CBSE 12th Physics
Unsolved Overall Important Question Paper - I

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Q.1. **What is geometrical shape of equipotential surfaces due to a single isolated charge?**

Q.2. **Define Capacitive reactance, Write its S.I. Units.**

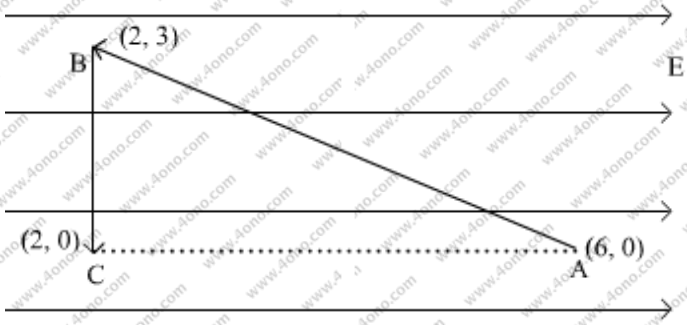
Q.3. **In which orientation, a dipole placed in a uniform electric field is in (i) stable, (ii) unstable equilibrium?**

Q.4. **Name the EM waves used for studying crystal structure of solids. What is its frequency range?**

Q.5. **A point charge Q is placed at point O as shown in the figure. Is the potential difference $V_A - V_B$ positive, negative or zero, if Q is (i) positive (ii) negative?**

Q.6. **Derive the expression for the electric potential at any point along the axial line of an electric dipole?**

Q.7. **A test charge 'q' is moved without acceleration from A to C along the path from A to B and then from B to C in electric field E as shown in the figure. (i) Calculate the potential difference between A and C. (ii) At which point (of the two) is the potential more and why?**



Q.8. **Draw typical output characteristics of an n-p-n transistor in CE configuration. Show how these characteristics can be used to determine output resistance.**

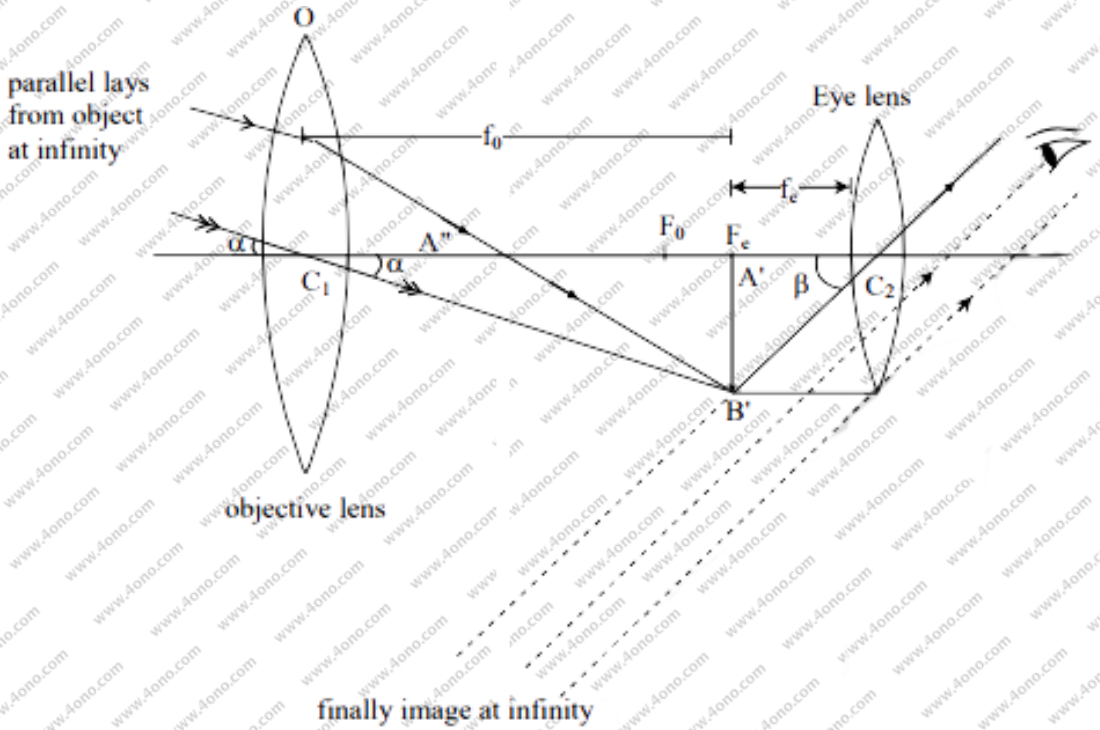
Q.9. **A ray of light, incident on an equilateral glass prism (mg= $\sqrt{3}$) moves parallel to the base line of the prism inside it, Find the angle of incidence for this ray**

Q.10. **(i) Write two characteristics of a material used for making permanent magnets.**
(ii) Why is core of an electromagnet made of ferromagnetic materials?

Q.11. **A metallic rod length *I* is rotated at a constant angular speed, normal to a uniform magnetic field B. derive an expression for the current induced in the rod, if the resistance of the rod is R.**

Q.12. **Draw a plot showing the variation of photoelectric current with collector plate potential for two different frequencies, $V_1 > V_2$, of incident radiation having the same intensity. In which case will the stopping potential be higher? Justify your answer.**

Q.13. **(a) Draw a ray diagram depicting the formation of the image by an astronomical telescope in normal adjustment.**
(b) You are given the following three lenses. Which two lenses will you use as an eyepiece and as an objective to construct an astronomical telescope? Give reason.



