

Standard X

PHYSICS



ആമുഖം

കൊല്ലം ജില്ലാ പഞ്ചായത്തും പൊതുവിദ്യാഭ്യാസ വകുപ്പും കൊല്ലം ഡയറ്റിന്റെ അക്കാദമിക പിന്തുണയോടെ പത്താം ക്ലാസ്സിലെ വിദ്യാർത്ഥികൾക്ക് വേണ്ടി തയ്യാറാക്കിയിട്ടുള്ള പഠനസാമഗ്രിയാണ് 'ഉജ്ജ്വലം'. എസ്.എസ്.എൽ.സി. പരീക്ഷ എഴുതുന്ന കൊല്ലം ജില്ലയിലെ മുഴുവൻ വിദ്യാർത്ഥികൾക്കും പഠനനേട്ടങ്ങൾ ഉറപ്പാക്കി പരീക്ഷാഫലം മെച്ചപ്പെടുത്തുക എന്നതാണ് പദ്ധതിയുടെ ലക്ഷ്യം. കോവിഡ് കാലഘട്ടത്തിൽ സ്വാഭാവിക ക്ലാസ്സന്തരീക്ഷം സാധ്യമല്ലാതിരുന്ന സാഹചര്യത്തിലുണ്ടായ പഠനവിടവ് പരിഹരിക്കുന്നതിനും വിദ്യാഭ്യാസ പ്രവർത്തനങ്ങൾക്ക് ശക്തിപകരുന്നതിനും വേണ്ടി നൂതന സാങ്കേതികവിദ്യയുടെ കൂടി സഹായത്തോടെ തയ്യാറാക്കിയ പഠനസാമഗ്രിയാണിത്. കഴിഞ്ഞ വിദ്യാലയ വർഷം എസ്.എസ്.എൽ.സി പരീക്ഷയിൽ 'A+' കളുടെ എണ്ണം വർദ്ധിപ്പിക്കുന്നതിന് ഉജ്ജ്വലത്തിലൂടെ സാധിച്ചിട്ടുണ്ട്. ഈ പഠനസഹായി ഉപയോഗിച്ചുകൊണ്ട് 60% പരീക്ഷാചോദ്യങ്ങൾക്ക് ഉത്തരം കണ്ടെത്താൻ കുട്ടികൾക്ക് കഴിഞ്ഞു. എസ്.എസ്.എൽ.സി. പരീക്ഷയെ സ്വാഭാവിക സന്ദർഭത്തിൽ ആത്മവിശ്വാസത്തോടെ ഏറ്റെടുക്കുന്നതിന് വിദ്യാർത്ഥികളെ സഹായിക്കുന്ന വിധത്തിലാണ് ഇതിലെ ഓരോ യൂണിറ്റും ക്രമീകരിച്ചിരിക്കുന്നത്. ഒപ്പം മാതൃകാചോദ്യങ്ങളും ഉൾപ്പെടുത്തിയിട്ടുണ്ട്. കുട്ടികൾക്ക് സ്വന്തമായും അധ്യാപകരുടെ ഇടപെടലോടെയും പഠനം ഉറപ്പാക്കുന്ന രീതിയിലാണ് ഇത് രൂപകല്പന ചെയ്തിരിക്കുന്നത്. ക്ലാസ്റും പഠന പ്രവർത്തനങ്ങളോടൊപ്പം സ്വാഭാവിക സന്ദർഭം കൂടി ഒരുക്കി കുട്ടികളെ ആത്മവിശ്വാസത്തോടെ പരീക്ഷ എഴുതാൻ പ്രാപ്തരാക്കുന്നതിന് അധ്യാപകർ ശ്രദ്ധിക്കേണ്ടതാണ്. 'ഉജ്ജ്വലം' പഠനസാമഗ്രി പരമാവധി പ്രയോജനപ്പെടുത്തി പ്രതിജ്ഞാബദ്ധതയോടുകൂടി അക്കാദമിക പ്രവർത്തനങ്ങളിലേർപ്പെട്ട് ജില്ലയിലെ എസ്.എസ്.എൽ.സി വിജയം 100% ഉറപ്പാക്കുന്നതിന് എല്ലാവിധ ആശംസകളും നേർന്നുകൊള്ളുന്നു.

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CONTENTS

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2. Magnetic Effects of Electric Current
3. Electromagnetic Induction
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5. Refraction of Light
6. Vision and the World of Colour
7. Energy Management

UNIT 1

Effects of Electric Current

MAIN POINTS

- Energy transformation and effect of electric current in each electrical appliance
- Heating effect of electric current
- Joule's Law
- Arrangement of resistors in circuits
- Safety Fuse
- Electric Power
- Incandescent lamps
- Discharge lamps
- LED Bulbs
- Construction of LED Bulbs
- Repairing the damages of LED Bulbs

WORK SHEET - 1

Names of some electrical appliances are given in the box

Storage battery,	Electric Iron,	Mixie
Soldering Iron,	Electric Blub	
Induction cooker,	Electric fan	
Microwave oven,		

- a) Which are the appliances that make use of heating effect of electrical energy ?
- b) Which appliances convert electrical energy into mechanical energy ?
- c) Devices that make use of heating effect of electric current are named as _____
- d) Which part of electric iron and soldering iron changes electrical energy into the useful form of energy?
- e) Which material is used to make this part ?
- f) Write down three properties of that material.

WORK SHEET - 2

Heat is generated in a current carrying conductor. The equation connected with this statement is $H = I^2Rt$

- a) Name the law related to the above equation.
- b) State the law
- c) Write down the units of H, I, R, and t
- d) The items given in the box are either related to H (heat developed in a current carrying conductor) or P (Power of electrical appliance)

$VI,$	$V^2 \frac{t}{R},$	$I^2 R,$	$\frac{V^2}{R}$
I^2Rt	$\frac{H}{t},$	$Pt,$	VIt

Classify them accordingly

H	P
•	•
•	•
•	•
•	•

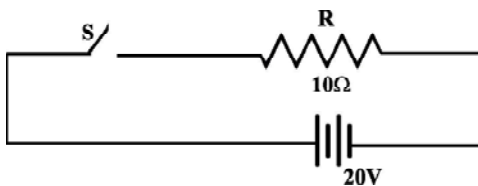
WORK SHEET - 3

Changes in the intensity of electric current, resistance of the conductor and time of flow of current will influence the heat generated in a current carrying conductor. State whether the following statements are right or wrong

- a) As resistance is doubled, heat also is doubled
- b) When intensity of electric current is doubled, heat generated will be halved.
- c) When time of flow of current is halved, heat is halved.
- d) When intensity of electric current is halved, heat will be increased by 4 times

WORK SHEET - 4

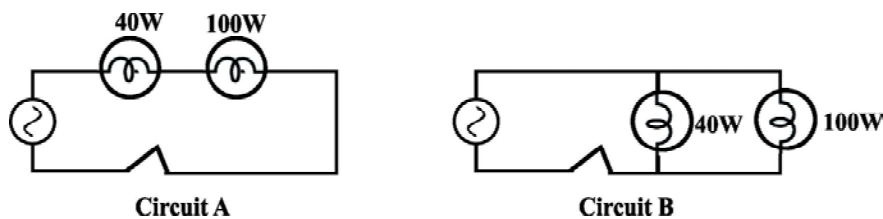
Observe the circuit



- a) Write down the energy change in R when the switch S is turned on
- b) Calculate the heat generated when current flows through this circuit for 5 minute
- c) What will be the power ?
- d) If the voltage is reduced to 10V, calculate the heat generated in 1s

WORK SHEET - 5

Observe the circuit



- a) In which mode, bulbs are connected in circuit B ?
- b) Write down four advantages of connecting devices in parallel
- c) If 0.6A current flows through the 40 W bulb, what will be the current through 100 W bulb in that circuit ?

WORK SHEET - 6

Safety fuse is a device that protects us and the appliances from danger when an excess current flows through the circuit

- a) This device works making use of _____ effect of electric current.
- b) What are the circumstances that lead to excess current ?
- c) How does a safety fuse ensure safety in a circuit ?
- d) What are the precautions to be taken when a fuse wire is included in a circuit ?

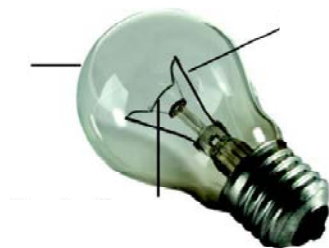
WORK SHEET - 7

Power of an electric heater that works on 250 V is 1000 W

- a) Calculate the current through the circuit
- b) How much will be the power of the heater, if it works on 125 V ?

WORK SHEET - 8

Picture of a lamp that was in wide use in the early days is shown below.



- a) Which is the main part of this lamp ? Which material is used to make this part ?
- b) What is the advantage of filling inert gas (or nitrogen) at low pressure inside the bulb ?
- c) If a bulb is lit after rejoining the parts of a broken filament, what change occurs in the intensity of the light from the lamp ? Justify your answer.
- d) Write down four properties of this material that make it suitable for being used as filament.

WORK SHEET - 9

Some statements regarding the working of a discharge lamp are given below.

- i) Energy will be radiated
 - ii) High potential difference is applied
 - iii) Gas molecules come back to their original states
 - iv) Depending on the difference in the energy levels light of different colours are emitted
 - v) Gas molecules get excited
 - vi) Excited atoms attain stability
- a) Arrange the statements in correct order
 - b) Write down one advantage of using discharge lamps instead of incandescent lamps.
 - c) Name four discharge lamps

WORK SHEET - 10

It is the research for high energy efficient bulb led to the invention of LED bulbs

- a) Write down four advantages of LED bulbs
- b) Some main parts of LED bulbs are given in the box

Heat Sink,	Diffuser Cup
Base Unit	Power Supply Board

Choose the suitable part for the given statements

- i) The metallic part that connects the bulb to the holder
- ii) The part from which light comes out of the bulb
- iii) The part close to the base unit that absorbs heat from the base
- iv) Part that converts AC to DC and supplies necessary output voltage

WORK SHEET - 11

Four 4Ω resistors are given

- a) What is the current if these resistors are connected in series and 16 V potential difference is applied?
- b) What is the least resistance that you can get using these four 4Ω resistors ?
- c) Suppose you need a circuit of 10Ω resistance. How can you arrange these resistors to make a circuit of resistance 10Ω . Draw the diagram and illustrate

ANSWERS

WORK SHEET - 1

- a) Electric iron, soldering iron, induction cooker, microwave oven
- b) Mixie, Electric fan
- c) Electric heating appliance
- d) Heating coil
- e) Nichrome
- f)
 - High resistivity
 - High melting point
 - Ability to remain in red hot condition for a long time without getting oxidised

WORK SHEET - 2

- a) Joule's law
- b) The heat generated (H) in a current carrying conductor is directly proportional to the product of the square of the current (I) in the conductor, the resistance of the conductor (R) and the time (t) of flow of current.
- c) H – joule (J)
 I – ampere (A)
 R – ohm (Ω)
 t – second (S)

d)

