ICSE Board
Physics
Sample Paper – 5

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. If the number of turns in a solenoid is increased, the strength of the magnetic field produced will
(a) Decrease
(b) Remain the same
(c) Increase
(d) Increase first and then decrease

2. Buoyant force exerted by a fluid on a body is equal to the
(a) Mass of the body
(b) Weight of the body
(c) Apparent loss of weight of the body
(d) None of these

3. Lightning is caused in the sky due to
(a) Two appositively charged clouds
(b) Two similarly charged clouds
(c) One neutral and one charged cloud
(d) None of these

4. The specific heat of water is
(a) 42000 $Jkg^{-1}C^{-1}$
(b) 4200 $Jkg^{-1}C^{-1}$
(c) 420 $Jkg^{-1}C^{-1}$
(d) 4250 $Jkg^{-1}C^{-1}$

5. A ray of light going from an optically rarer medium to an optically denser medium
(a) Remains undeviated
(b) Bends towards the normal
(c) Bends away from the normal
(d) None of these

6. Time taken by light to reach the Earth from the Sun is
(a) 18 minutes and 10 seconds
(b) 8 minutes and 10 seconds
(c) 10 minutes and 16 seconds
(d) 16 minutes and 10 seconds

7. Which of these is a renewable source of energy?
(a) Coal
(b) Petroleum
(c) Solar energy
(d) L.P.G

8. The direction of magnetic lines of force due to a current carrying straight conductor when the electric current flows upwards is
(a) Clockwise
(b) Anticlockwise
(c) Upwards
(d) Downwards

9. For a person suffering from hypermetropia, the image of a nearby object is focused _____ the retina.
(a) Behind
(b) In front of
(c) On
(d) None of these

10. Sea breeze occurs due to a fall in pressure over the surface of
(a) Air
(b) Water
(c) Land
(d) Sea

11. The atmospheric pressure at sea level is
(a) 76 cm of mercury column
(b) 70 cm of mercury column
(c) 80 cm of mercury column
(d) 66 cm of mercury column

12. When light is dispersed by a prism, the colour least dispersed is
(a) Violet
(b) Indigo
(c) Yellow
(d) Red

13. The direction of conventional current is from
(a) Higher potential to lower potential
(b) Lower potential to higher potential
(c) Both a and b
(d) None of the above

14. Earth behaves like a huge bar magnet with its Magnetic North Pole situated near the
(a) Geographical South Pole
(b) Geographical North Pole
(c) Geographical East Pole
(d) Geographical West Pole

15. Which of these is not obtained from petroleum?
(a) Diesel
(b) CNG
(c) Biogas
(d) Kerosene

Question 2

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

	Column A		**Column B**
1	Latent heat of fusion of ice	1	3×10^8 m/s
2	Like charges	2	Aryabhatta
3	Velocity of light	3	Attraction
4	Artificial satellite	4	Dispersion
5	Rainbow	5	336000 J/gm
		6	Repulsion
		7	300000 m/s

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

1. Steam from within the Earth can be used to generate electricity. This is called _____ energy.
2. In a step up transformer, the _____ coil is thicker; less heavily insulated and has less number of turns.
3. The pressure exerted by a solid is directly proportional to its _____ and inversely proportional to its _____.
4. When an ebonite rod is rubbed with fur, the charge acquired by the ebonite rod is _____.
5. Between air and water, _____ is the denser medium.

Question 3

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

1. The distance between the focus and optical centre of a lens is called its focal length.
2. An electromagnet is a permanent magnet.
3. Human body is a good conductor of electricity.
4. Atmospheric pressure decreases as we move from sea level to higher altitudes.
5. Evaporation needs an external source of heat.

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

1. A concave lens is used in spectacles for the correction of myopia.
2. The Sun appears to move from the east to the west.
3. A comb rubbed on dry hair attracts small bits of paper.
4. Water has a tendency to form spherical droplets.
5. An ice-cube is used for cooling a drink.

