

KENDRIYA VIDYALAYA NO 1 , A.F.S, TAMBARAM.

PRACTICE PAPER

CLASS XII PHYSICS

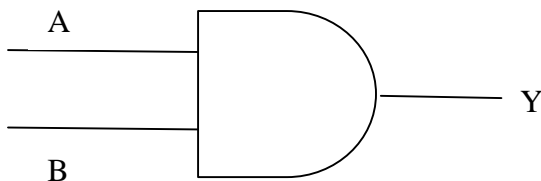
MAX MARKS : 70

TIME: 3 HOURS

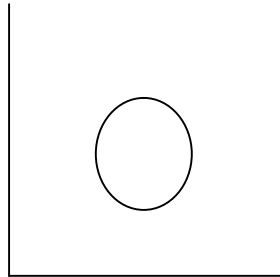
General Instructions:

- (i) All questions are compulsory. In an internal choice questions attempt only one question.
- (ii) Question numbers 1 to 5 are very short answer type questions, carrying **one** mark each.
- (iii) Question numbers 6 to 10 are short answer type questions, carrying **two** marks each.
- (iv) Question numbers 11 to 22 are also long answer type questions, carrying **three** marks each.
- (v) Question numbers 24 to 26 are very long answer type questions, carrying **five** marks each.
- (vi) Question number 23 is value based question carries four marks.
- (vii) Use of calculators is not permitted. However, you may use log tables, if necessary.
- (viii) You may use the following values of physical constants wherever necessary
 $h = 6.6 \times 10^{-34} \text{ Js}$
 $e = 1.6 \times 10^{-19} \text{ C}$
 $\mu_0 = 4 \times 10^{-7} \text{ Tm/A}$
Mass of neutron $m_n = 1.6 \times 10^{-27} \text{ kg}$

- 1. An electron suffers no force while passing through a magnetic field. When is this possible? 1
- 2. The stopping potential is 3 V. What is the maximum kinetic energy of the photo electrons? 1
- 3. How does the width of the interference fringes change when the wavelength of the light is changed? 1
- 4. Write the truth table for the following gate. 1



5. There are two nuclei, the ratio of their mass numbers is 27: 1000. What is the ratio of their nuclear radii? 1
6. Why is modulation of communication signal essential before it is transmitted? 2
7. What is meant by critical angle? Does it depend on the colour of light? 2
8. What is meant by linearly polarized light? State Brewster's law. 2
9. The mass of a nucleus in its ground state is always less than the total mass of its constituents. Why? Why is iron nucleus is the most stable? 2
10. A small charged metal sphere is situated in an earthed metal box. Draw the electric field between the sphere and the metal box. 2



11. Define voltage sensitivity. When the current sensitivity is increased, not necessarily the voltage sensitivity will increase. Why? 3
12. A wire of 10 ohm resistance is stretched to double its length. It is then cut into four equal parts. These parts are then connected in parallel with a battery of 40 V. Find the current drawn from the battery. 3

OR

- Obtain the equation for the internal resistance measured using a potentiometer. 3
13. (i) What is meant by equipotential surface?
(ii) Draw the equi potential surface of a point charge and uniform electric field. 3
14. What is meant by displacement current. Write the Maxwell's modified ampere's circuital law. 3

15. (i) Draw the set up of Rutherford's experiment.
(ii) What was the drawback in his postulates?
(iii) What is meant by impact parameter? 3
16. Obtain the balance condition for wheatstone's network. 3
17. (i) How does the width of the diffraction central fringes change when the wave length of the light is increased?
(ii) In Young's double slit experiment mono chromatic light of 600nm illuminates the pair of slits and produces an interference pattern in which two consecutive bright fringes are separated by 10 mm. Another source of mono chromatic light produces the interference pattern in which the two consecutive bright fringes are separated by 8 mm. Find the wave length of the light from the second source. 3
18. Keeping the voltage of the charging source constant, what would be the percentage change in the energy stored in a parallel plate capacitor if the separation between its plates were to be decreased by 20%. 3

OR

- Obtain the equation for the electric field at a point due to a dipole when the point lies on the equatorial line of the dipole. 3
19. What are sky wave and space wave propagation? Why is sky wave transmission not possible for TV transmission? 3
20. (i) Draw the circuit diagram of a common base amplifier.
(ii) Obtain the equation for its power gain. 3
21. (i) What are meant by potential barrier and depletion layer?
(ii) Draw the circuit diagram of a full wave rectifier. Also draw the input and output waveforms. 3
22. d(i) What is meant by decay constant?
(ii) Obtain a relation for it with half life.
(iii) How long will a radioactive isotope, whose half life is T years, take to be reduced to one-sixteenth of its initial quantity? 3
23. (iv) Mohan is a student of class VIII. He saw a box kept between two electric poles on the roadside. Mohan was eager to know what was it. He asked his

brother Naveen studying in class XII about it. Naveen told that it, was a transformer and explained him about its importance. On hearing the reply from his brother, Mohan felt excited.

