10th Class 2019

Physics	Group-I	Paper-II
Time: 15 Minutes	(Objective Type)	Max. Marks: 12

Note: Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink in the answer-book. Cutting or filling two or more circles will result in zero mark in that question.

1-1- **To measure the value of current flowing in a circuit which device is used:**

(a) Galvanometer (b) Ammeter √
(c) Voltmeter (d) None of these

2- **The brain of any computer system is:**

(a) Monitor (b) Memory card
(c) Floppy disc (d) C.P.U √

3- **To correct the defect of vision farsightedness which type of lens is used:**

(a) Converging √ (b) Diverging
(c) Both (d) None of these

4- **The process by which electrons are emitted by a hot metal surface is known:**

(a) Boiling
(b) Evaporation
(c) Thermionic emission √
(d) Conduction

5- **When U-92 ejects a beta particle how many protons will be in the remaining nucleus:**

(a) 93 (b) 89
(c) 91 √ (d) 90

6- **If the mass of the bob of the pendulum is increased by a factor of 3, the time period of the pendulum's motion will be:**

(a) Increased by factor of two
(b) Remain unchanged √
(c) Decreased by factor of two
(d) Decreased by factor of four

7- **The combined resistance of two identical resistors connected in series is 8 Ohm. Their combined resistance in parallel arrangement will be:**

(a) 4 Ω (b) 2 Ω √
(c) 8 Ω (d) 12 Ω

8- **We can distinguish between a shrill and grave sound by its:**

(a) Loudness (b) Amplitude
(c) Area (d) Pitch √

9- **The turn ratio of a transformer is 10, it means:**

(a) $I_S = 10\ I_P$ (b) $N_S = \frac{N_P}{10}$ √
(c) $V_S \frac{V_P}{10}$ (d) $N_S = 10\ N_P$

10- **S.I unit of capacitance of a capacitor is:**

(a) V (b) A
(c) F √ (d) N

11- **To get virtual image from a convex lens the object is kept:**

(a) On F (b) Between F and 2F
(c) Between O and F √ (d) Beyond 2F

12- **Typical value of the voltage and current used for thermionic emission from tungsten filament is:**

(a) 6 V and 0.3 A √ (b) 12 V and 0.3 A
(c) 12 V and 3 A (d) 6 V and 3 A

10th Class 2019

Physics	Group-I	Paper-II
Time: 1.45 Hours	(Subjective Type)	Max. Marks: 48

(Part-I)

2. Write short answers to any Five (5) questions: (10)

(i) Write down two characteristics of simple harmonic motion.

Ans Two characteristics of simple harmonic motion are:

1. A body executing simple harmonic motion always vibrates about a fixed position.
2. Its acceleration is always directed towards the mean position.

(ii) Prove that: $v = f\lambda$

Ans The velocity of wave is defined as:

$$\text{Velocity} = \frac{\text{distance}}{\text{time}}$$

$$v = \frac{d}{t}$$

If time taken by the wave in moving from one point to another is equal to its time period T, then the distance covered by the wave will be equal to one wavelength, hence we can write

$$v = \frac{\lambda}{T}$$

But time period T, is reciprocal of the frequency f,

i.e., $T = \frac{1}{f}$

Hence proved

$$v = f\lambda$$

(iii) What do you know about Ripple Tank?

Ans Ripple tank is a device to produce water waves and to study their characteristics.

This apparatus consists of a rectangular tray having glass bottom and is placed nearly half meter above the surface of a table.

(iv) What is tuning fork?

Ans A two-pronged steel device used by musicians, which vibrates when struck to give a note of specific pitch.

(v) Write two uses of ultrasound in medical field.

Ans Two uses of ultrasound are:

1. Powerful ultrasound is now being used to remove blood clots formed in arteries.
2. It can also be used to get pictures of thyroid gland for diagnosis purposes.

(vi) State Lenz's Law.

Ans **Lenz's law:**

The direction of an induced current in a circuit is always such that it opposes the cause that produces it.

