ICSE Board
Physics
Sample Paper – 2

Time: 2 hrs **Total Marks: 75**

General Instructions:

1. ***All** questions are **compulsory**.*
2. *Questions 1 to 15 carry one mark each.*
3. *Questions in 2A and 2B carry one mark each.*
4. *Questions in 3A and 3B carry one mark each.*
5. *Question 4A and 4B carry five marks each.*
6. *Question 5A and 5B carry five marks each.*
7. *Question 6A and 6B carry five marks each.*
8. *Question 7A and 7B carry five marks each.*

Question 1

Choose the correct answer out of the four available choices given under each question. [15]

1. The fluid between the retina and the lens is called
(a) Aqueous humour
(b) Vitreous humour
(c) Choroid
(d) Sclerotic

2. Which among the following is false?
(a) A denser liquid exerts a greater upthrust
(b) Relative density has no unit
(c) Icebergs have 11/12 parts above water
(d) A body experiences a loss in weight in a liquid

3. The attractive property of a magnet is maximum at
(a) The North Pole only
(b) The South Pole only
(c) Both the poles
(d) The centre of the magnet

4. Which of the following was the first satellite launched by India?
(a) EDUSAT
(b) INSAT
(c) Bhaskara
(d) Aryabhatta

5. When an object is placed beyond 2F in front of a convex lens, the image is formed
(a) Between O and F
(b) At 2F
(c) Between F and 2F
(d) Beyond 2F

6. According to the principle of calorimetry
(a) Heat lost by a hot body is less than the heat gained by a cold body
(b) Heat lost by a hot body is more than the heat gained by a cold body
(c) Heat lost by a hot body is equal to the heat gained by a cold body
(d) None of the above

7. In a simple barometer, a vacuum is created in the tube above the mercury level. This vacuum is known as a
(a) Barometric vacuum
(b) Torricellian vacuum
(c) Aneroid vacuum
(d) Pascalian vacuum

8. What happens to the kinetic energy of a body when $3/4^{th}$ of its mass is removed and its velocity is doubled?
(a) Becomes 4 times
(b) Becomes 1/4 times
(c) Becomes 1/2 times
(d) Remains the same

9. The quantity which mains the same across all the resistances when they are connected in a series is the
(a) Current
(b) Voltage
(c) Power
(d) Heat energy

10. Who discovered that a magnetic field is developed around a current carrying conductor?
(a) Michael Faraday
(b) Hans Oersted
(c) John Fleming
(d) James Maxwell

11. A prism is said to be in minimum deviation when
(a) Angle of incidence = Angle of emergence
(b) Angle of incidence > Angle of emergence
(c) Angle of incidence < Angle of emergence
(d) Angle of incidence = 0°

12. Which among these is not true for a solid?
(a) Molecules are very tightly packed.
(b) Molecules attract one another with a strong force.
(c) It is easy to break solids as they have a strong intermolecular force.
(d) They have a definite shape and volume.

13. Which of these functions is not performed by a gold leaf electroscope?
(a) To detect a charge
(b) To differentiate between a conductor and an insulator
(c) To charge an uncharged body
(d) To identify the nature of a charge

14. The temperature of the surface of the Sun is about
(a) 1 million°C
(b) 6000°C
(c) 20 million°C
(d) 4000°C

15. The main constituent of biogas is
(a) Methane
(b) Ethylene
(c) Hydrogen and oxygen
(d) Oxygen and Ethane

Question 2

(A) Match the columns and rewrite them correctly. [5]

	Column A		**Column B**
1	Brightest planet	1	Convex lens
2	Myopia	2	A battery
3	Chemical energy to sound energy	3	Venus
4	Potential difference	4	Water
5	Concave meniscus	5	Mercury
		6	A fire cracker
		7	Concave lens
		8	volt

(B) Fill up the blanks and rewrite the sentences: [5]

1. Rainbow is produced due to _____ of white light.
2. We use water in hot bags for _____ because it will keep us warm.
3. A glass slab appears to be _____ in water than in air.
4. The _____ Pole of the Earth's magnet is closer to the geographic South Pole.
5. If the Moon is in the _____ core of the Earth's shadow, it is known as a total lunar eclipse.

Question 3

(A) State whether the following statements are True or False. Correct the false statement and rewrite it. [5]

1. A concave lens always forms an inverted image.
2. A camel can run faster in deserts than a horse.
3. Non-renewable sources of energy can never get exhausted.
4. While charging by induction, there is no loss of charge.
5. An electromagnet is a temporary magnet.