(i) What is a transformer? Also write its principle.

(v) What are the values displayed by Mohan and Naveen?

(vi) The transformer ratio of a transformer is 5. Find the output current, if the input power is 5000 W and the input current is 20 A. 4

24. (i) Draw a labeled diagram of astronomical telescope and write the equation for its magnifying power.

(ii) Write three distinct advantages of a reflecting type telescope over a refracting type telescope.

(iii) Write the equation for the resolving power of a microscope. 5

OR

With the help of diagram derive the mirror formula. Also derive prism formula. 5

25. (i) What are eddy currents.

(ii) Write any two of their applications.

(iii) State ampere's circuital law.

(iv) Derive an equation for the magnetic field at a point due an infinitely long straight current carrying conductor. 5

OR

Explain the principle construction and working of a cyclotron with a neat labeled diagram. Obtain the equation for the max kinetic energy. 5

26. (i) State the Fleming's right hand rule.

(ii) Draw the set up of the A C generator.

(iii) Derive the equation for the emf induced in it. Draw the variation of current with angle of rotation of the coil. 5

OR

(iv) What is meant by self induction?

(v) What is meant by coefficient of self induction. Define its SI unit.

(v) Obtain an equation for the coefficient of self induction in terms of the number of turns. 5

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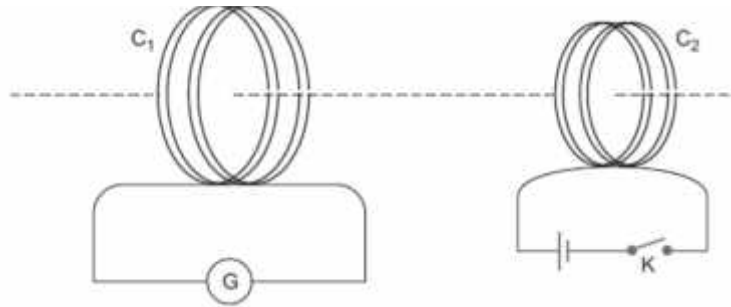
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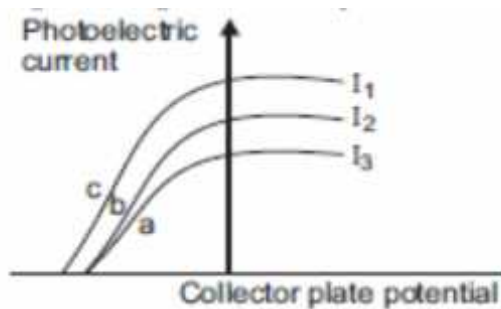
1. Define Electrostatic field at a point. and write its unit.
2. What is the ratio of energy of the electrons in the orbits corresponding first excited state and ground state in a hydrogen atom?
3. The ground state energy of hydrogen atom is -13.6 eV. What are the kinetic and potential energies of the electron in this state?
4. Two wires of equal length, one of silver and the other is nicrome have the same resistance which is the thinner?
5. An electromagnetic wave travels in air along x-direction. What can you say about the direction of electric and magnetic field vectors ?
6. In full wave rectification, what is the output frequency if the input frequency is 50 Hz. What is the output frequency of a half wave rectifier for the same input frequency?
7. Where is the vertical component and the horizontal component of earth's magnetic field equal in magnitude? (OR)

Define power factor Show that the ac power consumed across a capacitor over a complete cycle is zero.