(vii) What is difference between step-up and step-down transformer?

Ans If the secondary voltage is larger than the primary voltage, the transformer is called a step-up transformer.

If the secondary voltage is smaller than the primary voltage, that is called step-down transformer.

(viii) What is the function of relay?

Ans Relays are switches that open and close circuits electromechanically or electronically. Relays control one electrical circuit by opening and closing the contacts in another circuit.

3. Write short answers to any Five (5) questions: (10)

(i) Define power of lens and write its unit.

Ans "The reciprocal of focal length of a lens in metres is known as **power of lens**."

Unit:

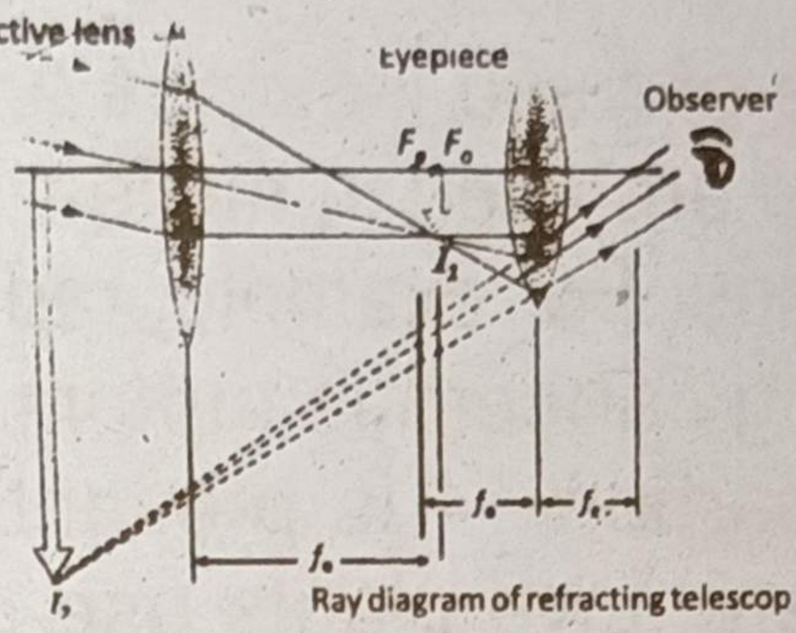
SI unit of power of a lens is Dioptre. It is denoted by D.

Dioptre:

It is power of lens whose focal length is one metre.

(ii) Draw the ray diagram of refracting telescope.

Ans



Ray diagram of refracting telescop

(iii) How can you define optical fibre?

Ans An optical fibre is made by a highly transparent fine strand of glass or plastic coated or cladded with another type of glass whose refractive index is less than the inner tube.

(iv) What is meant by compact disc?

Ans A molded plastic disc containing digital data that is scanned by a laser beam for the reproduction of recorded sound or other information is called compact disc.

(v) Define telecommunication.

Ans "The method that is used to communicate information to far-off places instantly is called telecommunication."

(vi) Define piracy and floppy disc.

Ans **Piracy:**

The illegal duplication of copyrights materials like books, papers and software etc. is called piracy.

Floppy disc:

A floppy disc is a small magnetically sensitive, flexible plastic wafer housed in a plastic case. It is inexpensive, convenient and reliable storage device.

(vii) What do you mean by background radiations?

Ans Radiations present in the atmosphere is due to the different radioactive substances are called background

radiations. Everywhere in rocks, soil, water and air of our planet are traces of radioactive elements. This natural radiation is called background radiation.

(viii) Write down two uses of radio isotopes.

Ans The two uses of radio isotopes are:

1. Radio isotopes are used in nuclear medicines for curing various diseases. For example, radioactive cobalt-60 is used for curing cancerous tumors and cells.
2. Radioactive carbon-14 is present in small amount in the atmosphere. Live plants use carbon dioxide and, therefore, become slightly radioactive.

4. Write short answers to any Five (5) questions: (10)

(i) Describe the construction of electroscope.

