Pre Board Assessment - January 2025

Class - 12

Subject - Physics

[Time allowed: 3 hours]   [Maximum Marks: 70]

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General Instructions:

1. There are 35 questions in all.

2. All questions are Compulsory.

3. This question paper is divided into five sections: A, B, C, D and E.

4. Section-A consists of eighteen (1-18) objective type questions each of 1 mark.

5. Section-B consists of seven (19-25) very short answer type questions each of 2 marks.

6. Section-C consists of five (26-30) short answer type questions each of 3 marks.

7. Section-D consists of two (31-32) case study type questions each of 4 marks.

8. Section-E consists of three (33-35) long answer type questions each of 5 marks.

9. There is no overall choice however an internal choice has been provided in Section B, C, D and E. You have to attempt only one of the given choices in such questions.

10. Use of calculator is not permitted.

SECTION-A Objective Type Question   (1 Mark Each)

1. How many Electrons make 1 Coulomb of

(a) 6.25×10^{18}

(b) 6.25×10^{28}

(c) 6.25×10^{08}

(d) None of the given

2. What is the SI unit of electric flux?

(a) Weber

(b) Tesla

(c) Henry

(d) Joule

3. Kirchhoff's fire rule at a junction in an electric network, deals with conservation of:

a) Energy

b) Charge

c) Moment

d) Both energy & charge.

4. The straight conductors carrying current in same direction and held parallel will………. each other.

(a) Attract

(b) Repel

(c) not interact with

(d) None of these

5. The relation between magnetic susceptibility and relative permeability μ_r of a magnetic material is!

a) $\mu_r = 1 + x$

b) $\mu_r = 1 + x^2$

c) $\mu_r = 1/x$

d) $\mu_r = 1 - x^2$

6. SI unit of Inductance is.

(a) Farad

(b) Ohm

(c) Henry

(d) None of these

7. Which waves are used in water sterilization

(a) Infrared

(b) Ultra Voilet

(c) Microwaves

(d) None of the given

8. The ratio of intensities of two waves is 25:1. What is the ratio of their amplitudes?

(a) 5:1

(b) 25:1

(c) 1:5

(d) 1:25

9. What is the nature of an image formed by a concave mirror when the object is placed between its focus and centre of curvature?

(a) Virtual and erect

(b) Real and inverted

(c) Real and erect

(d) Virtual and inverted

10. The electrostatic forces are ……………… in nature.

11. The susceptibility of a diamagnetic substance is ……………….

12. The shape of wavefront due to a point source will be …………….

13. Write expression for distance of closest approach.

14. Relate mass number and nuclear radius.

15. Name the majority charge carriers in p – type semiconductor

Directions (16-18): Two statements are given one labelled Assertion (A) and other labelled Reason (R). Select the correct answer codes given below.

(a) Both A and R are true and R is the correct explanation of A.

(b) Both A and R are true and R is not the correct explanation of A.

(c) A is true abut R is false.

(d) A is false but R is also false

16. **Assertion(A):** With increase in frequency of incident radiation, the Kinetic Energy of eject electrons increases.

   Reason(R): The Kinetic Energy of ejected electron is directly proportional to frequency of incident radiation.

17. **Assertion A:** Light travels faster in glass than in air

   Reason R: Air is denser than glass.

18: **Assertion(A):** Convex lenses are converging lenses.

   Reason(R): Convex lenses always produce real images.

Section B: Very Short Answer Questions (2 Marks Each)

19: Derive a relation between current & drift speed

                    OR

   What are the limitations of Ohm's Law?

                    OR

Nichrome and copper wire of same length and same radius are connected in series. Current I is passed through these. Which wire gets heated up more?

20. A radio can tune into any station in the 7.5 MHz to 12 MHz band. What is the corresponding wavelength band.

OR

What is the source of Electromagnetic Waves? List any one use of X Rays.

21. The ground state energy of hydrogen atom is - 13.6 Ev. What are the kinetic and potential energy of electron in this state.

OR

Write postulate of Rutherford's Atomic Model.