H	P
• V^2t/R	• VI
• I^2Rt	• I^2R
• VIt	• V^2/R
• Pt	• H/t

WORK SHEET - 3

- a) true b) wrong
- c) true d) wrong

WORK SHEET - 4

- a) Electrical Energy → Heat energy

b) $H = \frac{V^2t}{R} = \frac{20 \times 20 \times 5 \times 60}{10} = 12000 \text{ J}$ $V = 20 \text{ V}, t = 5 \text{ minute}, R = 10 \Omega$

c) $P = \frac{V^2}{R} = \frac{20 \times 20}{10} = \frac{400}{10} = 40 \text{ W}$

d) $H = \frac{V^2 t}{R} = \frac{10 \times 10 \times 1}{10} = 10 \text{ J}$ $V = 10 \text{ V}, R = 10 \Omega, t = 1 \text{ s}$

WORK SHEET - 5

- a) Parallel connection
- b) • Devices work according to the marked power
• Devices can be controlled using switches as per need
• Effective resistance will be low
• Potential difference across each resistor is same
- c) 0.6 A

WORK SHEET - 6

- a) Heating effect
- b) Short circuit and over loading
- c) When current that flows through the circuit exceeds a permissible limit, the heat generated becomes excessive. Since more heat is generated the fuse wire melts and is broken off.
- d) • The ends of the fuse wire must be connected firmly at appropriate points
• The fuse wire should not project out of the carrier base

WORK SHEET - 7

- a) $V = 250 \text{ V}$
 $P = 1000 \text{ W}$
 $I = \frac{P}{V} = \frac{1000}{250} = 4 \text{ A}$

$$b) P = \frac{V^2}{R}$$

$$\therefore R = \frac{V^2}{P}$$

$$= \frac{250 \times 250}{1000} = \frac{62500}{1000} = 62.5 \Omega$$

When $V = 125 \text{ V}$,

$$P = \frac{V^2}{R} = \frac{125 \times 125}{62.5} \\ = 250 \text{ W}$$

WORK SHEET -8

- a) Filament, Tungsten
- b) Vaporisation can be reduced
- c) Intensity of the lamp increases. When the broken filament is rejoined, its length decreases, resistance decreases, current increases and power increases. The bulb glows with more intensity
- d) High resistivity
High melting point
High ductility
Ability to emit white light in the white hot condition

WORK SHEET -9

- a) ii
v
iii
vi

- i
- iv
- b) Minimum wastage of energy in the form of heat
- c)
 - Sodium vapour lamp
 - Arc lamp
 - Fluorescent lamp
 - CFL

WORK SHEET - 10

- a)
 - As there is no filament, there is no loss of energy in the form of heat
 - Since there is no mercury in it, it is not harmful to environment.
 - More efficient than other bulbs
 - Low power consumption
- b)
 - i) Base unit
 - ii) Diffuser cup
 - iii) Heat sink
 - iv) Power supply board

WORK SHEET - 11

a) $R_1 = 4 \Omega$
 $R_2 = 4 \Omega$
 $R_3 = 4 \Omega$
 $R_4 = 4 \Omega$
 $R = R_1 + R_2 + R_3 + R_4 = 4 + 4 + 4 + 4 = 16 \Omega$

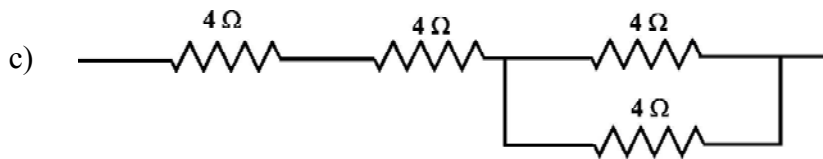
OR

$R = r \times n$
 $= 4 \times 4$
 $= 16 \Omega$

$V = 16 \text{ V}$ $I = \frac{V}{R} = \frac{16}{16} = 1 \text{ A}$

b) $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \frac{1}{R_4}$ or $R = \frac{r}{n} = \frac{4}{4}$
 $= 1\Omega$

$$\frac{1}{R} = \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{4}{4} = 1\Omega$$



Two 4 Ω resistors are connected in parallel to get 2 Ω and then it is connected in series with 4 Ω and 4 Ω resistors

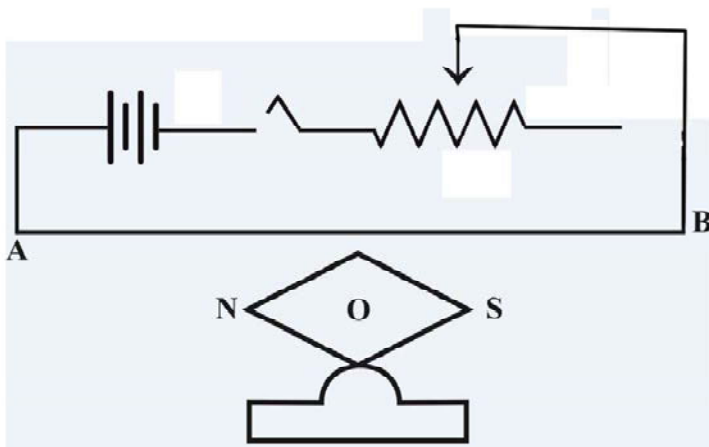
$$R = 2 + 4 + 4$$
$$= 10\Omega$$

UNIT 2

Magnetic Effects of Electric Current

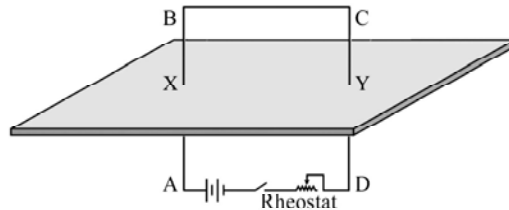
WORK SHEET - 1

In the figure AB is a straight conductor



- In which direction will the current flows when switch is ON.
(from A to B / from B to A)
- Will the magnetic needle deflects when the switch is in ON mode ? Why ?
- What is the direction of deflection of North Pole
(Clock wise / Anti clock wise)
- Is there any change in the deflection of magnetic needle ? Why ?

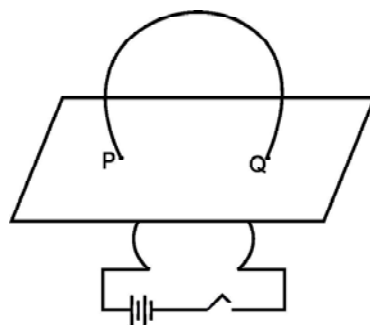
WORK SHEET - 2



- a) What is the direction of electrons in CD in the circuit ?
(C to D / D to C)
- b) Draw the magnetic field lines around the points X & Y
- c) Which law helps you to draw the magnetic field lines ? state the law
- d) Does the direction of magnetic field lines around the points X & Y is in the same direction or opposite direction why?

WORK SHEET - 3

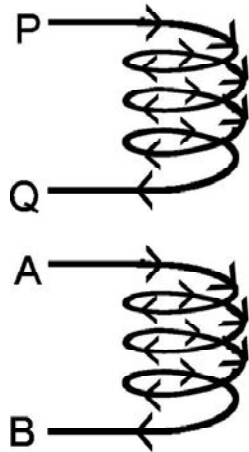
A conductor is passed through a card board, in the shape of a coil as shown in the figure. P & Q are the points in the card board through which the coil passes



- a) Draw the magnetic field lines around P & Q
- b) Draw 2 magnetic field lines through the centre of the coil
- c) Write any 2 methods to increase the magnetic field in this experiment

WORK SHEET - 4

PQ and AB are two current carrying solenoids as shown below

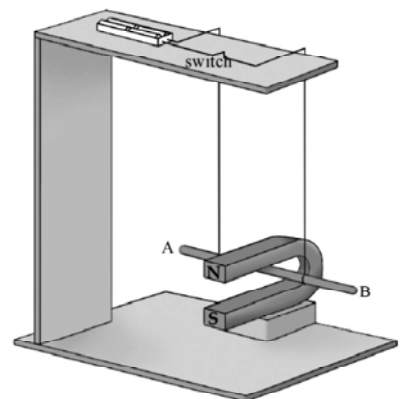


- a) What is the direction of current in the portion P ?
(clockwise / Anti clockwise)
- b) What is the polarity at the end B ?
- c) The north pole of a bar magnet is bring near to the region P of the solenoid. Is the magnet repels or attracts. Why?
- d) Does the two solenoids attract or repel. Why ?
- e) Write any 2 differences between solenoid & bar magnet.

WORK SHEET - 5

AB is a conductor which is allowed to move freely in between the poles of a U shaped magnet as shown is the figure. The direction of current through the conductor is from B to A.

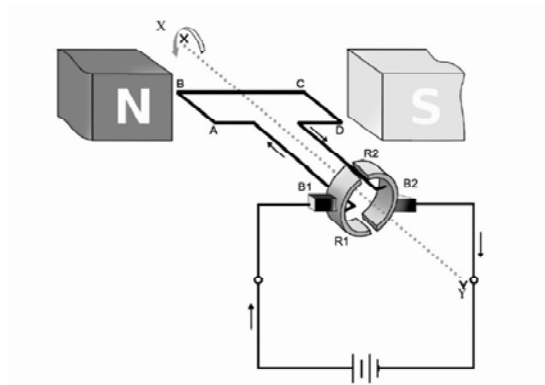
- a) Direction of motion of the conductor is _____ (in to the magnet / outwards from the magnet)
- b) If the direction of current & polarity of magnet are opposite then the



direction of motion of the conductor is _____ (in to the magnet / outwards from the magnet)

- c) Which law is helpful to find the direction of motion of the conductor in this case
- d) What is the force on the conductor when current in the conductor flows in the direction of the magnetic field?

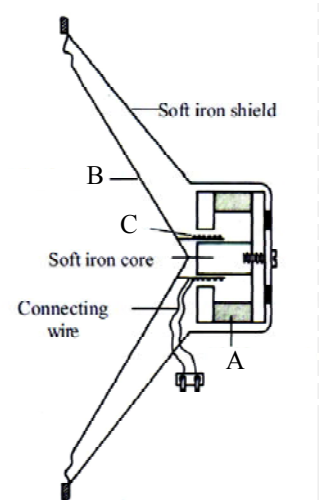
WORK SHEET - 6



- a) Identify the device
- b) Write the working principle of the device
- c) What is the direction of force acting on the arm CD in the figure
(Upward / Downward)
- d) Does the force acting on the arms AB & CD are in the same direction ? Why ?
- e) If there is no split ring commutator in this device what happens why ?

WORK SHEET - 7

- a) Identify A & B in the figure
- b) Write the working principle of the device ?
- c) Write the function of C in the device ?
- d) Who strength the electric pulses from microphone to this device ?



ANSWERS

WORK SHEET - 1

a) A to B

b) Magnetic needle deflects.

Because there is a magnetic field around the conductor when current flows through it.

c) Anti clock wise direction

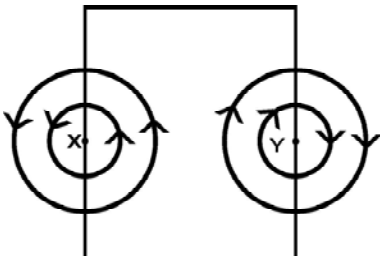
d) The deflection of the magnetic needle increases.