(B) Give reasons for the following. [5]

1. It takes some time to see objects in a cinema hall when we just enter it from bright sunlight.
2. Heavy trucks have 6-8 tyres.
3. In a hydroelectric power plant more electrical power can be generated if the water falls from a greater height.
4. Soaps and detergents help in cleaning clothes.
5. Land breeze is set up during the night.

Question 4

(A)

1. For which position of an object does a convex lens form a real and inverted image of the same size as that of object? Draw a labelled ray diagram to show the formation of the required image. [3]

2. What is a galaxy? Name the different kinds of galaxies. [2]

(B)

1. Identify the poles of the magnet in the figures (1) and (2) below: [2]

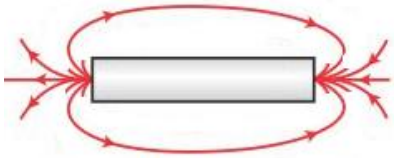


Figure 1

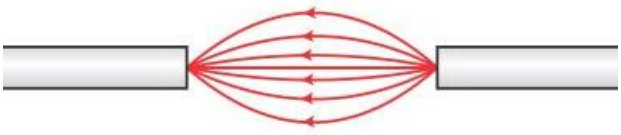


Figure 2

2. Answer the following: [3]

   (a) What is electromagnetic induction?
   (b) In what way can the magnitude of the induced current be increased?

Question 5

(A)

1. Water wets the glass surface while mercury does not. Explain. [2]
2. Give three differences between myopia and hypermetropia. [3]

(B)

1. What are the do's and dont's during a thunderstorm when you are outside the house? [3]
2. For what purposes is solar energy used? [2]

Question 6

(A)

1. Describe the advantages of high specific heat capacity of water as a coolant. [2]
2. Answer the following: [3]
   (a) What happens to the equivalent resistance and the current in a parallel circuit when more and more resistances are added?
   (b) Name the physical quantity whose unit is volt/ampere.
   (c) What is meant by potential difference between two points?

(B)

1. Write a note on tides. [2]
2. Ram throws a stone in the pond. It displaces 1.5 kg of water. Calculate the buoyant force acting on the stone ($g = 9.8\ m/s^2$). [3]

Question 7

(A)

1. 'A ray of light incident on a rectangular glass slab immersed in any medium emerges parallel to itself". Draw a labelled ray diagram to justify the statement. [2]
2. State the rules for construction of ray diagrams for a convex lens along with the ray diagram. [3]

(B)

1. How much current will an electric bulb draw from a 220 V source, if the resistance of the filament of the bulb is 1200 Ω? [2]
2. What is Pascal's law? Demonstrate it with the help of an experiment. [3]

Solution

Question 1

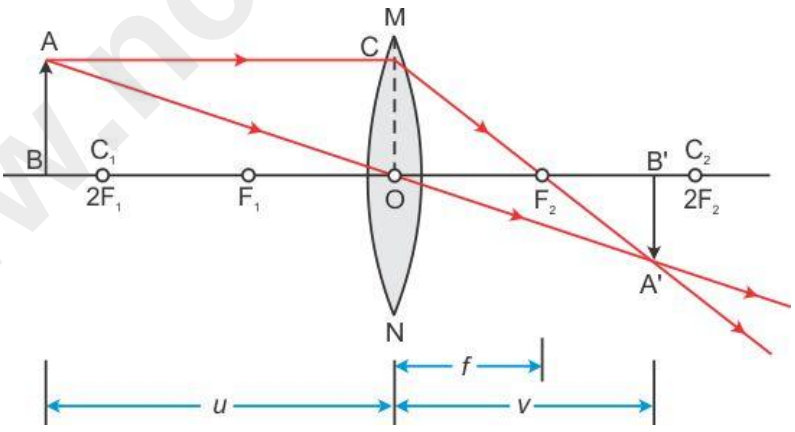
1. **(b)** Vitreous humour
   A fluid called vitreous humour is present between the lens and the retina of the eyes which keeps it wet.

2. **(c)** Icebergs have 11/12 parts above water
   It is estimated that icebergs have 11/12 parts below water.

3. **(c)** Both the poles
   The attractive property of a magnet is maximum at both the poles, i.e. the North Pole as well as the South Pole. It is the least at the centre of the magnet.

4. **(d)** Aryabhatta
   The first Indian satellite Aryabhatta was launched on April 19, 1975.

5. **(c)** Between F and 2F
   When an object is placed beyond 2F in front of a convex lens, the image is formed between F and 2F.