Ans Electroscope consists of a brass rod with a brass disk at the top and two thin leaves of gold foil hanging of the bottom. The rod passes through an insulator that keep the rod in place. Charges can move freely from the disk to the leaves through the rod. A thin aluminium foil is attached on the lower position of the inside of the jar. Usually, the aluminium foil is grounded by connecting a copper wire. This protects the leaves from the external electrical disturbances.

(ii) Differentiate between ohmic and non-ohmic material.

Ans Materials that obey's Ohm's law, and hence a constant resistance over a wide range of voltages, are said to be ohmic. Materials having resistances that changes with voltage or current are non-ohmic.

(iii) Define the S.I unit of capacitance of a capacitor.

Ans "If one columb of charge given to the plates of a capacitor produces a potential difference of one volt between the plates of the capacitor then its capacitance would be one Farad."

S.I unit of capacitance is Farad (F).

(iv) **What is the difference between conductors and insulators?**

Ans The substances which allow electric current ot pass through them are called **conductors**. For example, metals like iron, copper, sliver, etc.

The substances through which electric current cannot flow through them are called **insulators**. For example, glass, wood, plastic, fur, etc.

(v) **Define specific resistance of a substance. Also write its S.I unit.**

Ans The specific resistance or resistivity may be defined as "the total resistance between opposite faces of two end of that materials."

The S.I unit of specific resistance is ohm-meter (Ωm).

(vi) **For which purpose circuit breaker is used in circuits?**

Ans The circuit breaker is used in circuit as a safety device in the same way as a fuse.

(vii) **Describe the function of deflecting plates in cathode ray oscilloscope.**

Ans After leaving the electron gun, the electron beam passes between a pair of horizontal plates. A potential difference applied between these plates deflects the beam in a vertical plane. This pair of plates provides the y-axis or vertical movement of the spot on the screen. A pair of vertical plates provides the x-axis or horizontal movement of the spot on the screen.

(viii) **Describe the uses of cathode ray oscilloscope.**

Ans Cathode-ray oscilloscopes are used:

1. In the display terminals of computers.
2. In picture tubes of T.V sets.

(Part-II)

NOTE: Attempt any Two (2) questions.

Q.5.(a) State the reflection of light and explain laws of reflection. **(4)**

Ans **Reflection of Light:**

Reflection of light is illustrated in the following Fig. When a ray of light from air along the path AO falls on a plane mirror M, it is reflected along the path OB. The ray AO is called incident ray while the ray OB is called reflected ray. The angle between incident ray AO and normal N, *i.e.*, ∠ AON is called the angle of incidence represented by i. The angle between the normal and the reflected ray OB, *i.e.*, ∠ NOB is called angle of reflection represented by r.