Because when number of cell increases current increases. So magnetic field increases

WORK SHEET - 2

a) D to C

b)



c) Maxwell's Right hand thumb rule

(Right hand screw rule)

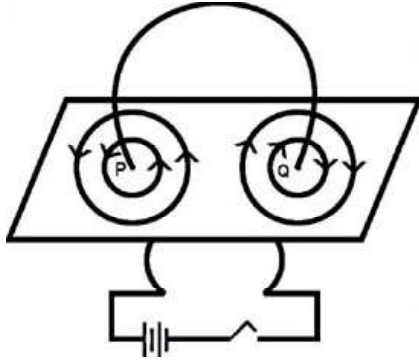
“Imagine you are holding a current carrying conductor with the right hand in such a way, that the thumb points in the direction of the current. The direction in which the other fingers encircle the conductor gives the direction of the magnetic field”

d) In opposite direction

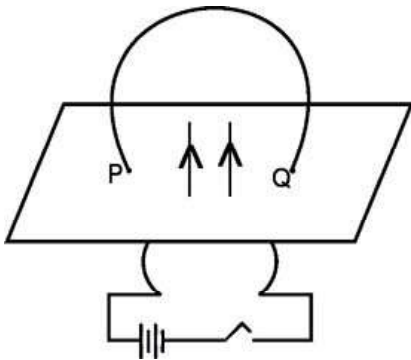
The direction of current through CD is opposite to that through AB. When direction of current is opposite then the direction of magnetic field will be opposite

WORK SHEET - 3

a)



b)



- (i) Increases the number of turns in the coil
- (ii) increase the strength of current / increase the number of cells.

WORK SHEET - 4

- a) clock wise
- b) North pole
- c) Attracts

At the end P current is in clock wise direction so south pole is developed at P. This south pole attracts the north pole of the bar magnet

- d) Attracts. At the end Q current flows in anti clock wise direction, So at that end acts like N - pole. At A due to clock wise direction of current produce S- pole. So the 2 ends attract.

e)	Solenoid	Bar magnet
	1. The magnetism is temporary 2. Magnetic field strength is variable	1. The magnetism is permanent 2. Magnetic field strength is permanent

WORK SHEET - 5

- a) In to the magnet
- b) in to the magnet
- c) Fleming's left hand rule
- d) Zero

WORK SHEET - 6

- a) Motor
- b) Motor principle
- c) upwards
- d) No. In opposite direction

The direction of current through AB and CD are opposite

- e) If the rotation of the armature is to be sustained the direction of current through the armature should continuously keep on changing. The split rings help to change the direction of current through the oil after every half rotation. If there is no split rings the armature does not rotate fully.

WORK SHEET - 7

- a) A → Field Magnet B → Diaphragm
- b) Motor principle
- c) C is the voice coil

The voice coil moves to and for rapidly in accordance with the electric pulses. These movements make the diaphragm vibrates

- d) Amplifier

UNIT 3

Electromagnetic Induction

MAIN POINTS

- Electromagnetic induction - whenever there is a change in magnetic flux linked with a coil, an emf is induced in the coil. This phenomenon is electromagnetic induction
- Factors affecting induced emf:
 - Number of turns of the coiled conductor
 - Strength of the magnet.
 - Speed of movement of solenoid/magnet
- Factors influencing direction of induced emf
- Direction of magnetic field
- Direction of movement of solenoid/magnet.
- Fleming's right hand rule.
- Stretch the forefinger, middle finger and the thumb of the right hand in mutually perpendicular directions. If the forefinger represents the direction of the magnetic field, and the thumb represents the direction of motion of the conductor, then the middle finger represents the direction of the induced current.
- AC&DC- A current that flows only in one direction continuously is direct current (DC) .Current that changes direction at regular intervals of time is alternating current (AC)
Generator :- Main parts, working principle energy change etc:
- Mutual induction: consider two coils were kept side by side. When the strength or direction of current in one coil changes, the magnetic flux around it changes. As a result, an emf is induced in the secondary coil. This phenomenon is mutual induction.

Transformer:- Structural difference between step up and step down transformers.

Working principle

$$\frac{V_s}{V_p} = \frac{N_s}{N_p}$$

$V_s \times I_s = V_p \times I_p$; problems

- **Self induction:** The change in magnetic flux due to the flow of an AC in a solenoid will generate a back emf in the same solenoid in a direction opposite to that applied to it. This phenomenon is called self induction.
- **Inductor:** Inductors are coils used to oppose the changes in electric current in a circuit. They are used to reduce current in a circuit to the desired value without loss of power.
- **Moving coil microphone:**

Working principle

Energy Change

Main parts and working

- **Transmission loss:-**

When electricity is transmitted to distant places there is loss of energy in the conductors in the form of heat. This is known as a transmission loss.

We can reduce transmission loss by reducing current by increasing voltage using a step up transformer.

Household electrification: - Diagram with position of different devices like KWH meter, Main fuse, Main switch, MCB, ELCB. etc.

- **Watt hour Meter :-** it is a device that is used to measure electrical energy.

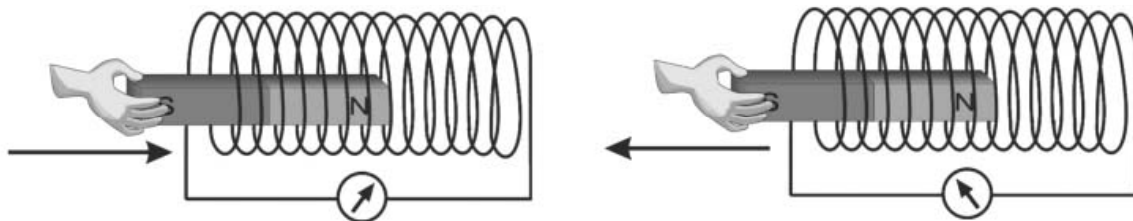
$$\text{Energy in kilowatt hour} = \frac{\text{power in watt} \times \text{time in hour}}{1000}$$

- Safety measures
- Safety fuse

- MCB
- ELCB
- Three pin plug and earthing
- Electric shock – precautions, first aid

WORK SHEET - 1

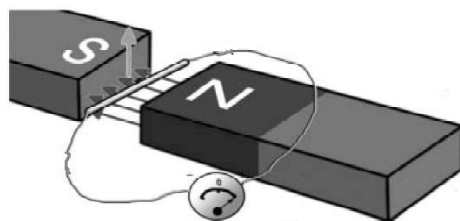
Observe the picture and answer the questions that follow.



- What do you observe when the magnet is moved into the solenoid?
- What is the reason for your observation?
- What change do you observe when the magnet is kept stationary inside the solenoid?
- State the phenomenon related to this.

WORK SHEET - 2

‘Whenever there is a change in the magnetic flux linked with a coil an emf is induced in the coil’.

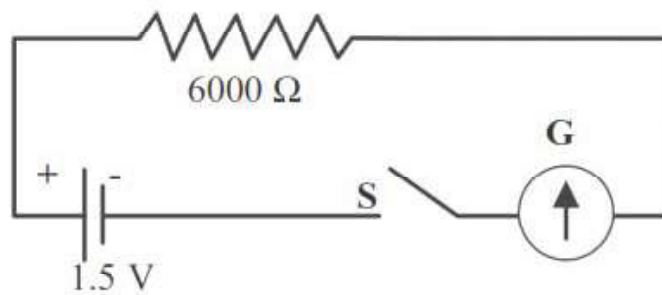


- Mark the direction of induced current in the given figure.

- b) Write two factors on which the direction of induced emf depends
- c) State the principle that help to find out the direction of induced emf
- d) Write three methods to increase the induced emf.

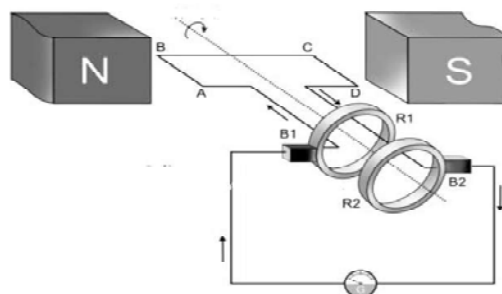
WORK SHEET - 3

Observe the figure.



- a) How does the galvanometer needle deflect when the switch is on?
- b) What change do you observe in the deflection of galvanometer if it is connected to a solenoid and a magnet is moved in and out continuously through that solenoid?
- c) Distinguish between AC current and DC current

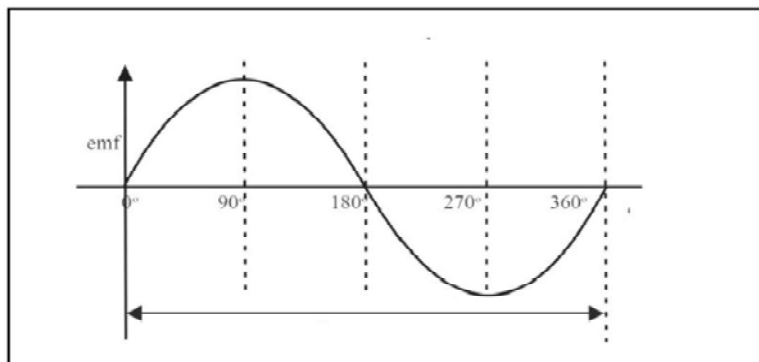
WORK SHEET - 4



- Identify the device
- What is its working principle?
- Write the energy change taking place in it
- Name the important parts and write the function of each part.
- When the coil rotates about the axis in the clockwise direction, what will be direction of induced current in AB?

WORK SHEET - 5

The following graph shows the emf produced by the armature coil during one rotation of an AC generator. Observe



- a) Complete the table

Angle of Rotation	0°	90°	180°	270°	360°
Rate of change of flux	0	Maximum	(a)	Maximum	(b)
Induced emf in volts	(c)	Maximum	0	(d)	0

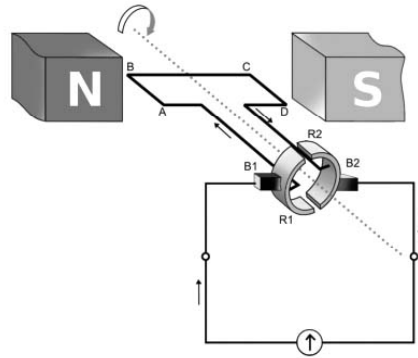
- b) What is the frequency of AC generated for distribution in our country?

WORK SHEET - 6 AC generator works on the principle of electromagnetic induction.

- How does the current generated in the armature coil of an AC generator brought to the external circuit?
- In AC generators in power station magnet is made to rotate. Why?
- Is it possible to produce DC using a generator? How?

WORK SHEET - 7

Observe the figure of a DC generator



- a) Tabulate two similarities and differences between a DC motor and a DC generator.
- b) Draw the graphical representation of the emf produced in the armature coil and output of a DC generator.