Question 4

(A)

1. What is an electromagnet? How is it different from a permanent magnet? State any two uses of an electromagnet. [3]
2. State the laws of refraction of light [2]

(B)

1. Why are astronauts made to wear special suits? [2]
2. Give three observations in our daily life where the principle of evaporation produces cooling. [3]

Question 5

(A)

1. What is nuclear energy? State two precautions to be taken care in nuclear power plants. [2]
2. State two differences between charging by conduction and charging by induction[3]

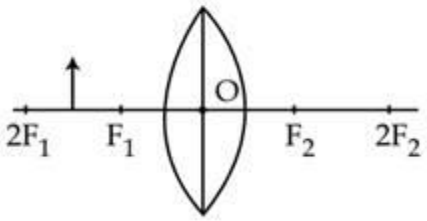
(B)

1. State the 'right hand thumb' rule to find the direction of the magnetic field around a current-carrying straight conductor. Illustrate using a diagram. [3]
2. State the law of floatation. Why does ice float on the surface of water? [2]

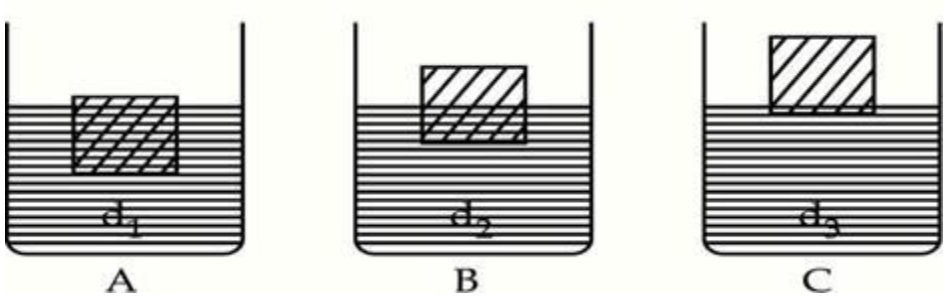
Question 6

(A)

1. Complete the diagram in your answer book and write the nature of the image formed. [2]



2. State Archimedes' principle. The following figure shows three identical blocks of wood floating in three different liquids A, B and C of densities d_1, d_2 and d_3 respectively. Which of these has the highest density? Give reasons to justify your answer. [3]



(B)

1. Define- 'specific latent heat of fusion'. Calculate the specific latent heat of fusion of ice when 200 g at 0°C is converted to water by supplying 67200 J of heat. [2]
2. Differentiate between the following: [3]
   (a) Concave and convex lens
   (b) Solids and liquids

Question 7

(A)

1. Distinguish between galaxy and constellation. On which day does a lunar eclipse always occur? [3]
2. State any three assumptions of the kinetic theory. [2]

(B)

1. State any four precautions which one should take while using energy in everyday life. [2]
2. How do you charge a body by induction? Explain with the help of an example. [3]

Solution

Question 1

1. **(c)** increase
   If the number of turns in a solenoid is increased, the strength of the magnetic field produced will increases.

2. **(c)** Apparent loss of weight of the body
   Buoyant force exerted by a fluid on a body is equal to the apparent loss of weight of the body.

3. **(a)** Two oppositively charged clouds
   Lightning is caused in the sky due to two oppositely charged clouds.

4. **(b)** 4200 $Jkg^{-1}C^{-1}$
   The specific heat of water is 4200 $Jkg^{-1}C^{-1}$.

5. **(b)** Bends towards the normal
   A ray of light travelling from an optically rarer medium to an optically denser medium bends towards the normal.

6. **(b)** 8 minutes and 10 seconds
   Time taken by light to reach the Earth from the Sun is 8 minutes and 10 seconds.

7. **(c)** Solar energy
   Solar energy is a renewable source of energy.

8. **(b)** Anticlockwise
   The direction of magnetic lines of force due to a current carrying straight conductor when the electric current flows upwards is anticlockwise.

9. **(a)** Behind
   For a person suffering from hypermetropia, the image of a nearby object is focused behind the retina.

10. **(c)** Land
    A sea breeze occurs when there is a fall in pressure over the surface of land.

11. (a) 76 cm of mercury column

The atmospheric pressure at sea level is 76 cm of mercury column.

12. (d) Red

When light is dispersed by a prism, the colour which is dispersed the least is red.

13. (b) Lower potential to higher potential

The direction of conventional current is from low to high potential.

14. (a) Geographical South Pole

Earth behaves like a huge bar magnet with its Magnetic North Pole situated near the geographical South Pole.

15. (c) Biogas

Biogas is not obtained from petroleum. All others are obtained from petroleum.