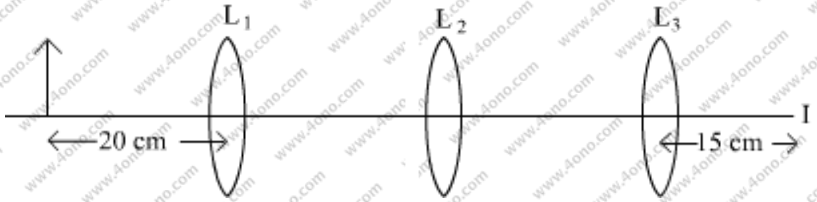
Lenses	Power (D)	Aperture (cm)
L_1	3	8
L_2	6	1
L_3	10	1

Q.14. **(a) Using Bohr's second postulate of quantization of orbital angular momentum show that the circumference of the electron in the nth orbital state in hydrogen atom is n times the de-Broglie wavelength associated with it.**
(b) The electron in hydrogen atom is initially in the third excited state. What is the maximum number of spectral lines which can be emitted when it finally moves to the ground state?

Q.15. **An electron and a photon each have a wavelength 1.00 nm. Find**
(i) their momenta,
(ii) the energy of the photon and
(iii) the kinetic energy of electron.

Q. 16. **(a) Draw a labelled ray diagram showing the formation of a final image by a compound microscope at least distance of distinct vision.**
(b) The total magnification produced by a compound microscope is 20. The magnification produced by the eye piece is 5. The microscope is focused on a - certain object. The distance between the objective and eyepiece is observed to be 14 cm. If least distance of distinct vision is 20 cm, calculate the focal length of the objective and the eye piece.

Q.17. **You are given three lenses L_1, L_2 and L_3 each of focal length 20 cm. An object is kept at 40 cm in front of L_1, as shown. The final real image is formed at the focus 'I' of L_3. Find the separations between L_1, L_2 and L_3.**



Q.18. **(a) Using the phenomenon of polarization, show, how transverse nature of light can be demonstrated.**
(b) Two Polaroid P_1 and P_2 are placed with their pass axes perpendicular to each other. Un-polarized light of intensity 10 is incident on P_1. A third polaroid P_3 is kept in between P_1 and P_2 such that its pass axis makes an angle of 30^0 with that of P_1. Determine the intensity transmitted through P_1, P_2 and P_3.

Q.19. Write the principle of working of a potentiometer. Describe briefly, with the help of a circuit diagram, how a potentiometer is used to determine the internal resistance of a given cell.

Q.20. For a CE-transistor amplifier, the audio signal voltage across the collector resistance of 2 kΩ is 2 V. Given the current amplification factor of the transistor is 100, find the input signal voltage and base current, if the base resistance is 1 kΩ.

Q.21. (i) State faraday's law of electromagnetic induction.
(ii) A jet plane is travelling towards west at a speed of 1800 km/h. What is the voltage difference developed between the ends of the wing having a span of 25 m, if the earth's magnetic field at the location has a magnitude of 5×10^{-4}T and the angle is 30^0?

Q.22. A proton and an alpha particle are accelerated through the same potential. Which one the two has
(i) greater value of de-Broglie wavelength associated with it, and
(ii) less kinetic energy? Justify your answers.

Q.23. (a) Define wavefront. Use Huygens' principle to verify the laws of refraction.
(b) How is linearly polarised light obtained by the process of scattering of light ? Find the Brewster angle for air – glass interface, when the refractive index of glass = 1.5.

Q.24. State Biot-Savart law, giving the mathematical expression for it.
Use this law to derive the expression for the magnetic field due to a circular coil carrying current at a point along its axis. How does a circular loop carrying current behave as a magnet?

OR

With the help of a labelled diagram, state the underlying principle of a cyclotron. Explain clearly how it works to accelerate the charged particles. Show that cyclotron frequency is independent of energy of the particle. Is there an upper limit on the energy acquired by the particle? Give reason.

Q.25. (a) 'Two independent monochromatic sources of light cannot produce a sustained interference pattern'. Give reason.

(ii) Light waves each of amplitude "a" and frequency "w", emitting from two coherent light sources superimpose at a point. If the displacements due to these waves is given by $y_1 = a\,cos\omega t$ and $y_2 = a\cos(\omega t + \phi)$ where ϕ is the phase difference between the two, obtain the expression for the resultant intensity at the point.

(b) In Young's double slit experiment, using monochromatic light of wavelength λ, the intensity of light at a point on the screen where path difference is λ, is K units. Find out the intensity of light at a point where path difference is λ/3

OR

(a) How does one demonstrate, using a suitable diagram, that unpolished light when passed through a Polaroid gets polarized?

(b) A beam of unpolished light is incident on a glass-air interface. Show, using a suitable ray diagram, that light reflected from the interface is totally polarized, when $\mu = \tan i_B$, where μ is the refractive index of glass with respect to air and i_B, is the Brewster's angle.

Q.26. (i) Draw a circuit diagram to study the input and output characteristics of an n-p-n transistor in its common emitter configuration. Draw the typical input and output characteristics.

(ii) Explain, with the help of a circuit diagram; the working of n-p-n transistor as a common emitter amplifier.

OR

The given input A, B are fed to a 2-input NAND gate. Draw the output wave form of the gate.