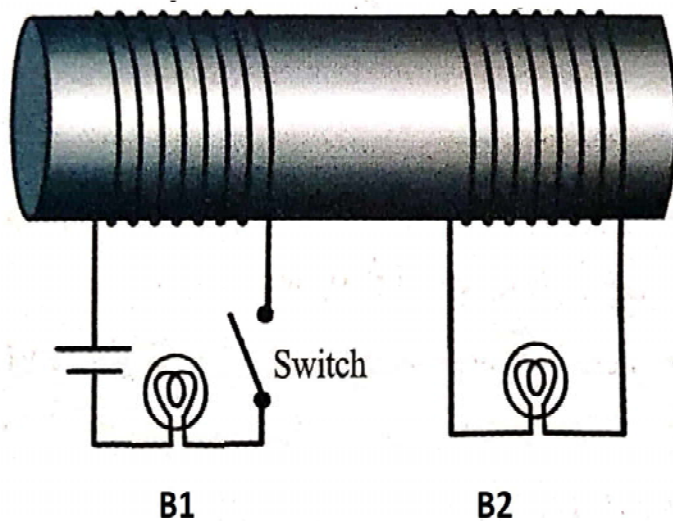
WORK SHEET - 8

Graphical representation of emf obtained from an AC generator, a battery and a DC generator are given in the table complete it

	<p>AC generator</p>	<ul style="list-style-type: none"> • Direction changes continuously • (c)
	<p>(a)</p>	<ul style="list-style-type: none"> • (d) • steady
	<p>(b)</p>	<ul style="list-style-type: none"> • (e) • (f)

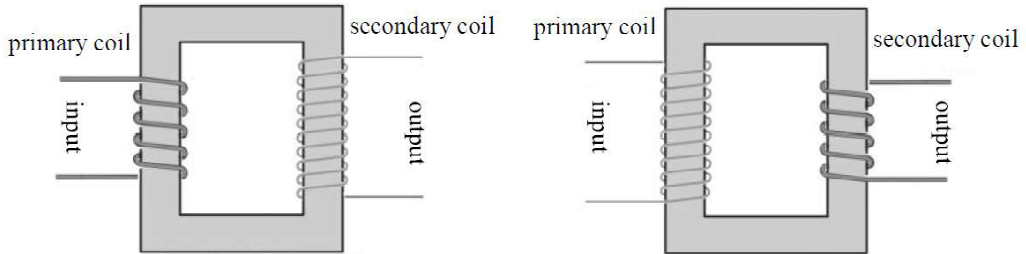
WORK SHEET - 9

Observe the diagram below



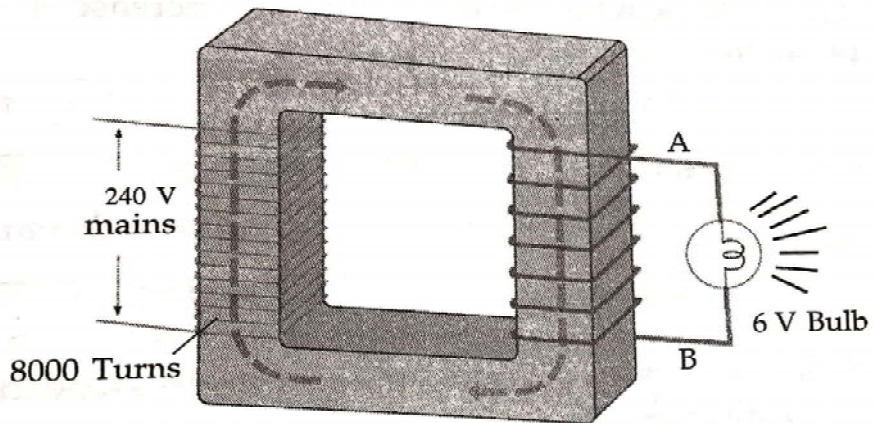
- What do you observe when the switch is turned on?
- What is the observation when the switch is kept in the on position?
- What change will be noticed when the switch is turned off?
- If DC in the primary is replaced by AC current and the switch is turned on what difference do you observe?
- State the phenomenon responsible for this?
- Is there any change in the brightness of bulb B 1 when AC current is given in the primary coil. Justify your answer.

WORK SHEET - 10



- a) Identify setup and stepdown transformers from the figures
- b) List out two structural differences between step up and step down transformers
- c) What is the working principle of transformers.

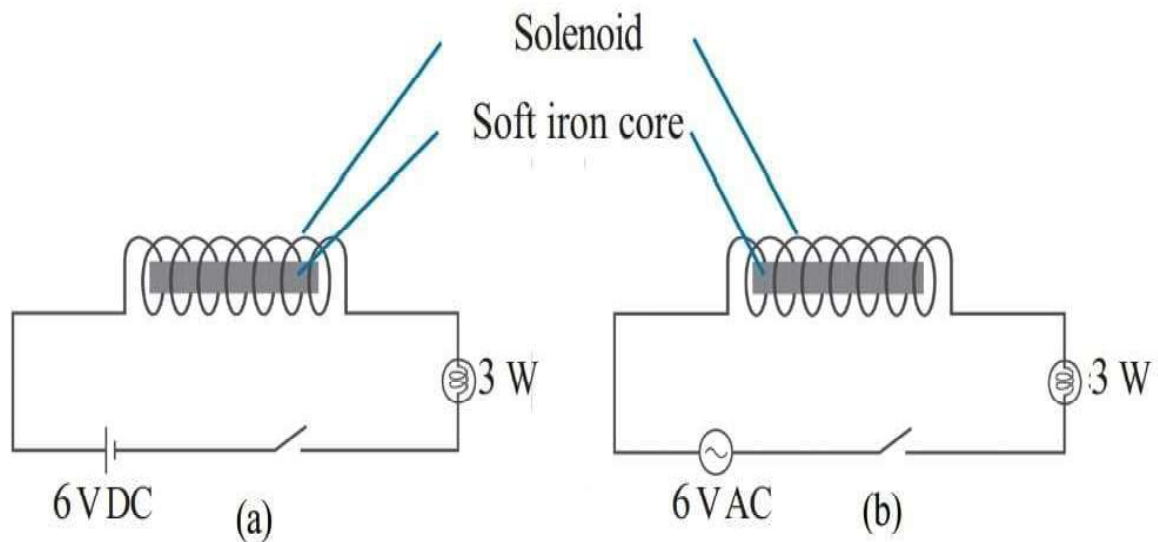
WORK SHEET - 11



- a) Calculate the number of turns in the secondary coil based on the information shown in the figure?
- b) What happens when a 1.5v bulb is connected to the output.

WORKSHEET 12

Let us examine the following experiments.

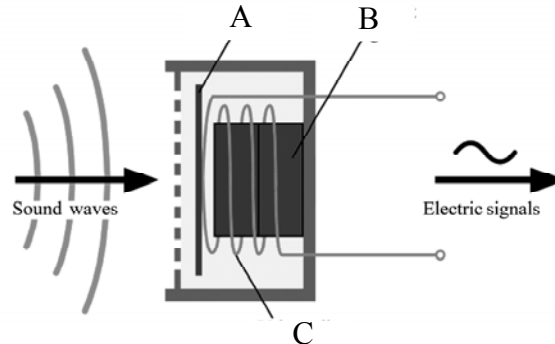


- In which circuit the bulb glow with low intensity?
- In which circuit is a varying magnetic field developed around the solenoid?
- Which phenomenon is responsible for it? Explain?

WORKSHEET 13

- What are the uses of Inductors?
- Why resistors are not used in AC circuits instead of Inductors?
- Why Inductors are not used in DC Circuits?

WORK SHEET - 14



- Identify the figure and label the parts
- Which is the moving part?
- If a sound is produced in front of a movable diaphragm, what will happen to the diaphragm? What will be the results?

WORK SHEET - 15

- Tabulate the similarities and differences between a moving coil microphone and a moving coil loudspeaker

WORK SHEET - 16

- What is the voltage at which electricity is produced in India?
- Write down the name of any 4 power stations in Kerala ?
- What do you mean by transmission loss?
- Suggest some methods to reduce transmission loss?

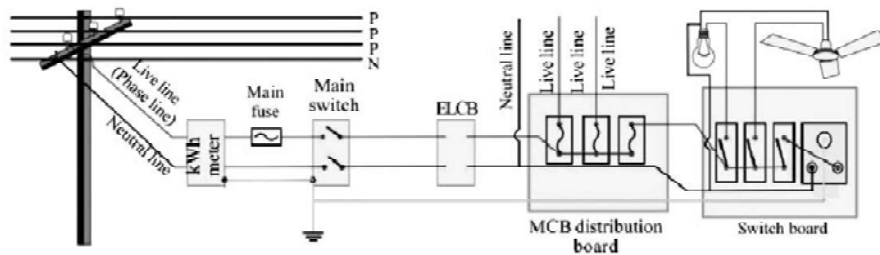
WORK SHEET - 17

- Which type of transformer is there in a power station?
- Which type of transformer is a distribution transformer?
- The person standing on the earth touches a phase line, will he get an electric shock? Why?
- List out the lines essential for household electrifications?

WORK SHEET -18

- a How many lines are coming out from a distribution transformer? List out them?
- b. What is the potential differences between two phase lines?
- c. What is the neutral potential?
- d. What is the potential difference between phase and neutral?

WORK SHEET - 19



Look at the picture, Answer the following Questions

- a From where does the earth line starts?
- b. What is the purpose of watt hour meter?
- c. In which line is the fuse wire connected?
- d. Where is the position of the main switch? What is its function?

WORK SHEET - 20

- a What are the colours used for wires in phase, neutral and earth lines?
- b. How are the household device connected? What are the advantages of connecting device in this method?

WORK SHEET - 21

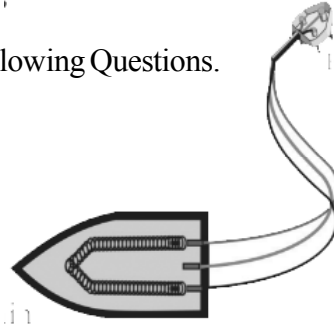
- a What is the unit of electrical energy?
- b. In a house hold circuit 5 CF lamps of 20W works for 8 hours, 4 fans of 60W works for 5 hours in a day, what will be the daily energy consumption? If the cost of electrical energy per unit is 5 Rs. Calculate the Monthly current bill as per the above mentioned data?

WORK SHEET - 22

- a List out the differences between Ordinary fuse and MCB?
- b. What are the advantages of MCB over a safety fuse?

WORK SHEET - 23

Observe the Picture and answer the following Questions.



- Which are the lines connected to the coil?
- Which line comes in contact with the pin E?
- How does the Earth pin differ from the other pins?
- If a phase line comes in to contact with the body of the appliance due to defects in insulation, what happens to the person who touches the body of the appliance?

WORK SHEET - 24

- Classify the devices working in AC and working in DC
Fan, Calculator, Light, Computer, Mixie, Heater, TV, Radio
- Name of the device that convert AC in to DC? Write the name of the process?

WORK SHEET - 25

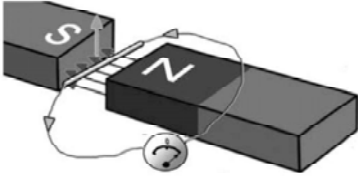
- What are the situations which causes electric shock?
- What are the precautions to be taken to avoid electric shock?
- Write the first aids to be given in the case of electric shock?

ANSWER KEY

WORK SHEET - 1

- Galvanometer needle defelcts.
- Due to the change in magnetic flux linked with the solenoid an emf is induced in the coil.
- Galvanometer needle does not deflect.
- Whenever there is a change in the magnetic flux linked with a coil, an emf is induced in the coil. This phenomenon is electro magnet induction.

WORK SHEET - 2

- a) 
- b) i) Direction of magnetic field
ii) Direction of movement of solenoid or magnet
- c) Fleming's right hand rule : Stretch the fore finger, middle finger and the thumb of the right hand in mutually perpendicular directions. If the fore finger represents the direction of the magnetic field, and the thumb represents the direction of motion of the conductor, then the middle finger represents the direction of the induced current.
- d) i) Increase the number of turns of the solenoid
ii) Increase the magnetic strength.
iii) Increase the speed of movement of either the magnet or the solenoid.