Question 2

(A)

	Column A		**Column B**
1	Latent heat of fusion of ice	1	336000 J/gm
2	Like charges	2	Repulsion
3	Velocity of light	3	3×10^8 m/s
4	Artificial satellite	4	Aryabhatta
5	Rainbow	5	Dispersion

(B)

1. Steam from within the Earth can be used to generate electricity. This is called geothermal energy.
2. In a step up transformer, the primary coil is thicker; less heavily insulated and has less number of turns.
3. The pressure exerted by a solid is directly proportional to its weight and inversely proportional to its surface area.
4. When an ebonite rod is rubbed with fur, the charge acquired by the ebonite rod is negative.
5. Between air and water, water is the denser medium.

Question 3

(A)

1. True.
2. False. An electromagnet is a temporary magnet.
3. True.
4. True.
5. False. Evaporation does not need an external source of heat.

(B)

1. A concave lens is used in spectacles for the correction of myopia because it enables the formation of image of a far-off object at the retina.
2. The Earth rotates from west to east and hence the Sun appears to move from east to west.
3. When a comb is rubbed on dry hair, it attracts small bits of paper because the charge acquired on the comb is opposite to that of the charge on the bits of paper.
4. Due to surface tension, molecules of water tend to acquire the smallest possible area which is a sphere.
5. 1 g of ice takes away 336 J of heat from the drink and melts into water at 0°C. Hence the drink looses heat and cools down.

Question 4

(A)

1. When a piece of metal like soft iron is placed inside a solenoid and current is passed through it, it gets magnetised. The magnet so formed is called an electromagnet. An electromagnet is a temporary magnet. Its polarity can be reversed by reversing the direction of current, whereas the polarity of a permanent magnets is fixed. Uses:-
   i. They are used in the separation of magnetic substances from non magnetic impurities.
   ii. They are used in electrical appliances such as electric bell, electric motor, electric fan etc.

2. The laws of refraction of light are:
   i. The incident ray, the refracted ray and the normal lie on the same plane.
   ii. For a given pair of media, the ratio of the sine of angle of incidence to the sine of angle of refraction is a constant. i.e.

   $$\frac{\sin i}{\sin r} = \text{constant } \mu$$

   This is also known as Snell's law.

(B)

1. Astronauts go beyond the limit of atmosphere where the pressure is so low that the pressure on their bodies would be negligible. So astronauts are made to wear special suits to protect themselves from the adverse effects of low pressure at higher altitudes. These suits maintain a pressure equal to the atmospheric pressure.

2. Following are some daily life observations where the principle of evaporation produces cooling:
   i. During summer, we use earthen pots to get cool water.
   ii. A desert cooler blows cold air.
   iii. On a hot day, we feel relieved under a fan after perspiring.

Question 5

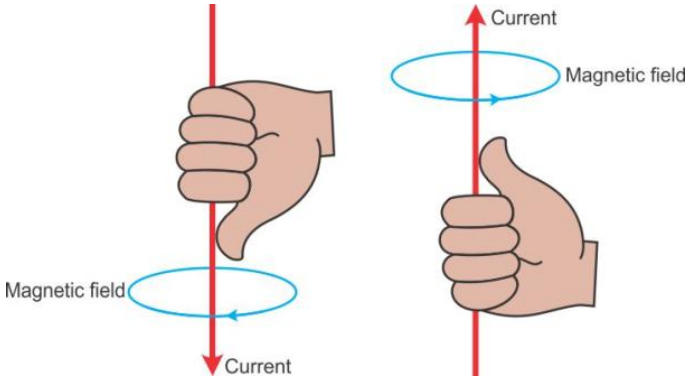
(A)

1. The energy stored in the nucleus of some heavy elements like uranium and plutonium, is called nuclear energy. Nuclear energy is released during nuclear reactions like nuclear fission and nuclear fusion.
   Two precautions to be taken in nuclear power plants are:
   i. There should be proper arrangements for the disposal of waste products from nuclear power plants.
   ii. The radioactive elements used in nuclear reactors should be kept in thick lead walled containers.

2. The differences between the two methods of charging a body are as follows:
   i. Charging a body by conduction is done by touching a charged body, whereas no touching is needed to charge a body by induction.
   ii. While charging by conduction, charge moves from a charged body to an uncharged body, whereas while charging by induction no charge flows from the charged body to the uncharged body.
   iii. Some charge is lost while charging by conduction, whereas there is no loss in any charge while charging by induction.

(B)

1. According to right hand thumb rule, hold the current carrying straight conductor in your right hand such that the thumb points towards the direction of current. Then, the fingers of the right hand wrap around the conductor in the direction of the field lines of the magnetic field.