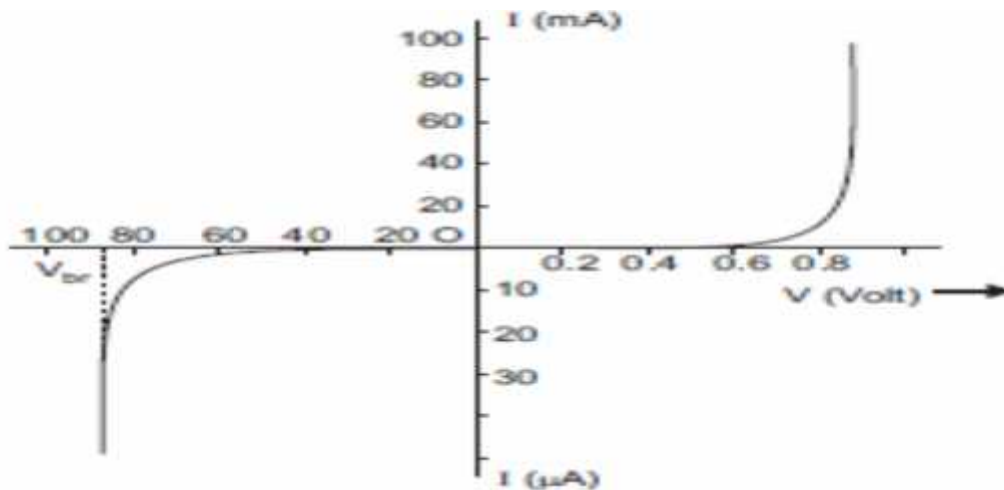
8. A current is induced in coil C1 due to the motion of current carrying coil C2.
- (a) Write any two ways by which a large deflection can be obtained in the galvanometer G.
- (b) Name the phenomenon.



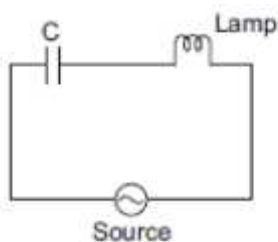
9. The figure shows a plot of three curves a, b, c showing the variation of photocurrent vs. collector plate potential for three different intensities I_1, I_2 , and I_3 having frequencies n_1, n_2 , and n_3 respectively incident on a photosensitive surface. Point out the two curves for which the incident radiations have same frequency but different intensities. What do you understand by the term threshold wavelength.



10. The figure adjoining shows the V-I characteristics of a device.
- (i) Identify the semiconductor device used.
- (ii) Draw the circuit diagram to obtain the given characteristic of this device.

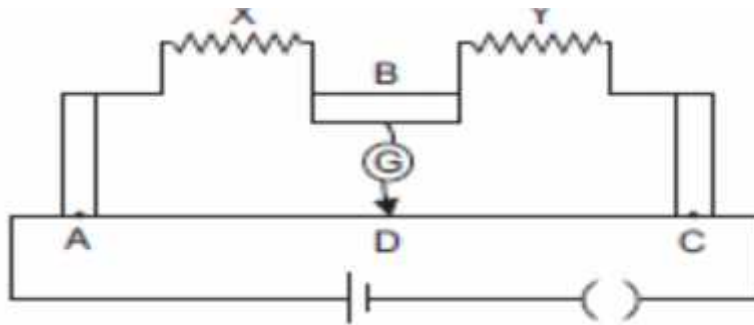


11. In a parallel plate capacitor with air between the plates, each plate has an area of $60 \times 10^{-3} \text{ m}^2$ and the distance between the plates is 8.85 mm. Calculate the capacitance of the capacitor. If this capacitor is connected to a 200 V supply, what is the charge on each plate of the capacitor.
12. An electric lamp having coil of negligible inductance connected in series with a capacitor and an AC source is glowing with certain brightness. How does the brightness of the lamp change on increasing the (i) capacitance, and (ii) the frequency of of ac source? Justify your answer.



13. Derive the relation for the force between two parallel currents with the help of a diagram. Also prove the statement that, two parallel conductors carrying current in the same direction attract each other.
14. Define magnetic intensity. Name two elements, one having positive susceptibility and the other having negative susceptibility. What does negative susceptibility signify? State curie law.

15. In the following figure, when the two unknown resistances X and Y are inserted, the null point D is obtained 40 cm from the end A. When a resistance of 10 is connected in series with X, the null point shifts by 10 cm. Find the position of the null point when the 10 resistance is instead connected in series with resistance 'Y'. Determine the values of the resistances X and Y.



16. A circular copper disc, 20 cm in radius rotates at a speed of 100 rad/s about an axis passing through its centre and perpendicular to the disc. A uniform magnetic field of 0.4 T acts perpendicular to the disc.
- Calculate the potential difference developed between the axis of the disc and the rim.
 - What is the induced current if the resistance of the disc is 20 ohm?

(OR)

- How will a dia, para and a ferromagnetic material behave when kept in a non-uniform external magnetic field ?
- Name two main characteristics of a ferromagnetic material which help us to decide its suitability for making (i) a permanent magnet (ii) an electromagnet. Which of these two characteristics should have high or low values for each of these two types of magnets?

