 = \beta V_0 \Delta T$$

$$V = V_0 + \beta V_0 \Delta T$$

$$V = V_0 (1 + \beta \Delta T) \quad \text{-----(ii)}$$

From -----(i) $\beta = \Delta V / V_0 \Delta T =$ Temperature Coefficient of Volume Thermal Expansion.

It is defined as: Fractional change in Volume of a substance per kelvin change in temperature.

OBJECTIVES (MCQ'S) OF CHAPTER-9 Topic Wise IN ALL PUNJAB BOARD PAPERS-2013-2022

- 1- Thermal conductivity of silver is $\text{Wm}^{-1} \text{K}^{-1}$
(A) 245 (B) 105 (C) 400 (D) 430
 - 2- A Leslie cube has faces (3 Times)
(A) Two (B) Four (C) six (D) Eight
 - 3- Heat transfer through fluids by the method called:
(A) Radiation (B) Conduction (C) Convection (D) Absorption
 - 4- Thermal conductivity of rubber is..... $\text{Wm}^{-1} \text{K}^{-1}$: (2 times)
(A) 0.08 (B) 1.7 (C) 0.2 (D) 0.59
 - 5- Land and sea breezes are result of : (2 Times)
(a) Conduction (b) convection (c) radiation (d) absorption
 - 6- The example of bad conductor is.
(a) wool (b) copper (c) gold (d) iron
 - 7- Which of the following birds are expert thermal climbers:
(A) eagles (B) hawk (C) vultures (D) all these
 - 8- Worst absorber of heat is:
(A) dull black surface (B) coloured surface (C) white surface (D) shining silvered surface
 - 9- Ways to transfer of heat are:
(A) 1 (B) 2 (C) 3 (D) 4
- 2017**
- 10- Global warming is due to a gas: (2 times)
(A) Oxygen (B) Carbon dioxide (C) Carbon monoxide (D) Chlorine
 - 11- Thermal Conductivity of Ice is:
(A) $1.8 \text{ Wm}^{-1} \text{K}^{-1}$ (B) $1.9 \text{ Wm}^{-1} \text{K}^{-1}$ (C) $1.7 \text{ Wm}^{-1} \text{K}^{-1}$ (D) $2.0 \text{ Wm}^{-1} \text{K}^{-1}$
- 2018**
- 12- The thermal conductivity of copper in $\text{Wm}^{-1} \text{K}^{-1}$ is:
(A) 200 (B) 300 (C) 400 (D) 500

Rate of flow of heat is:

- (A) $\frac{Q}{t}$ (B) $\frac{t}{Q}$ (C) $\frac{Q}{A}$ (D) $\frac{KL(T_1 - T_2)}{A}$

Best reflector of heat is:

- (A) dull black surface (B) coloured surface
(C) white surface (D) shining silvered surface

Rate of flow of heat through conductor is inversely proportional to its:

- (A) Area (B) Length (C) Temperature (D) Time

2019

Thermal conductivity (dry) air is:

- (A) $245 \text{ W m}^{-1}\text{K}^{-1}$ (B) $105 \text{ W m}^{-1}\text{K}^{-1}$ (C) $0.026 \text{ W m}^{-1}\text{K}^{-1}$ (D) $0.6 \text{ W m}^{-1}\text{K}^{-1}$

Thermal conductivity of wood is:

(2 Times)

- (A) $0.06 \text{ W m}^{-1}\text{K}^{-1}$ (B) $0.07 \text{ W m}^{-1}\text{K}^{-1}$ (C) $0.08 \text{ W m}^{-1}\text{K}^{-1}$ (D) $0.09 \text{ W m}^{-1}\text{K}^{-1}$

2021

Heat from fireplace reaches us by:

- (A) Conduction (B) Radiation (C) Convection (D) Absorption

In SI, the unit of thermal conductivity is:

- (A) $\text{W m}^{-2}\text{K}$ (B) $\text{W m}^{-1}\text{K}^{-1}$ (C) $\text{W m}^{-1}\text{K}^{-2}$ (D) $\text{W m}^{-2}\text{K}^{-1}$

2022

Rate of flow of heat $\frac{Q}{t}$ is proportional to:

- (A) A^2 (B) $\frac{1}{A^2}$ (C) $\frac{1}{A}$ (D) A

Poor conductor of heat is:

- (A) Water (B) Gold (C) Iron (D) Copper

ANSWERS

1	2	3	4	5	6	7	8	9	10	11	12
D	B	C	C	B	A	D	D	C	B	C	C
13	14	15	16	17	18	19	20	21			
A	D	B	C	C	B	B	D	A			

Chapter No.9: Exercise (MCQ's)

In Solids, heat is transferred by:

(5 Times)

- (A) radiation (B) conduction (C) convection (D) absorption

What happens to the thermal conductivity of a wall if its thickness is doubled?