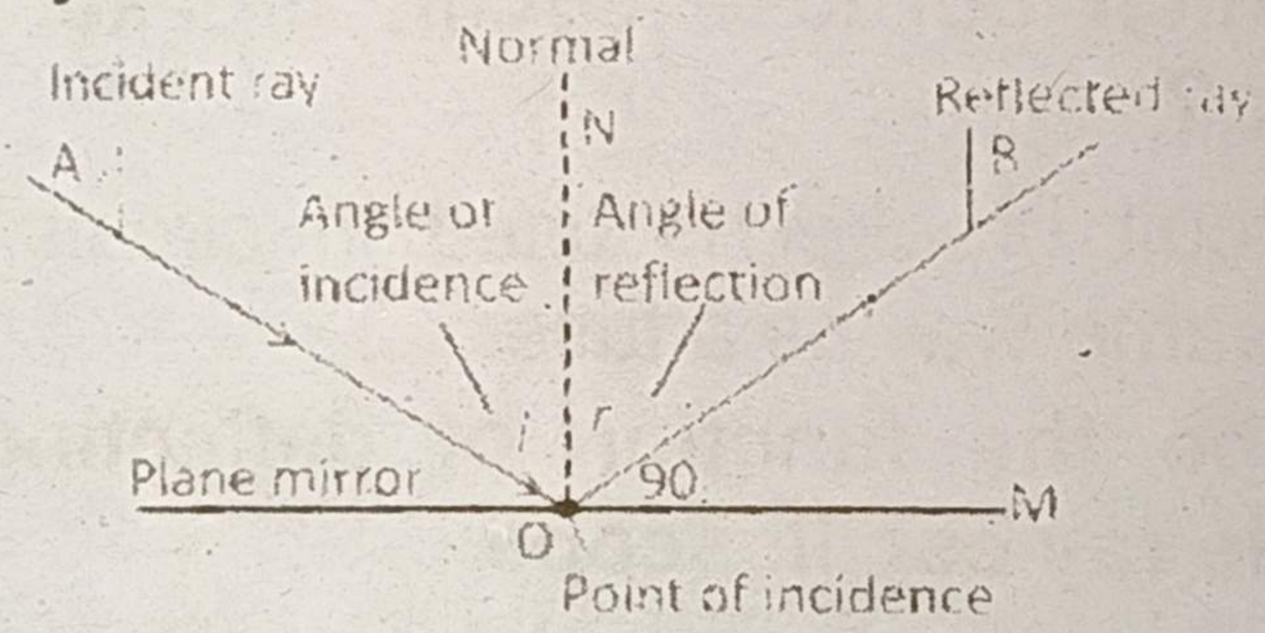


Fig. Reflection of light.

So phenomenon of Reflection is:

When light travelling in a certain medium falls on the surface of another medium, a part of it turns back in the same medium.

Laws of Reflection:

(i) The incident ray, the normal, and the reflected ray at the point of incidence all lie in the same plane.

(ii) The angle of incidence is equal to the angle of reflection *i.e.*, i = r.

(b) A doctor counts 72 heartbeats in one minute. Calculate the frequency and period of the heartbeats. **(5)**

Ans Given Data:

Number of counts $n = 72$

Time $t = 1 \text{ min.} = 60 \text{ sec}$

$$f = \frac{\text{number of beats}}{\text{time}}$$

Putting values, we get

$$f = \frac{72}{60} = 1.2 \text{ Hz}$$

And $fT = 1$

$$T = \frac{1}{f}$$

$$T = \frac{1}{1.2} = 0.83 \text{ sec}$$

Q.6.(a) Explain parallel combination of resistors with the help of circuit diagram. (4)

Ans Parallel Combination:

In parallel combination, one end of each resistor is connected with positive terminal of the battery while the other end of each resistor is connected with the negative terminal of the battery as shown in the following Fig. Therefore, the voltage is same across each resistor which is equal to the voltage of the battery *i.e.*,