WORK SHEET - 3

- a) Galvanometer needle deflects only in one direction
b) Galvanometer needle deflects to both directions
c) A current that flows only in one direction continuously is direct current (DC).
Current that changes direction at regular intervals of time is alternating current (AC)

WORK SHEET - 4

- a) AC generator b) Electro magnetic induction
c) Mechanical energy to electrical energy
d) Field magnet – create magnetic flux in the generator
Armature – Rotate about its axis
Slip rings – Rotate along with the armature
Brushes – Current flows to the external circuit through it
e) A to B f) Fleming's right hand rule

WORK SHEET - 5

- I) a) 0 b) 0 c) 0 d) maximum
- II) 50Hz

WORK SHEET - 6

- a) Through the slip ring and brush arrangement
 b) Armature is heavy and hence the rubbing of slip ring ring on brushes produce sparks.
 c) Yes. Replace slip rings with split rings

WORK SHEET - 7

a) Similarities

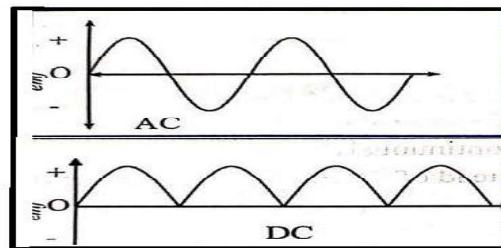
- Both have permanent magnets
 Both have armature coil

Differences

DC generator	DC Motor
Working principle is electromagnetic induction	Working principle is motor principle
Mechanical energy to electrical energy	Electrical energy to mechanical energy

Armature coil

Output



WORK SHEET - 8

- a) Battery (DC)
 b) DC generator
 c) emf increases and decreases
 d. Direction does not change
 e) Direction does not change
 f) emf increase and decreases

WORK SHEET - 9

- a. B1 glows, B2 blinks
- b. B1 glows continuously, B2 does not glow
- c. B1 doesn't glow , B2 blinks.
- d. Both B1 and B2 glows continuously.
- e. Mutual induction – When the direction of current in the primary coil changes, the magnetic flux around it also changes. As a result an emf is induced in the secondary coil. This phenomenon is mutual induction.
- f) Yes Brightness of bulb B1 decrease due to self induction when AC current flows through primary coil.

WORK SHEET - 10

- a) A - step up transformer
B - step down transformer

Step Up transformer	Step down transformer
Number of turns in secondary is greater than primary Thick wires are used in primary	Number of turns in primary is greater than secondary Thick wires are used in secondary

- c) mutual induction

WORK SHEET - 11

- a) $V_p=240V$ $V_s=6V$ $N_p=8000$ $N_s=?$

$$V_s/V_p=N_s/N_p$$

$$N_s = \frac{V_s \times N_p}{V_p}$$

$$= \frac{6 \times 8000}{240} = 200$$

- b) The bulb will be fused

WORK SHEET - 12

- a) (b)
- b) (b)
- c) Self induction, the change in magnetic flux due to the flow of an AC current in a solenoid will generate a back emf in the same solenoid in a direction opposite to that applied to it. This phenomenon is known as the self induction

WORK SHEET - 13

- a) Inductors are coils used to oppose the changes in electric current in circuit.
Reduce the current without power loss.
- b) Electrical energy loss in the form of heat energy.
- c) Back emf is not produced as the flux formed by the current has no variation. So current control by inductor in DC is not possible

WORK SHEET - 14

- a) Moving coil microphone-Diaphragm, Permanent magnet, Voice coil
- b) Diaphragm, Voice coil
- c) Vibrates, electric signals in accordance with the sound is generated in the coil.

WORK SHEET - 15

Similarities	Differences
Both have 1) Diaphragm 2) Voice coil 3) Permanent magnet	<u>Microphone</u> Electromagnetic induction Sound energy - electrical energy <u>Loud speaker</u> Motor principle Electrical energy - sound energy

WORK SHEET - 16

- a) 11 kv (11000V)
- b) Idukki - Moolamattom, Kuttyadi, Pallivasal, Sabarigiri.
- c) When electricity is transmitted to distant places there is loss of energy in the form of heat energy.
- d) Reduce the current, Reduce the resistance of the conductor.

WORK SHEET - 17

- a) Step up transformer
- b) Step down transformer
- c) Yes, the potential difference between the phase line and earth is 230V. So, the person may get an electric shock.
- d) 1-phase, 1 neutral

WORK SHEET - 18

- a) 4, 1- neutral, other 3 are phase lines
- b) 400V
- c) OV
- d) 230V

WORK SHEET - 19

- a) From watt hour metre.
- b) To measure the electrical energy
- c) Phase line
- d) Just after the watt hour metre, the electricity reaches the electrical appliances through main switch. The entire circuit can be controlled by using main switch.

WORK SHEET - 20

- a) Phase - Red
Neutral - Black / Blue
Earth - green
- b) Parallel connection
 - i) Device will get required current
 - ii) The Voltage is same for all devices.
 - iii) Device works according to the marked power.
 - iv) Device can be controlled by using separate switches

WORK SHEET - 21

- a) Kilowatt hour (kWh)
- b) Energy consumption of CFL = $\frac{20 \times 5 \times 8}{1000} = \frac{800}{1000} = 0.8$
Energy consumption of Fan = $\frac{60 \times 4 \times 5}{1000} = \frac{1200}{1000} = 1.2$

WORK SHEET - 25

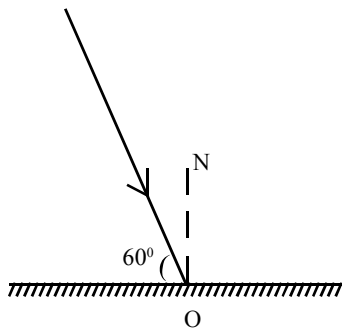
- a) Touch bare wires or cables with damaged insulation or when lightning strikes.
- b)
 - 1. Never handle electric equipment or operate switches when the hands are wet.
 - 2. Do not operate device of high power using ordinary sockets.
 - 3. Do not fly kites near electric lines.
 - 4. Do not use table fan to dry hair
- c)
 - 1. Raise the temperature of the body by massaging.
 - 2. Give artificial respiration.
 - 3. Massaging the muscles and bring them to the original condition.
 - 4. Apply pressure on the chest regularly.

UNIT 4

Reflection of Light

WORK SHEET - 1

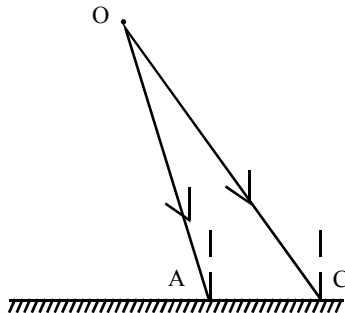
A ray of light incidents on a plane mirror is depicted below.



- a) Complete the diagram by drawing the reflected ray.
- b) Angle of reflection is
- c) Write down the laws of reflection.

WORK SHEET - 2

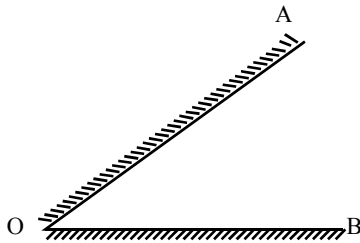
Arrange a source of light at a point 'o' in front of a plane mirror.



- a) Complete the ray diagram showing the image formation.
- b) Write down the properties of the image.

WORK SHEET - 3

Two mirrors OA and OB are arranged in such a way that their edges are in contact as shown in the figure. A burning candle is placed in between them.



- a) If the number of images seen when viewed from A and B is 11, how much is the angle between the mirrors?
- b) If the angle between the mirror is set as 90° , how many images will be formed?
- c) To view only one image, in which angle should the mirrors be arranged?

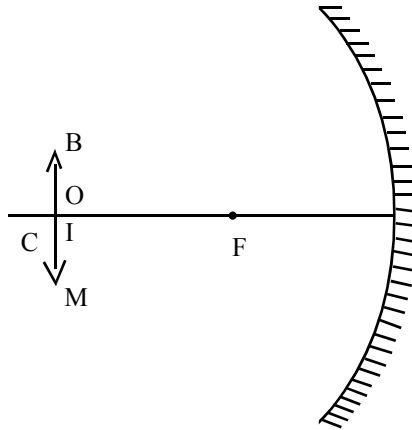
WORK SHEET - 4

Match the columns A, B and C suitably.

A	B	C
Convex mirror	Converges distant rays to the principal focus	For observing the face
Plane mirror	Field of view is maximum	Solar Furnace
Concave mirror	Image is virtual, erect and is of the same size as that of the object	Rear view mirror

WORK SHEET - 5

Observe the figure and complete the table.



Distance of the object from the mirror, (u)	- 20 cm
Distance of the image from the mirror (v)	....(a).....
Focal length, (f)	....(b).....
Radius of curvature, (r)	....(c).....
Height of the image (hi)	-2 cm
Height of the object, (ho)	<u>(d)</u>
Magnification, (m)	....(e).....

WORK SHEET - 6

It is written on a mirror which is used as rearview mirror in vehicles, that “objects in the mirror are closer than they appear.”

- a) Identify the mirror (concave/convex/plane)
- b) Why is it written so?

c) This mirror always forms an image that is

(erect and enlarged / inverted and enlarged / erect and diminished / inverted and diminished)

WORK SHEET - 7

A spherical mirror is used in search light.

a) Identify the mirror.

b) Why is it used in search light?

c) Write down another use of this mirror.

d) This mirror forms images.

(only virtual image/only real image/virtual as well as real images.)

WORK SHEET - 8

State whether the following statements are true or false.

a) When the magnification is positive, the image is virtual and erect.

b) When the magnification is positive, the image is real and inverted.

c) When the magnification is negative, the image is virtual and erect.

d) When the magnification is 1, the size of the image and size of the object are equal.

e) When the magnification is negative, the image is real and inverted.

f) When $m > 1$, size of the image is greater than the size of the object.

g) When $m > 1$, size of the image is less than the size of the object.

WORK SHEET - 9

We are able to see a plane mirror and a book since light falling on them gets reflected from them and reaches our eyes. We can see our image in a mirror, but can not see our image in a book. Explain why?

WORK SHEET - 10

When an object of height 4 cm is placed in front of a concave mirror at a distance 8 cm away from it, an image is obtained 16 cm away on the same side.

- a) Find out the magnification.
- b) Find out the height of the image.
- c) Write down the properties of the image.