- (A) becomes double (B) remains the same (C) becomes half (D) becomes one fourth

Metals are good conductors of heat due to the:

(2 Times)

- (A) free electrons (B) big size of their molecules
(C) small size of their molecules (D) rapid vibrations of their atoms

In gases, heat is mainly transferred by:

(4 Times)

- (A) molecular collision (B) conduction (C) convection (D) radiation

Convection of heat is the process of heat transfer due to the:

- (A) random motion of molecules (B) downward movement of molecules
(C) upward movement of molecules (D) free movement of molecules

- 6- **False ceiling is done to:** (2 Times)
 (A) lower the height of ceiling (B) keep the roof clean
 (C) cool the room (D) insulate the ceiling
- 7- **Rooms are heated using gas heaters by:** (2 Times)
 (A) Conduction only (B) Convection and radiation
 (C) Radiation only (D) Convection only
- 8- **Land breeze blows from:** (3 Times)
 (A) Sea to land during night (B) sea to land during day
 (C) land to sea during night (D) land to sea during the day
- 9- **Which of the following is a good radiator of heat?**
 (A) a shining silvered surface (B) a dull black surface
 (C) a white surface (D) a green coloured surface

CHAPTER NO. 9

1	2	3	4	5	6	7	8	9
B	B	A	C	C	D	B	C	D

**SHORT QUESTION'S OF CHAPTER-9 Topic Wise
IN ALL PUNJAB BOARD PAPERS-2013-2022**

9.1 Transfer of Heat:

1. **What is meant by Transfer of heat.** (3 Times)

Ans: Thermal Energy that flows from hot object to the cold object is called Transfer of heat. There are three ways of Transfer of heat:

- i. conduction ii. convection iii. Radiation

2. **Write the ways by which transfer of heat takes place.** (2 times)

Ans. There are three ways by which transfer of heat takes place.

- 1- Conduction 2- Convection 3- Radiation

9.2 Conduction:

3. **Define conduction of heat.** (5 Times)

Ans: **Conduction:-** Transfer of heat by vibrating atoms and free electrons in solids from hot to cold parts of a body is called conduction.

4. **Write use of Styrofoam.** (2 Times)

Ans. Styrofoam is a bad conductor of heat. It does not allow heat to leave or enter the body easily. Styrofoam boxes are used to keep food hot or ice cream cold for a long time.

5. **Define thermal conductivity and write its equation.** (3 Times)

Ans: The rate of flow of heat across the opposite faces of a meter cube of a substance maintained at a temperature difference of one kelvin is called thermal conductivity of that substance. Its value depends on the nature of the substance. It is denoted by K.

$$K = \frac{Q}{t} \times \frac{L}{A(T_1 - T_2)}$$

6. **What is the effect of length on thermal conductivity?** (3 Times)

Ans: Thermal conductivity (K) is directly proportional to length (L). So increase or decrease in length can increase or decrease in thermal conductivity.

Mathematically $K \propto L$.

7. **Define the rate of flow of heat and write its mathematical form.** (7 times)

Rate of Flow of Heat:- The amount of heat that flows from hot body to cold body in unit time is called the rate of flow of heat.

$$\text{Rate of flow of heat} = \frac{Q}{t}$$

Convection:

Define convection of heat.

(5 Times)

Convection:- Transfer of heat by actual movement of molecules from hot place to a cold place is called convection.

Why does Land Breeze blow in the night?

(5 Times)

Land Breeze:

At night, the land cools faster than the sea. Therefore warmer air above the sea rises up and the cold air from the land begins to move towards the sea. It is called land breeze.

What is meant by gliding? / What causes a glider to remain in air? (7 times)

A glider looks like a small aeroplane without engine. Glider pilots use upward movement of hot air currents due to convection of heat. These rising currents of hot air are called thermals. Gliders ride over these thermals. Air currents help them to stay in air for long period.

Define Sea Breeze.

(16 times)

Sea Breeze:

Sea breeze blows from sea to land in day time. It is done on the hot day when the temperature of the land increases more quickly than the sea because specific heat of land is much smaller as compared to water.

Write the name of any two birds who are expert thermal climbers.

Eagles, Hawks and vultures are expert thermal climbers.

Radiation:

Define Radiation of heat.

(11 times)

Transfer of heat from one place to another in the form of electromagnetic waves is called radiation.

Why bottoms of cooking pots are made black?

The bottoms of cooking pots are made black to increase the absorption of heat from fire. A black and rough surface absorbs more heat than a white or polished surface.

Wear white and light coloured clothes in summer why?

We wear white and light coloured clothes in summer because they reflect heat while dark colour clothes absorb more heat.

Define Leslie cube. Name its four faces.

(2 Times)

A Leslie cube is a metal box having faces of different nature. The four faces of Leslie cube may be:

(i) A shining silvered surface.

(ii) A dull black surface

(iii) A white surface.

(iv) A coloured surface.

Application of Radiation:

What is the thermos flask.

(2 Times)

A thermos flask consists of a double-walled glass vessel. It reduces the transfer of heat by conduction, convection and radiation.

2022

Write down two uses of non-conductors.

Insulators or bad conductors are used in home utensils such as handles of sauce-pans, hot plates, spoons, etc. They are made up of wood or plastic. Air is one of the bad conductors or best insulator.