22. Discuss the variation of resistivity of copper with temperature. Plot the graph as well.

23. Discuss grouping of unidentical cells in series.

24. The storage battery of a car has an emf of 12 Volt. If the internal resistance of the battery is 0.4 ohm. What is the maximum current that can be drawn from the battery.

25. Discuss forward biasing of a P N Junction Diode.

Section C: Short Answer Questions (3 Marks Each)

26. Derive an expression for torque acting on an electric dipole placed in uniform electric dipole.

OR

Derive an expression for electric field due to an infinitely long straight uniformly charged wire.

27. Derive an expression for potential due to an electric dipole

OR

Discuss the combination of capacitors in parallel and derive the formula for effective capacitance of a parallel combinations of two capacitors.

28. Discuss Biot-Savart's Law and write expression for it.

29. Define Binding Energy and write an expression for it.

30: Explain the working of a p-n junction diode as a half wave rectifier.

Section D: Case Study Questions (4 Marks Each)

31. The photoelectric effect is the phenomenon of emission of electrons from a metal surface when radiations of suitable frequency fall on them. The emitted electrons are called photoelectrons and the current so produced is called photoelectric current.

    (i)   With the increase in intensity of incident radiations on photoelectrons emitted by a phototube, the number of photoelectrons emitted per unit time is

    (a) increases   (b) decreases

    (c) remains same   (d) None of these

    (ii)   It is observed that photoelectron emission stops at a certain time t after the light source is switched on. The stopping potential (V) can be represented as

    (a) $2(KE_{max}/e)$ (b) (KE_{max}/e)

    (c) $(KE_{max}/3e)$ (d) $(KE_{max}/2e)$

    (iii)   A point source of light of power 3.2×10^{-3} W emits monoenergetic photons of energy 5.0 eV and work function 3.0 eV. The efficiency of photoelectron emission is 1 for every 106 incident photons. Assume that photoelectrons are instantaneously swept away after emission. The maximum kinetic energy of photon is

    (a) 4 eV   (b) 5 eV

    (c) 2 eV   (d) Zero

    (iv)   If the frequency of incident light falling on a photosensitive metal is doubled, the kinetic energy of the emitted photoelectron is
    (a) unchanged
    (b) halved
    (c) doubled
    (d) more than twice its initial value

32. Power (P) of a lens is given as the reciprocal of focal length (P=1/f) where f should be in meter and P is in Diopter, for convex power is positive and concave power is -ve. When two or more lenses are kept in contact then power of the combined lens is given as P= P_1 + P_2+P_3 …….

    (I)   A convex and a concave lens is separated by distance d are then put in contact then the focal length of the combination

(a) becomes 0 (b) remain the same

(iii) decreases (iv) increases.

(ii) The two lenses of power +1.5D and +1.0D are placed in contact then the effective power of the combination will be

(a) 2.5D (b)1.5 D (c) 0.5D (d) 3.25D .

(iii) If the power of the lens is 5D then what is the focal length of the lens?

(a)10cm (b) 20cm (c)15cm (d) 5cm

(iv) Two thin lens of focal length +10cm and -5cm are kept in contact, the power of the combination is?

(a)-10D (b)-20D (c)10D (d)15D .

Section E: Essay Type Questions (5 Marks Each)

33. Derive an expression for the force between two parallel current-carrying conductors and define the SI unit of current.

Or

Derive an expression for the torque on a rectangular current loop in a uniform magnetic field.

34. Explain the principle, construction and working of an AC generator.

OR

What is a transformer? What is its principle also explain its working.

35. How can you say that Huygen's wave theory obeys Snell's Law of refraction.

OR

Draw a ray diagram for the formation of the image by a simple microscope and derive an expression for its magnifying power.

OR

Two converging lenses, P and Q, have focal lengths of f_P= 20.0 cm and f_Q= 25.0 cm respectively. They are positioned 80.0 cm apart. An object is placed 60.0 cm in front of lens P.

(a) Calculate the image distance from lens Q.

(b) Based on your calculations, draw a ray diagram on graph paper to illustrate the image formed by this combination of lenses, using an appropriate scale.