WORK SHEET - 11

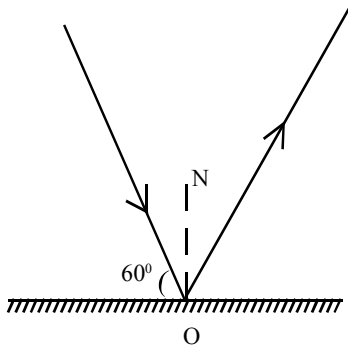
Complete the table

Concave mirror	
Position of object	Position of Image
Beyond C	_____ (a) _____.
_____ (b) _____.	At C
Between C and F	_____ (c) _____.
_____ (d) _____.	Behind the mirror

ANSWER KEY

WORK SHEET - 1

a)

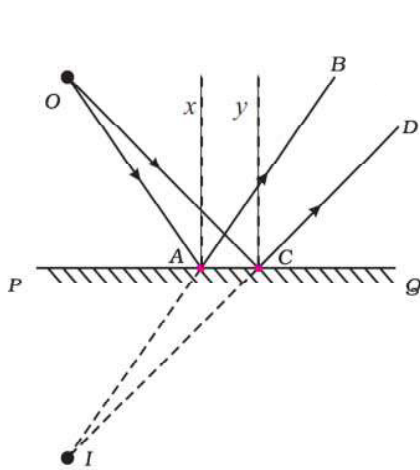


b) 30°

c) When light is reflected from the smooth surface, the angle of incidence and angle of reflection are equal. The incident ray, reflected ray and normal to the surface are in the same plane.

WORK SHEET - 2

a)



- b) • The image is virtual.
- The distance from the mirror to the object and the distance to the image from the mirror are equal.
- Size of the image and size of the object are same.

WORK SHEET - 3

a) 30°

b) $n = \frac{360}{\theta} - 1$

$$= \frac{360}{90} - 1 = 4 - 1 = 3$$

c) 180°

WORK SHEET - 4

A	B	C
Convex mirror	Field of view is maximum	Rear view mirror
Plane mirror	Image is virtual, erect and is of the same size as that of the object	For observing the face
Concave mirror	Converges distant rays to the principal focus	Solar furnace

WORK SHEET - 5

- (a) = -20 cm
- (b) = -10 cm
- (c) = -20 cm
- (d) = +2 cm
- (e) = -1

WORK SHEET - 6

- a) Convex mirror.
- b) The image formed by a convex mirror is always erect and diminished. Hence the driver who sees the image of vehicles on the mirror develops a feeling that the vehicles coming from behind are at greater distance. This may turn out to be dangerous. So it is written on this mirror that “objects in the mirror are closer than they appear.”
- c) Erect and diminished.

WORK SHEET - 7

- a) Concave mirror
- b) It reflects the rays coming from principal focus as parallel rays.
- c) Used as shaving mirror.
- d) Virtual as well as real images.

WORK SHEET - 8

- a) False
- b) True
- c) True
- d) True
- e) False
- f) True
- g) False

WORK SHEET - 9

As the book is rough, light falls on it undergoes irregular reflection, ie. light undergoes scattered reflection and no image is formed.

WORK SHEET - 10

- a) $u = -8\text{cm}$
 $v = -16\text{cm}$
 $h_o = 4\text{cm}$
 $m = ?$

$$m = -\left(\frac{v}{u}\right)$$
$$= -\left(\frac{-16}{-8}\right)$$
$$= -2$$

- b) $h_i = ?$

$$m = \frac{h_i}{h_o}$$

$$\therefore h_i = m \times h_o$$
$$= -2 \times 4 = -8\text{cm}$$

c) Image is real, inverted and image size is greater than that of the object

WORK SHEET - 11

a) Between F and C

b) At C

c) Beyond C

d) Between F and P

UNIT 5

Refraction of Light

IMPORTANT CONCEPTS

- Speed of light in different media
- Optical density
- Refraction
- Refraction in different media
- Laws of refraction
- Refractive index
- Snell's law
- Relative refractive index
- Absolute refractive index
- Refraction in Daily life
- Total internal reflection
- Critical angle
- Lens – Convex and Concave
- Terms related to lens
- Image formation and their ray diagrams
- New Cartesian sign convention
- Lens equation
- Power of lens
- Atmospheric refraction

WORK SHEET - 1

1. Among the following find out the statement which gives the relation between speed of light and optical density.
 - a) Speed of light increases when optical density increases.
 - b) Speed of light increases when optical density decreases
 - c) Speed of light decreases when optical density increases.
 - d) Speed of light decreases when optical density decreases.
2. **Complete the table** ($3 \times 10^8 \text{m/s}$, $1.25 \times 10^8 \text{m/s}$, $2.25 \times 10^8 \text{m/s}$, $2 \times 10^8 \text{m/s}$)

Medium	Speed of light
a. Air (vacuum)
b. Water
c. Glass
d. Diamond

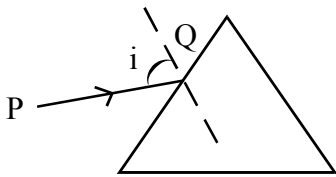
3. Choose the correct order according to the decreasing order of optical density of the given media.
 - a) Air (vacuum), water, glass, diamond
 - b) Water, Air (vacuum), diamond, glass
 - c) Diamond, glass, water, air (vacuum)
 - d) Glass, air (vacuum), water, diamond

WORK SHEET - 2

1. When light travels from one medium to another medium its path deviates, this is known as refraction of light. Among the following which is the correct condition for refraction of light.
 - a) When light travels from one medium to another medium perpendicularly.
 - b) When light travels from one medium to another medium.
 - c) When light travels from one medium to another medium, with difference in optical density obliquely.

2. Choose the correct reason for the refraction of light.
- Due to the difference in the speed of light in different medium.
 - Due to the difference in optical density of different medium.
 - Due to the travelling of light from one medium to another medium obliquely
 - All of the above

3.

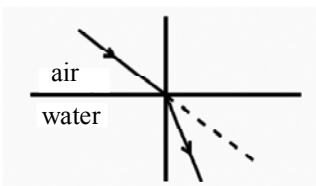


Observe the figure given above about the refraction of light through a glass prism.

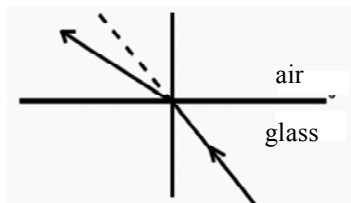
- Complete the figure
- Name the ray of light PQ
Incident ray /refracted ray
- Name the angle i
Incident angle/refracted angle
- Name the ray, which has to be completed in the above figure.
Incident ray/ refracted ray
- Ratio of the sin values of incident angle and refracted angle is

WORK SHEET - 3

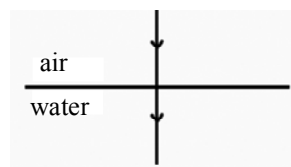
1. Find out the correct one?



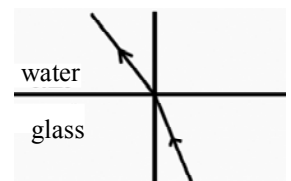
a



b



c



d

2. State Snell's law?
3. Write the equation for refractive index?

WORK SHEET - 4

1. 1. Refractive index is expressed with respect to the speed of light in different media.
 - a) Name the refractive index expressed with respect to the speed of light in vacuum.
 - b) Relative refractive index is written as n_{21} , what it means?
 - c) Complete the table by choosing the correct refractive index of the respective medium.
(2.4., 1.3, 1.5)

Medium	Refractive index
Glass
Water
Diamond

2. When the refractive index is expressed with respect to vacuum it is called absolute refractive index.
 - a) Write the equation for absolute refractive index.
 - b) If the absolute refractive index of glass and water is 1.5 and 1.3 respectively, then find the speed of light through these media.
 - c) If the absolute refractive index of a medium is high, then the speed of light will be higher/lower

WORK SHEET - 5

Refraction of light is utilized in different phenomena of day to day life.

1. Find out the phenomenon happening due to refraction of light.
 - a) A pencil placed in beaker containing water seems to be bented at the point of separation of air and water.
 - b) A coin placed at the bottom of an opaque vessel is seems to rises up when it is filled with water.
 - c) Scenery of the bottom of a fish tank is seems to appear at the surface of water taken in.

d) All the above.



fig(1)

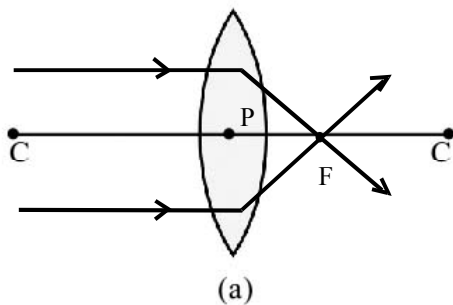


fig(2)

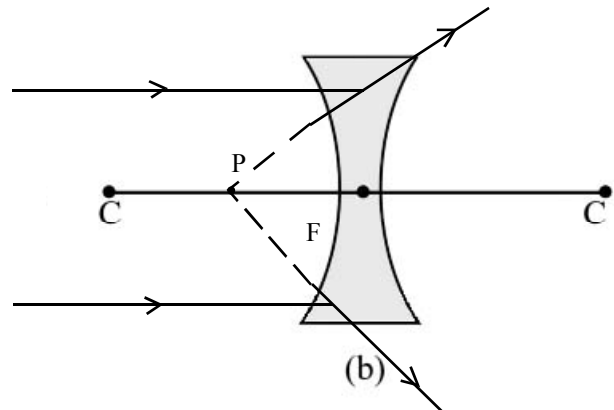
2. Observe the pictures and answer the following.

- In picture 1 light is travelling from / air to water / from water to air
- The angle of refraction in picture 1 is
greater than 90° / 90° / less than 90°
- The incident angle, when the refracted angle is 90° is known as
- In picture 2 the refracted ray is travelling from
water to air / air to water
- In picture 2, the light ray reflected back to the same medium, without undergoing refraction, this is known as
- Choose the correct conditions for total internal reflection.
 - When light travels from denser medium to rarer medium.
 - Incident angle should be greater than critical angle.
 - Refracted angle should be greater than 90°
 - All of the above

WORK SHEET - 6



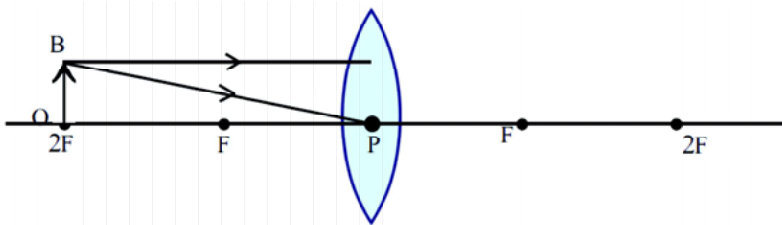
(a)



(b)

1. What is P, C, and F in these pictures

- Tabulate the difference between the the principal focus of concave and convex lenses.
- Complete the figure.



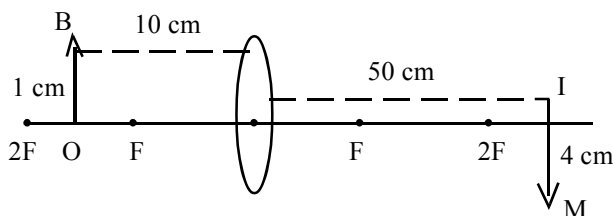
- What are the features of the image formed by concave lens?

WORK SHEET - 7

- Complete the table

Position of object	Position of image	Features of image formed		
		Type	Orientation	Size
1. Object at infinity	.....(a).....	.....(b).....	inverted	Diminished
2. Beyond 2F	Between F & 2F	.....(c).....	inverted	(d)
3. At 2F	(e)	real	(f)	same size
4. Between 2F & F	Beyond 2F	(g)	inverted	(h)
5. At F	at infinity	(i)	inverted	(j)
6. Between F & lens	behind the object	virtual	erect	(k)

- Observe the figure and answer the following



- Write u and v as per new cartesian sign convention.
- Write the heights of object and image.