6. **(c)** Heat lost by hot body is equal to the heat gained by cold body
   According to the principle of calorimetry, the heat lost by a hot body is always equal to the heat gained by a cold body.

7. **(b)** Torricellian vacuum
   In a simple barometer, a vacuum is created in the tube above the mercury level. This vacuum is known as Torricellian vacuum.

8. **(d)** Remains the same

The initial kinetic energy of the body is ½mv^2

The new mass is $m-\frac{3}{4}m=\frac{1}{4}m$

The new velocity is 2v

Hence, the new kinetic energy will be

$\frac{1}{2}\left(\frac{1}{4}m\right)(2v)^2=\frac{1}{2}\times\frac{1}{4}m\times 4v^2=\frac{1}{2}mv^2$

Therefore, there is no change in the kinetic energy.

9. **(a)** Current

When resistances are connected in series, the current through them is the same, whereas the voltage, power and heat energy vary.

10. **(b)** Hans Oersted

The Dutch scientist Hans Christian Oersted discovered in 1920 that a magnetic field is produced around a current carrying conductor.

11. **(a)** Angle of incidence = angle of emergence

When the angle of incidence is equal to the angle of emergence then the prism is said to be in minimum deviation.

12. **(c)** It is easy to break solids as they have a strong intermolecular force

It is hard to break solids as the molecules attract each other with a strong force.

13. **(c)** To charge an uncharged body

A gold leaf electroscope cannot be used to charge an uncharged body. It can only be utilised to perform the other three functions given.

14. **(b)** 6000°C

The temperature of the surface of the Sun is about 6000°C.

15. **(a)** Methane

Biogas mainly contains around 45-70% methane gas.

Question 2

(A)

	Column A		Column B
1	Brightest planet	1	Venus
2	Myopia	2	Concave lens
3	Chemical energy to sound energy	3	A fire cracker
4	Potential difference	4	Volt
5	Concave meniscus	5	Water

(B)

1. Rainbow is produced due to the dispersion of white light.
2. We use water in hot bags for fomentation because it will keep us warm.
3. A glass slab appears to be lighter in water than in air.
4. The North Pole of the Earth's magnet is closer to the geographic South Pole.
5. If the Moon is in the umbral core of the Earth's shadow, it is known as a total lunar eclipse.

Question 3

(A)

1. False. A concave lens always forms an erect image.
2. True.
3. False. Non-renewable sources of energy can get exhausted if not judiciously used.
4. True.
5. True.

(B)

1. The pupil regulates and controls the amount of light entering the eye. In bright sunlight the size of the pupil is small. When we enter a cinema hall, the pupil has to expand in size due to the dim light and this takes some time. Hence, it takes some time to see objects in a cinema hall when we just enter it from bright sunlight.

2. Heavy trucks have 6-8 tyres to increase the area of contact between the tyres and the road so as to reduce the pressure on the ground.

3. In a hydroelectric power plant more electrical power can be generated if the water falls from a greater height because a greater height means larger potential energy, and this large amount of potential energy can be converted into large kinetic energy, thereby producing more power.

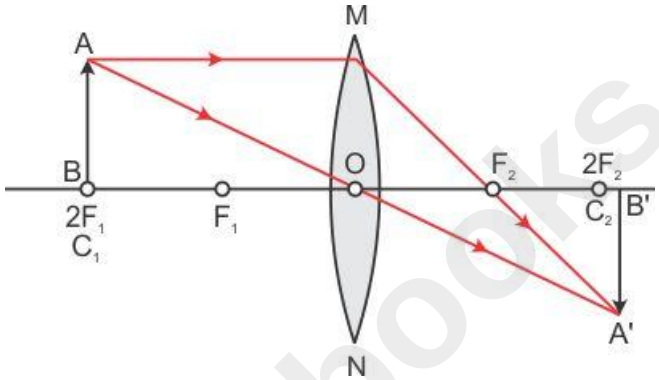
4. Soaps and detergents help in cleaning clothes because they reduce the surface tension of water, so that the water readily soaks into pores and soiled areas of the clothes.

5. During night, sand cools more rapidly than water. Hence, the air layers above water rise up and cooler land breeze moves towards the sea. This is why land breeze is set up during the night.