17. Name the waves which are referred to as 'heat waves'? Write their one important use.

18. A point source S is placed at a distance of 20 cm from a converging lens of focal length 10 cm on its principal axis. Where should a diverging mirror of focal length 12 cm be placed, so that a real image is formed at the source itself?
19. Explain the formation of diffraction pattern due to a single slit illuminated by a monochromatic source of light. When the width of slit is doubled, how will it affect the size and intensity of the central diffraction band?
20. (a) Describe briefly, with the help of suitable diagram, how the transverse nature of light can be demonstrated by the phenomenon of polarization.
- (b) State Brewster's law.
21. Write the Einstein's photoelectric equation. State the laws of photo electric emission.
22. Derive the law of radioactive decay. Define i) decay constant and ii) half-life period.
23. Advancements in communication principles and technology have helped mankind to communicate almost instantly in any part of the globe. These advancements, however, have also shown adverse effects. Many school authorities and parents are not in favor of free and unlimited access of these electronic devices to students fearing adverse effects on their emotional and psychological health.

Answer the following questions related to the information in the above passage.

- i) Name any three electronic devices which are used for their communication?
- ii) Write any two adverse effects of misuse of these devices on students?
- iii) Which two values are adversely affected due to misuse of these communication devices?
24. (a) Derive an expression for the electric field intensity at any point outside a uniformly charged thin spherical shell. Draw the field lines when the charge on the sphere is (i) positive, (ii) negative.
- (b) A uniformly charged conducting sphere of 2.5 m in diameter has a surface charge density of 0.2 C / m^2 . Calculate the (i) charge on the sphere (ii) total electric flux passing through the sphere.

(OR)

- (i) Write the principle of a transformer. Write any two the energy losses in the transformer.
- (ii) A power transmission line feeds input power at 4600 V to a step down transformer with its primary windings having 2000 turns. What should be

number of turns in the secondary in order to get output power at 230 V? Write any two advantages of a c.

25. (i) Draw a ray diagram to show refraction of a ray of monochromatic light passing through a glass prism. Deduce the prism formula.
 (ii) How the phenomenon of total internal reflection is used in optical fibre communication.

(OR)

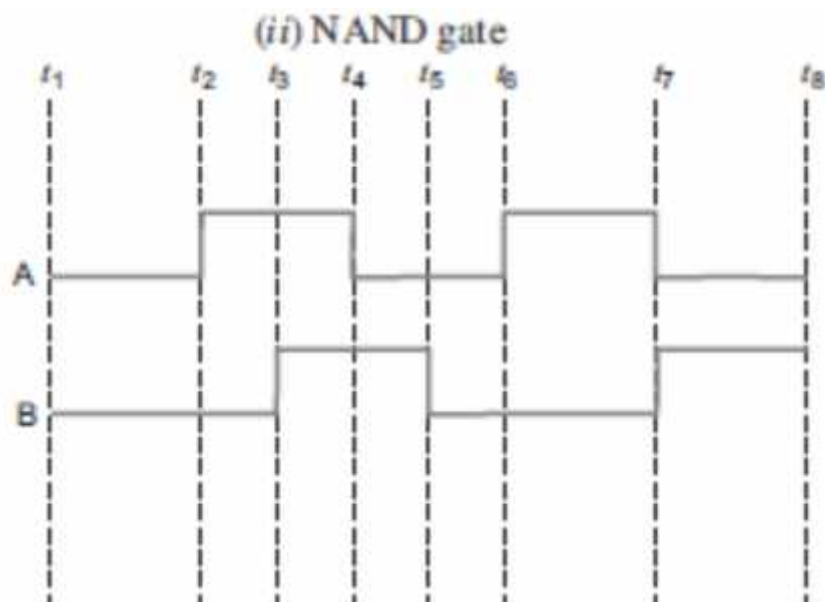
Obtain lens formula using the following equation. (Here the ray of light propagating from a rarer medium of refractive index (n_1) to a denser medium of refractive index (n_2), is incident on the convex side of spherical refracting surface of radius of curvature R.)

$$\frac{n_2}{v} - \frac{n_1}{u} = \frac{(n_2 - n_1)}{R}$$

26. Draw a simple circuit of a CE transistor amplifier. Derive an equation for the power gain. Draw the input and output waveforms.

(OR)

- (i) Draw the symbol and truth table for a OR gate.
 (ii) Show the output waveforms (Y) for the following inputs A and B of (i) NOR gate



(ii) NAND gate