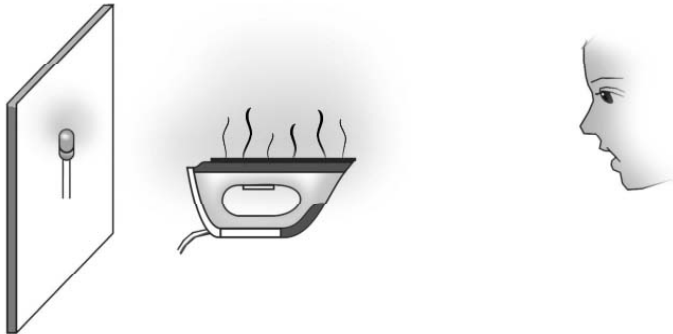
- c) What is the relation between them
- d) Write the equation of magnification.

WORK SHEET - 8

1. If the equation of lens is $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$
 - a) Find out the image distance of a concave lens, with focal length 20cm, when the object is placed at 30 cm away from the lens.
 - b) For a concave lens if the magnification $m = \frac{v}{u}$ then the image formed will be erect/inverted
 - c) If the magnification is -ve, the image formed is erect / inverted
 - d) Write any two uses of lens in everyday life.

WORK SHEET - 9

1. Observe the picture and answer the following.



- a) What is the reason behind that the LED is seems to be blinking.
- b) Write any other examples of atmospheric refraction.
- c) A prescription given by an ophthalmologist is written as -5D, what is the meaning of this?
- d) What is D denoted.
- e) What is the power of a lens.

ANSWER KEY

WORK SHEET - 1

1. b & c

2.

Medium	Speed of light
a. Air (vacuum)	3×10^8 m/s
b. Water	2.25×10^8 m/s
c. Glass	2×10^8 m/s
d. Diamond	1.25×10^8 m/s

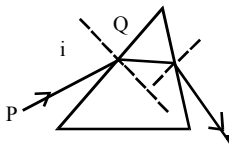
3. c

WORK SHEET - 2

1. c

2. d

3. a)



b) incident - ray

c) incident - angle

d) refracted ray

e) refractive index

WORK SHEET - 3

1. a

2. Ratio of the sin values of incident - angle to refracted - angle is a constant

3. $\frac{\sin i}{\sin r} = n$

WORK SHEET - 4

1. a) absolute refractive index

b) $n_{21} = \frac{\text{speed of light in medium 1}}{\text{speed of light in medium 2}}$

c)

Medium	Refractive index
Glass	1.5
Water	1.3
Diamond	2.4

2. a) $n = \frac{\text{speed of light in medium}}{\text{speed of light in vacuum}}$

b) $n_g = 1.5 = \frac{3 \times 10^8 \text{ m/s}}{\text{speed of light in glass}}$

$n_w = 1.3 = \frac{3 \times 10^8 \text{ m/s}}{\text{speed of light in water}}$

speed of light in water = $\frac{3 \times 10^8 \text{ m/s}}{1.3} = 2.25 \times 10^8 \text{ m/s}$

c) Lower

WORK SHEET - 5

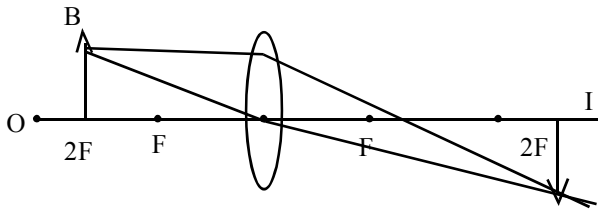
1. d

2. a) water to air b) 90°
c) critical angle d) water to air
e) total internal reflection f) iv

WORK SHEET -6

1. P - Optical center,
C - Centre of curvature
F - Focus
2. Correct statements.

3.



4. Erect, virtual and diminished

WORK SHEET - 7

- at F
 - real
 - real
 - diminished
 - at 2F
 - inverted
 - real
 - enlarged
 - real
 - enlarged
 - enlarged
- $u = -10\text{cm}$ $v = 50\text{ cm}$
 - $h_i = 4\text{cm}$, $h_o = 1\text{cm}$
 - Magnification is the ratio of height of the image to height of the object.
 - $m = \frac{h_i}{h_o}$

WORK SHEET - 8

- $f = -20\text{cm}$, $u = -30\text{ cm}$

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

$$\frac{-1}{20} = \frac{1}{v} - \frac{-1}{30}$$

$$\frac{-1}{20} = \frac{1}{v} + \frac{-1}{30}$$

$$\frac{1}{v} = \frac{-1}{20} - \frac{1}{30} = \frac{-30 - 20}{600} = \frac{50}{600} = -\frac{1}{12} \quad V = -12\text{ cm}$$

- b) erect
- c) inverted
- d) in spectacles, in camera

WORK SHEET - 9

1.
 - a) Atmospheric refraction
 - b) Twinkling of stars
 - c) The power of the lens is -5
 - d) Dioptre
 - e) $P = \frac{1}{f}$ in metre

UNIT 6

Vision and the World of Colour

MAIN POINTS

- Structure of eye
- Image formation in human eye
- Far Point
- Near Point
- Power of accommodation
- Long sightedness
- Short sightedness
- Remedies
- Eye donation
- Presbyopia
- Power of lens
- Dispersion of light
- Formation of rainbow
- Recombination of colour
- Scattering of lights
- Colour of rising and setting sun
- Tyndall effect
- Light Pollution

WORK SHEET - 1

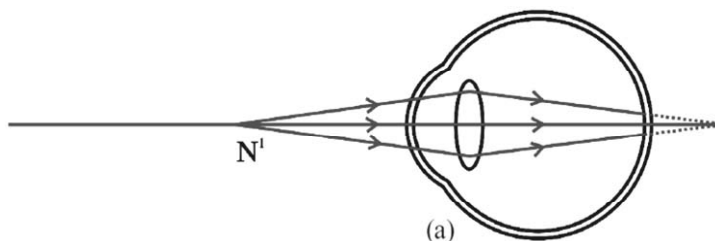
- a. How does the thickness of the eye lens change when we shift looking from a distant tree to reading a book ?
- b. What is mean by power of accommodation of the eye ? Name the muscle of the eye which is responsible for the same ?
- c. Power of accommodation of eye is limited. It implies that the focal length of the eye lens could not be reduced beyond a certain limit. At what distance from the eye do you get a clear vision ?
- d) What is the maximum distance of clear vision for a normal human eye.

WORK SHEET - 2

- a) A person is unable to see distinctly an object placed beyond 6m. Name the defect of vision he is suffering from ?
- b) State the two causes of myopia ?
- c) With the help of a labelled ray diagram show
 - (i) the eye defect myopia (ii) Correction of myopia using a lens
- d) What is the far point of a person suffering from myopia
 - (i) Infinity (ii) At a definite distance from the eye.

WORK SHEET - 3

The schematic diagram represents an image formation of a distant object in the eye.



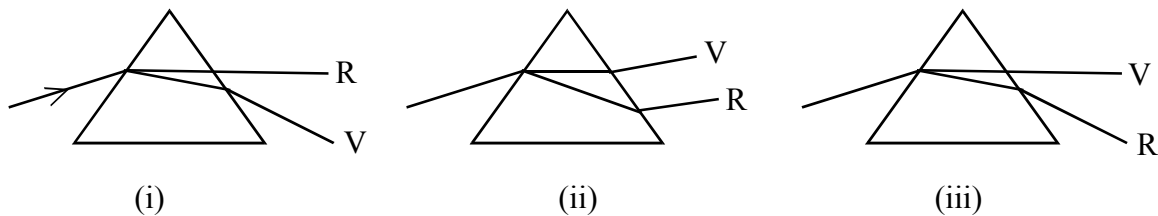
- a) Name the defect of vision of the eye shown in the diagram
- b) Name two reasons for the defect
- c) What type of lens is required to correct the defect of vision ?
- d) The near point of the eye of such a person will be at a distance
 - (i) 25 cm
 - (ii) More than 25 cm
 - (iii) less than 25 cm

WORK SHEET - 4

- a) Elderly people read the newspaper by holding it at a distance than usual. Name the defect of eye behind this ?
- b) Explain the defect ?
- c) When a person suffering from a problem in vision met a doctor, he wrote in his prescription +2D , -2D
 - (i) which are the types of lenses prescribed here ?
 - (ii) what type of lens is used to correct the defect presbyopia ?
- d) In eye donation which one of the following part of donors eye is utilised ?
 - i) cornea
 - ii) lens
 - iii) Iris
 - iv) Retina

WORK SHEET - 5

Observe carefully the following diagram which show the splitting up of a composite light into its constituent colours.



- a) Which among the above figure is correct ?
- b) Name the phenomenon behind this ?
- c) What is the reason behind the difference in deviation of each colour?
- d) Write an real life phenomenon showing dispersion of light?

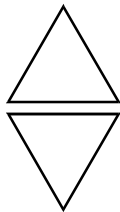
WORK SHEET - 6

Veena observed a beautiful rainbow in the western sky from her school ground.

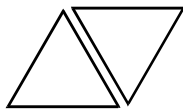
- a) When did Veena observe the rainbow
 - i) Morning ii) Evening iii) After noon
- b) Draw the diagram of dispersion taking place in water droplet during the formation of rainbow ?
- c) Rainbow occurs due to which of the following
 - i) Reflection ii) dispersion iii) Refraction iv) All of the above

WORK SHEET - 7

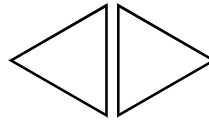
- a) Which among the following figures are correct so that they can recombine the component colour of light?



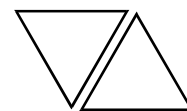
(i)



(ii)



(iii)



(iv)

- b) The discovery of Newton's colour disc proves which of the following statements
 - i) Light is colourless ii) Light has three basic colour
 - iii) Light is not colourless iv) Light has only one colour
- c) Name the phenomenon behind the disc appear white when it is rotated fast
- d) Identify the time interval of persistence of vision
 - a) $\frac{1}{10}$ second b) $\frac{1}{12}$ second c) $\frac{1}{16}$ second d) $\frac{1}{20}$ second
- e) Give two examples of persistence of vision in daily life

WORK SHEET - 8

- a) Why does the sun appear red at sunrise and sunset?
- b) How does the rate of scattering depend on size of particles in medium
- c) Give some examples of scattering of light that we come across in our day to day life.

WORK SHEET - 9

- a) Name the phenomenon by which the path of light is made visible when light rays pass through the colloidal solution.
- b) Explain the phenomenon
- c) In which month of the year is international dark sky week celebrated?
- d) What is the reason behind this celebration ?
- e) Write down what can be done to minimise light pollution ?