Question 4

(A)

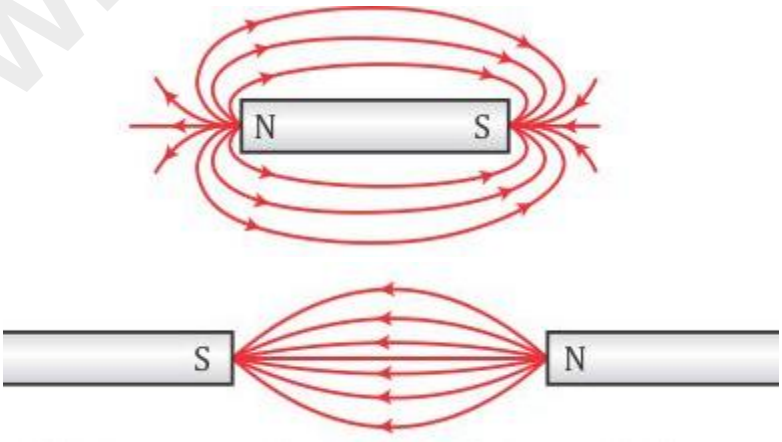
1. A convex lens forms a real and inverted image of the same size as that of the object when the object is placed at twice the focal length, i.e. at $2F_1$ of the lens.
   The ray diagram for the same is as follows:



2. A galaxy is a vast collection of stars, gas and dust bound together by gravity.
   The different types of galaxies are spiral, elliptical, irregular and starburst galaxy.

(B)

1. The field lines are directed from the North Pole to the South Pole outside the magnet. Hence, the poles can be depicted as below:



2.

(a) Electromagnetic Induction: It is the property due to which a changing magnetic field within a closed conducting coil induces an electric current in the coil.

(b) The magnitude of the induced current can be increased by:

(i) Increasing the number of turns in the coil,

(ii) Increasing the strength of the magnet, and

(iii) Increasing the relative speed between the magnet and the closed coil.

Question 5

(A)

1. The force of adhesion between the molecules of water and glass is more than the force of cohesion between the molecules. Due to this, water wets the glass surface.
   In mercury, the force of adhesion between the molecules and glass is less than the force of cohesion between the molecules. Due to this, mercury does not wet the glass surface.

2.

Myopia	Hypermetropia
1. Nearby objects are seen clearly but not distant objects.	1. Far away objects are seen clearly but not nearby objects.
2. Image is formed in front of the retina.	2. Image is formed behind the retina.
3. Can be corrected by using a diverging (concave) lens.	3. Can be corrected by using a converging (convex) lens.

(B)

1. The following are the do's and dont's to be followed during a thunderstorm, when you are outside the house: (Any 3)
   (1) Do not carry an umbrella over your head.
   (2) Do not stand near tall trees, electric poles, high-rise buildings or any metallic structure.
   (3) Take shelter around short trees.
   (4) Do not lie on the ground. You should squat low on the ground with your hands on your knees and head in between.

2. Solar energy is used for the following purposes:
   (1) For obtaining salt from water through salt pans.
   (2) For drying purposes.
   (3) For preservation of various eatables.
   (4) To get rid of moisture from the crops for harvesting.

Question 6

(A)

1. Water is used as an effective coolant by allowing it to flow in pipes around the heated parts of a machine such as the radiator in cars. This is because, water has a high specific heat capacity, and hence, for the same rise in temperature, water extracts more amount of heat.

2.

(a) Increasing the number of resistors in a parallel circuit decreases the total resistance of the circuit. With a decrease in the total resistance, the total current should increase as current and resistance are inversely proportional for a constant battery voltage.

(b) The quantity whose unit is volt/ampere is resistance.
R = V/I = volt/ampere

(c) Potential difference between any two points in an electric field is the amount of work done in bringing a unit positive charge from one point to the other.

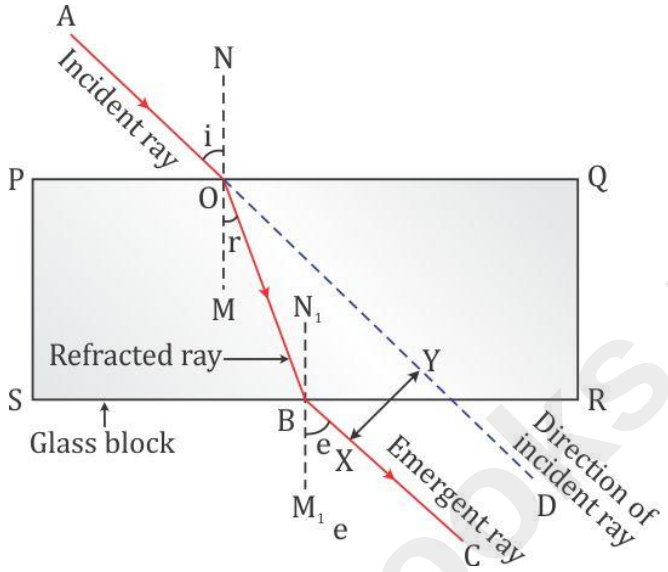
(B)