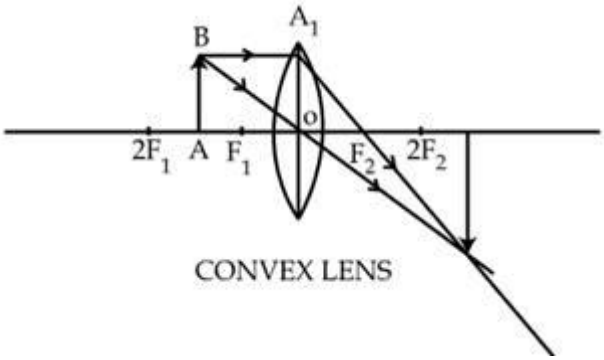


2. The law of floatation states that when the weight of a body is equal to the weight of the liquid displaced by it then the body floats in the liquid.
   The density of ice is less than the density of water, so it experiences an upthrust greater than its own weight. Hence ice floats on the surface of water.

Question 6

(A)

1.



The nature of the image formed - Real, inverted and enlarged.

2. Archimedes' principle states that when an object is immersed wholly or partially in a fluid, it experiences an upward force which is equal to the weight of the fluid displaced by it.
   Liquid C has the highest density. Because upthrust $\propto$ density of liquid, if the density of liquid is more, upthrust is greater and the object immersed in it will sink less.

(B)

1. The specific latent heat of fusion is the quantity of heat required to convert unit mass of a substance from solid to liquid at its melting point without any change in its temperature and it is denoted by L_f.
   Q = mL
   Thus, L = Q/m
   L = 67200/200 = 336 J/g

2.

(a)

Convex Lens	Concave Lens
It is thicker at the centre and thin at the edges.	It is thinner at the centre and thicker at the edges.
It converges rays of light falling on it.	It diverges rays of light falling on it.
Image formed may be real or virtual.	Image formed is always virtual and erect.

(b)

Solids	Liquids
The molecules are very tightly packed.	The molecules are less tightly packed than solids.
They have a definite shape and volume due to the fixed position of molecules.	They have a definite volume at a particular temperature but not a definite shape.
The intermolecular forces are strong.	The intermolecular forces are not so strong.

Question 7

(A)

1.

Galaxy	Constellation
It is a collection of stars, dust and gas	It is a group of stars.
It does not form any particular pattern. Galaxies can be elliptical, spiral and irregular.	It forms the shape of an animal or any other recognizable object.
There are around 10^{11} galaxies in the universe.	There are only 88 constellations known so far.
Example: Milky Way	Example: Orion

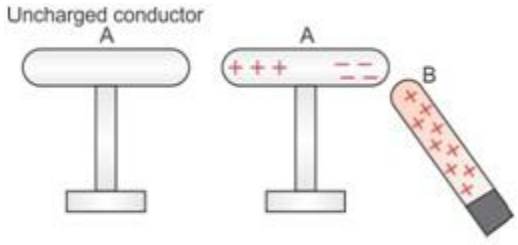
A lunar eclipse always occurs on a full moon day when the Sun, the Earth and the moon lie in the same line.

2. The assumptions of kinetic theory are as follows:
   i. Molecules are in a state of continuous motion and hence they possess kinetic energy.
   ii. The kinetic energy of molecules increases with increase in temperature and decreases with decrease in temperature.
   iii. Molecules of matter always attract each other and this force is known as intermolecular force of attraction.
   iv. The force between molecules of similar kind is called force of cohesion and that between dissimilar molecules is called force of adhesion

(B)

1.
   i. Use of fossil fuels like coal, petroleum and natural gas must be done only when there is no alternative energy.
   ii. Renewable sources of energy like solar energy, wind energy, hydro-electric energy, etc. must be used more than the non-renewable sources.
   iii. Use of public transport or sharing vehicles (car pooling) must be done to save fuel.
   iv. More trees must be planted instead of cutting them down.

2. When an uncharged body is placed near a charged body without touching it, the nearer end of the uncharged body acquires a charge of opposite nature as compared to the charge on a charged conductor. This process is known as charging by induction.



Example:
An uncharged conductor 'A' is mounted on an insulating stand and a charged conductor 'B' is brought near it, because of which an opposite charge develops on the near end of the conductor 'A'.
At the same time, the same kind of charge as of 'B' is developed on the farther end of 'A'.
Thus, if charge on the conductor 'B' is positive then the charge developed on the nearer end of 'A' is negative and the charge developed on the farther end of 'A' is positive.