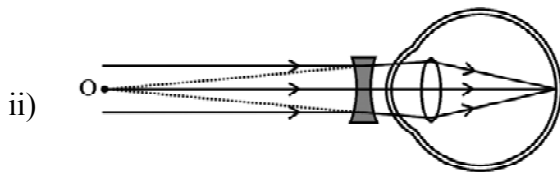
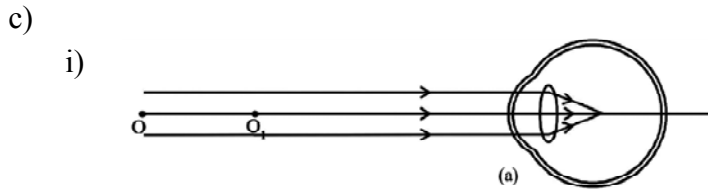
ANSWERS

WORK SHEET - 1

- a) Eye lens will become thicker
- b) The ability of the eye to form an image on the retina by adjusting the focal length of the lens in the eye by varying the curvature of the lens, irrespective of the position of the object is the power of accommodation . Ciliary muscles of the eye are responsible for this phenomenon
- c) 25 cm or 0.25 m
- d) infinity

WORK SHEET - 2

- a) Myopia
- b) Causes of myopia
 - (i) Elongation of eye ball
 - (ii) The focal length of the eye lens is low or power of lens increases



- d) i) At a definite distance from the eye (Not infinity)

WORK SHEET - 3

- a) Hypermetropia or long sightedness
- b) • smaller size of the eyeball
• Low power of the lens
- c) convex lens
- d) (ii) more than 25 cm

WORK SHEET - 4

- a) presbyopia
- b) For elderly people the distance to the near point is greater than 25 cm. This is due to the diminishing ability of the ciliary muscles. For such people the power of accommodation will be less. This is presbyopia
- c) i) convex lens, concave lens
ii) convex lens
- d) cornea

WORK SHEET - 9

- a) Tyndall effect
- b) When ray of light pass through a colloidal fluid or suspension, the tiny particles get illuminated due to scattering. Because of this the path of the light is made visible. This phenomenon is Tyndall effect
- c) Every year, the week of the new moon in April is celebrated as international dark sky week.
- d) To make awareness about light pollution among people
- e)
 - Reduce the use of decorative lighting
 - Dim lighting while driving at night
 - Design to shaded bulbs that light facing downwards prevents light from being emitted upwards.

MODEL QUESTIONS

- 1. What will be the colour of the sky for an astronaut staying in the international space station orbiting the earth? Justify your answer giving reason.
- 2. What is the reason for using yellow light in fog lamps of vehicles?
- 3. i) The near point of eye is increased with age. Name the defect of eye behind this?
ii) What is the remedy for this defect?
- 4. Raindrops falling down during rain appear like a glass rod. Find out the reason
- 5. What is the age limit of eye donation? After how many hours of death the cornea of a donor should be harvested?

Answers

- 1. Dark. Space sky is dark even the sun is there because there is no atmosphere to scatter light
- 2. Yellow has compatible greater wavelength and low scattering. Moreover it has more visibility
- 3. a) Presbyopia b) Convex lens
- 4. Persistence of vision
- 5. Any people of any age can donate eyes. 6 hours.

UNIT 7

Energy Management

MAIN POINTS

- ◆ Different types of fuels - Solid liquid, gas
- ◆ Combustion of fuels - Complete combustion and partial combustion.
- ◆ Fossil fuels
- ◆ Biomass, biogas
- ◆ Fuel Efficiency
- ◆ Calorific value
- ◆ Hydrogen as fuel
- ◆ Solar energy
- ◆ Energy from wind
- ◆ Energy from sea
- ◆ Geothermal energy
- ◆ Nuclear energy
- ◆ Renewable sources of energy
- ◆ Green energy, brown energy
- ◆ Energy crisis

WORK SHEET - 1

Fuels are substances that burn in the presence of oxygen and release plenty of heat energy. The main source of energy that we make use of today are fuels. Fuels exist in three states. Solid , liquid and gas. We are familiar with firewood in solid state, kerosene in liquid state and LPG in gaseous state fuels.

1. Classify the given fuels into solid, liquid and gaseous state.

LPG, petrol, cowdung cake, biogas, coal, methane, firewood, diesel, kerosene

Solid	Liquid	Gas

2. Write down the properties related to ‘complete combustion of fuels.’

- a) Sufficient O₂ must be available for burning.
- b) Liquid fuels must not evaporate easily.
- c) The solid fuels must be wet.
- d) The ignition temperature should be attained.

3. List out the given statements into complete combustion and partial combustion.

- i) More heat is generated
- ii) Carbon monoxide is not formed.
- iii) Atmospheric pollution occurs.
- iv) Loss of fuel
- v) Carbon monoxide is formed.
- v) Less heat is generated

WORK SHEET - 2

Fossil fuels are used in vehicles and industries. They are not renewed in proportion to their consumption. Coal petroleum and natural gases are fossils fuels.

1. The sources of fossil fuels and the fuels extracted from them are listed. Expand the list.

Coal	Petroleum	Natural Gas
• Coke	• Petrol	• LNG
•	•	•
•	•	•
•	•	•

2. Substance related to coal are given. Classify them into a) forms of coal and b) product of coal after distillation. (Coal tar, bituminous coal, peat, coke, anthracite, coal gas, lignite, ammonia.)

Forms of coal	Product of coal after distilled
• Coal tar	• Lignite
•	•
•	•
•	•

3. Complete the table

Fuel	Main component	source
LPG	.....a.....	.....b.....
CNG	methane	.....c.....
LNG	.....d.....	Natural gas

- 4 a) How will you know if there is a leakage in LPG cylinder.
- b) C23 is marked on the domestic LPG cylinder
- i) What is meant by this marking?
 - ii) What does C stands for in it.
 - iii) What will be the marking of the cylinder that expires in December 2024?
- c) Write the full form of BLEVE.

WORK SHEET - 3

The amount of heat liberated by the complete combustion of 1 kg of fuel is its calorific value.

1. Some fuels and their calorific values are given. Arrange them in the ascending order of their fuel efficiency.

LPG - 55000 KJ/kg

Hydrogen - 150000 KJ/kg

Biogas - 40000 KJ/kg

CNG - 50000 KJ/kg

Petrol - 45000 KJ/kg

2. Why hydrogen is not used as domestic fuel even if it has high calorific value?
3. Select the most appropriate one from the box below.

Hydrogen, LPG, CNG, Uranium, LNG

- a. Used as fuel in reactors
- b. Fuel in rocket
- c. Used as fuel in vehicles
- d. Fuel used in industries
- e. Domestic fuel

4. Write a few properties that a good fuel must have

- should be easily available
-
-
-

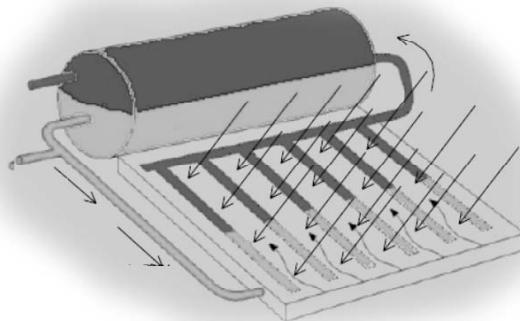
WORK SHEET - 4

Power stations can be classified based on the nature of the source providing the energy required to operate the generator.

1. Match the following

Power stations	Source of energy	Place
Hydroelectric Power Station	Fuels	Rajasthan
Thermal Power Station	Solar Energy	Kalpakkam
Nuclear Power Station	Flowing water	Kayamkulam
Solar Thermal Power Station	Nuclear Energy	Pallivasal

- 2. Can the solar panel be utilised in night, cloudy atmosphere and rainy seasons? why ?
- 3. Write two devices that make direct use of solar heat radiations.
- 4. a. Identify the device



b. Why is the hot water pipe placed at the top of the tank?

WORK SHEET - 5

1. Write the full form of OTEC
2. Why is it said that geothermal power plants are not possible in Kerala?
3. Choose the correct one from the bracket.
 - a. Occurs in stars and sun (Nuclear Fission / Nuclear Fusion)
 - b. Nuclie of greater mass are split into lighter nuclei using neutron
(Nuclear Fission / Nuclear Fusion)
 - c. Working principle of hydrogen bomb
(Nuclear fission / Nuclear fusion)
 - d. Working principle of atom bomb (Nuclear fission / Nuclear fusion)
4.
 - a. Name the system that converts nuclear energy into electrical energy?
 - b. What is the energy transformation that take place in a nuclear power station?

WORK SHEET - 6

1. Write any two examples for renewable and non renewable sources of energy.
2. Classify the following as green energy and brown energy.
Solar cells, atomic reactor, tidal energy, hydroelectric power, diesel engine, wind mill, thermal power station
3. What must be done to ensure maximum utilization of green energy while constructing a house?
4. The energy crisis is one of the major threat in our society.
 - a. What is energy crisis?
 - b. What can be done for reducing energy crisis ?

ANSWER KEY

WORK SHEET - 1

1. Solid - Firewood, cowdung cake, Coal
Liquid - Petrol, Diesel, Kerosene
Gas - LPG, Methane, Biogas
2. a, d
3. Complete Combustion - i, ii
Partial combustion - iii, iv, v, vi

WORK SHEET - 2

1.

Coal	Petroleum	Natural Gas
Coke	Petrol	LNG
Coaltar	Diesel	CNG
Coalgas	Kerosene	
Ammonia	LPG	

2. Forms of coal : Coal tar, Coal gas, Coke, Ammonia
Product of coal after distillation : Peat, lignite, anthracite, bituminous coal
3. a. Butane b. Petroleum
c. Natural gas d. Methane
4. a. There will be a strong smell of ethyl mercaptain
b. i. Expiry date of cylinder ii. July, August, September iii. D24
c. Boiling Liquid Expanding Vapour Explosion

WORK SHEET - 3

1. Biogas, Petrol, CNG, LPG, Hydrogen
2. Highly inflammable and explosive in nature.
3.
 - a. - Uranium
 - b. - Hydrogen
 - c. - CNG
 - d. - LNG
 - e. - LPG
4. Should have high calorific value
should be of low cost
should be easily storable.

WORK SHEET - 4

1.	Power Stations	Source	Place
	Hydro electric power station	Flowing water	Pallivasal
	Thermal power station	Fuels	Kayamkulam
	Nuclear power station	Nuclear energy	Kalpakkam
	Solar thermal power station	Solar energy	Rajasthan

2. No
There is no sunlight
3. Solar cooker, Solar water heater
4. As the temperature increases, density of water decreases. As the hot water is less dense and always at the top of the tank, the outlet pipe is placed at the top.

WORK SHEET -5

1. Ocean Thermal Energy Conversion Plants.
2. Regions of hotspots are not there in Kerala.
3. a. Fussion
b. Fision
c. Fussion
d. Fision
4. a. Nuclear reactor
b. Nuclear energy \Rightarrow Electrical Energy

WORK SHEET - 6

1. Renewable sources of energy :- Sunlight, Wind, Rain
Non renewable sources of energy : Petroleum, coal, nuclear energy.
2. Green energy : Solar cell, tidal energy, hydro electric power, wind mill
Brown energy : Atomic reactor , diesel engine, thermal power station
3. Sufficient sunlight should be available in the rooms during day time.
comfortable warmth, coolness, and air circulation must be available without the help of electricity.
4. a) Energy crisis is the consequence of increasing demand and decreasing availability.
b) ♦ Judicious utilisation of energy
 - ♦ Maximum utilisation of solar energy
 - ♦ Minimising the wastage of water
 - ♦ Make use of public transportation