1. The water level of the sea rises or falls twice a day exactly after 12 hours and 24 minutes. This regular rise or fall of the water level of the sea is called a tide.
Tides occur due to the gravitational pull of the Moon on the surface of the Earth.
At any place on the seashore, a high tide occurs only after 12 hours and 24 minutes while the time interval between a high tide and a low tide is 6 hours and 12 minutes.
High tides can help generate electricity and heaps of garbage near the shore are removed due to high tides.
2. Mass of the water displaced by the stone, m = 1.5 kg
We know that
Weight = Mass × Acceleration due to gravity = mg
∴Weight of the water displaced = 1.5 × 9.8 = 14.7 N
Now, in accordance with the Archimedes' Principle, when an object is wholly or partially immersed in a liquid, it experiences a buoyant force or upthrust which is equal to the weight of the liquid displaced by the object.
Hence, the buoyant force acting on the stone is 14.7 N.

Question 7

(A)

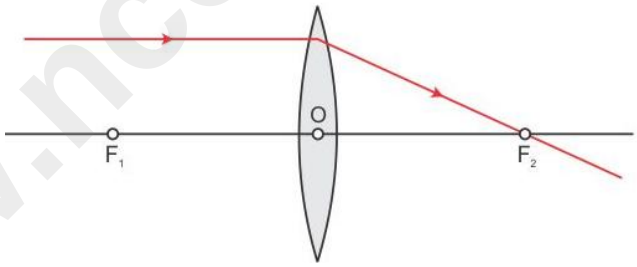
1. The ray diagram for the glass block is shown below.



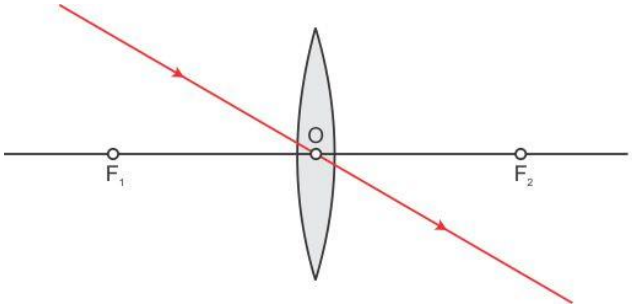
From the figure, we can see that the incident ray is parallel to the emergent ray but with a lateral displacement.

2. There are three rules to be followed while drawing a ray diagram for a convex lens:

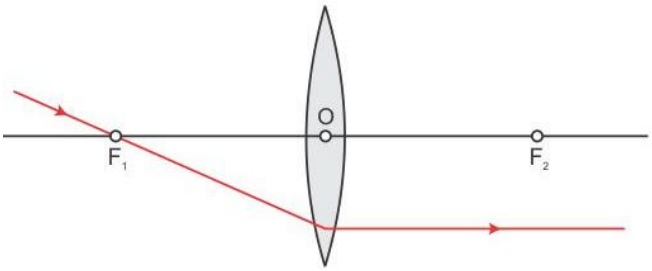
(1) Rule 1: A light ray incident parallel to the principal axis converges at the focal point.



(2) Rule 2: A ray passing through the optical centre of the lens remains undeviated irrespective of its inclination on the principal axis.



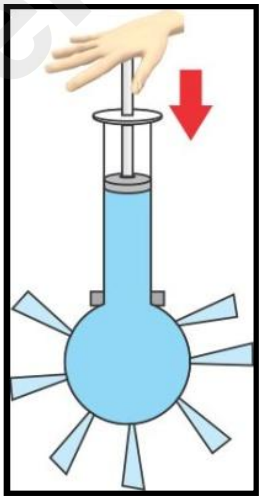
(3) Rule 3: A ray of light which comes through the focus becomes parallel to the principal axis after passing through the lens.



(B)

1. Given: V = 220 V; R = 1200 Ω
   From Ohm's law, the current is given as
   $$I = \frac{V}{R} = \frac{220}{1200} = 0.18 \text{ A}$$

2. Pascal's law: The pressure exerted at any point on an enclosed liquid is transmitted equally and undiminished in all directions.
   Experiment:
   (1) Consider a glass tube with a piston at one end and a round bulb (flask) with some holes at the other end.



   (2) Fill the apparatus with water and then press the piston. The water comes out of the holes with equal pressure.
   (3) This demonstrates that liquid pressure is transmitted and undiminished in all directions.