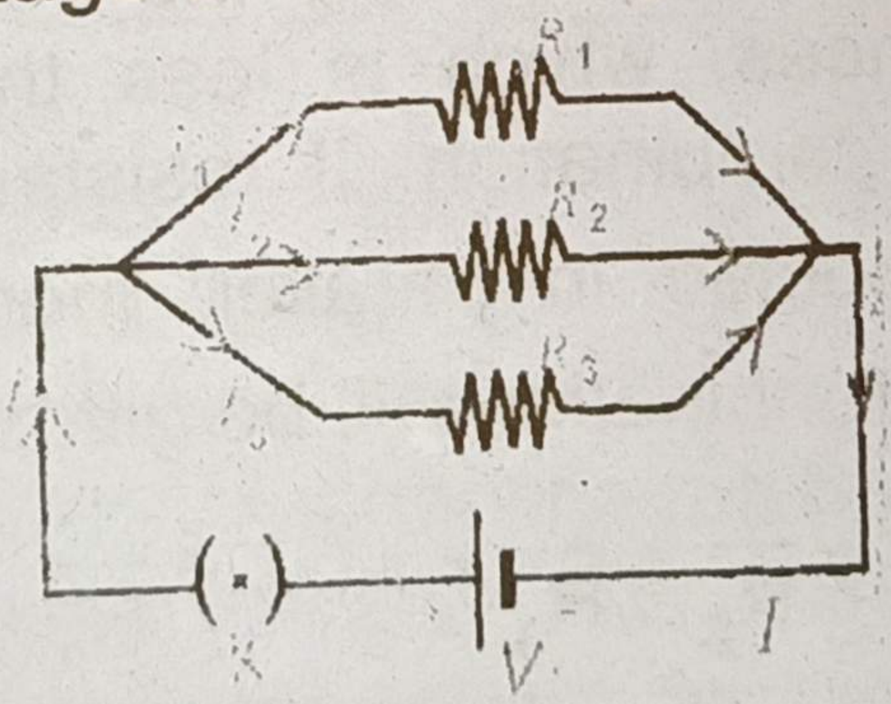


Fig. Three resistors in parallel combination.

$$V = V_1 = V_2 = V_3$$

Equivalent Resistance of Parallel Circuit:

In parallel circuit, the total current is equal the sum of the currents in various resistance *i.e.*,

$$I = I_1 + I_2 + I_3 \quad (1)$$

Since the voltage across each resistance is V, so by Ohm's law

$$I_1 = \frac{V}{R_1}, \quad I_2 = \frac{V}{R_2} \quad \text{and} \quad I_3 = \frac{V}{R_3}$$

Thus, (1) becomes

$$I = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3}$$

$$I = V\left(\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}\right) \qquad (2)$$

We can replace the combination of resistors with a single resistor called equivalent resistance R_e such that the same current passes through the circuit. From Ohm's law, $I = \frac{V}{R}$. Thus, equation (2) becomes

$$\frac{V}{R_e} = V\left[\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}\right]$$

$$\frac{1}{R_e} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \qquad (3)$$

Thus, the reciprocal of equivalent resistance of a parallel combination is sum of the reciprocals of the individual resistances, which is less than the smallest resistance of the combination. If resistances R_1, R_2, R_3, ..., R_n are connected in parallel, then the equivalent resistance of the combination will be given by

$$\frac{1}{R_e} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \ldots\ldots + \frac{1}{R_n}$$

(b) Two point charges $q_1 = 10\ \mu C$ and $q_2 = 5\ \mu C$ are placed at a distance of 150 cm. What will be the Coulomb's force between them? Also find the direction of the force. (5)

Ans Given data:

Let Charges are $q_1 = 10\ \mu C$

$$q_1 = 10 \times 10^{-6} C$$

$q_2 = 5\ \mu C \quad q_2 = 5 \times 10^{-6} C$

Placed at distance $r = 150\ cm \quad r = 1.50\ m$

And in S.I units:

$$1\ \mu C = 10^{-6} C$$

$$1\ m = 100\ cm$$

$$k = 9 \times 10^9\ Nm^2C^{-2}$$

Coulomb's law,

$$F = k\frac{q_1 q_2}{r^2}$$

By putting values, we get

$$F = (9 \times 10^9)\frac{10^{-5} \times 5 \times 10^{-5}}{(1.5)^2}$$

$$F = \frac{9 \times 5 \times 10^{9-10}}{2.25} = \frac{4.5}{2.25}$$

$$F = 2\ N$$

The changes are same, so there will be repulsion between the charges.

Q.7.(a) What is electron gun? Explain the process of thermionic emission. (4)

Ans Electron Gun:

The electron gun consists of an electron source which is an electrically-heated cathode that ejects electrons. Electron gun also has an electrode called grid G for controlling the flow of electrons in the beam. The grid is connected to a negative potential. The more negative this potential, the more electrons will be repelled from the grid and hence fewer electrons will reach the anode and the screen. The number of electrons reaching the screen determines the brightness of the screen. Hence, the negative potential of the grid can be used as a brightness control. The anode is connected to positive potential and hence is used to accelerate the electrons. The electrons are focused into a fine beam as they pass through the anode.