CLASS - XII

PHYSICS

PRACTICE QUESTIONS

Questions carrying 1 marks -

1. What is the value of refractive index of a medium of polarising angle 60°?
2. The instantaneous value of voltage from an ac. source is given by $E = 300 \sin 314t$. What is the rms voltage of the source?
3. If the temperature of a good conductor increases how does the relaxation time of electrons in the conductor change?
4. What is the angle of dip at a place where the horizontal and vertical components of earths magnetic field are equal?
5. Draw an equipotential surface in a uniform electric field.
6. Name the physical quantity which has its unit - joule coulomb^{-1}. Is it a scalar or vector quantity?
7. Two bulbs are marked 60W, 220V and 100W, 220V. These are connected in parallel to 220V mains. Which one out of the two will glow brighter?
8. State the reason why the ground waves cannot be transmitted above the frequency range 1500 kHz.
9. How will the magnetic field intensity at the centre of a circular coil carrying current change, if the current through the coil is doubled and radius of the coil is halved?
10. Draw the energy band diagram for a n-type

semiconductor.

11. What is the advantage of using a radial magnetic field in a moving coil galvanometer?

12. What is the power dissipation of an a.c circuit in which voltage and current are given by: $V = 300 \sin\left(\omega t - \frac{\pi}{2}\right)$ and $I = 10 \sin \omega t$?

13. A magnet is moved in the direction indicated by an arrow between two coils AB and CD as shown in the figure. Suggest the direction of current in each coil.

Questions carrying 2 marks -

14. Two point charges $+5 \times 10^{-19}$ C and $+20 \times 10^{-19}$ C are separated by a distance 2m. Find the point on the line joining them at which electric field intensity is zero.

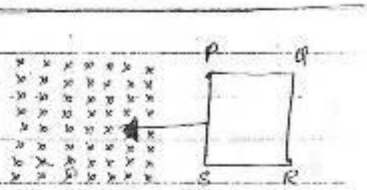
15. What will be the effect on the interference fringes in a Young's double slit experiment, if (i) monochromatic source is replaced by a source of white light.
(ii) the screen is moved away from the slit?
Justify your answer.

16. For a photosensitive surface, threshold wavelength is λ_0. Does photoemission occur if the wavelength (λ) of the incident radiation is (i) more than λ_0 (ii) less than λ_0?
Justify your ~~non~~ answers.

17. The coil in a tangent galvanometer is 6cm in radius. Find the no. of turns of the wire that should be wounded if a current of 20mA is [illegible]

45°. (Horizontal component of earths magnetic field = 0.36×10^{-4} T).

18. State Lenz's law. The closed loop PQRS is moving into a uniform magnetic field acting at right angles to the plane of the paper as shown in the figure. State the direction in which the induced current flows in the loop



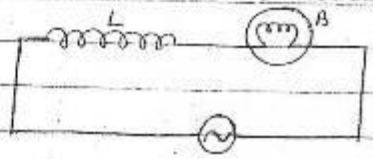
19. What changes in the focal length of a (i) concave mirror and (ii) convex lens occur when the incident violet light on them is replaced with red light?

20. The output of a 2-input NAND gate is fed to a NOT gate. Write down the truth table for the output of the combination for all possible inputs of A and B.

21. Explain with reason, how the resolving power of an astronomical telescope will change when (i) frequency of the incident light on the objective lens is increased. (ii) ~~frequency~~ aperture of the objective lens is halved.

22. What are coherent sources of light? Draw the variation of intensity with position in the interference pattern of Young's double slit experiment.

23. An inductor 'L' of reactance X_L, is connected in series with a bulb 'B' to an a.c source as shown in the figure. Briefly explain how does the brightness of the bulb change when



(i) no: of turns of the inductor is reduced and
(ii) a capacitor of reactance $X_C = X_L$ is included in series in the same circuit.

24. An object is placed in front of a right angled prism ABC in two positions (a) and (b) as shown. The prism is made of crown glass with critical angle of 41°. Trace the path of two rays from P and Q, (i) in (a), normal to the hypotenuse and (ii) in (b) parallel to the hypotenuse

(a) (b)

25. The work function of lithium is 2.3 eV, what does it mean? What is the relation between the work function 'W' and threshold wavelength 'λ' of a metal?

26. In the series of radioactive disintegrations of ${}^{Z}_{A}X$ first an alpha particle and then a beta particle is emitted. What is the atomic number and mass number of the new nucleus formed by these successive disintegrations?

Questions carrying 3 marks.

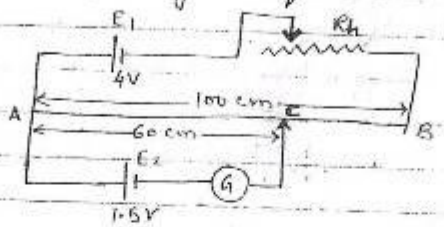
27. What is meant by 'drift velocity' of free electrons? Derive Ohm's law on the basis of the theory of electron drift.

28. What is wheatstone bridge. Deduce the condition for which wheatstone bridge is balanced.

29. What is meant by 'sensitivity' of a potentiometer?

A battery E1 of 4V and a resistor ... is

R_h are connected in series with a wire AB of the potentiometer. The length of the wire of the potentiometer is 1 metre. When the cell E_1 of e.m.f 1.5 volt is connected between points A and C, no current flows through E_2. Length of AC = 60 cm.



a) Find the potential difference between the ends A and B of the potentiometer.

(ii) Would the method work, if the battery E_1 is replaced by a cell of emf of 1V?

30. State Huygens principle. For reflection of a plane wavefront at a plane reflecting surface, construct the corresponding reflected wave front. Using this diagram, prove that angle of incidence is equal to the angle of reflection.

31. What is meant by 'interference' of light? In a double slit experiment with monochromatic light, fringes are obtained on a screen placed at some distance from the slit. If the screen is moved by 5×10^{-2} m towards the slit, the change in fringe width is 3×10^{-5} m. If the distance between slits is 10^{-3} m, Calculate the wavelength of light used.

32. State Gauss theorem. Express it mathematically. Apply this theorem to obtain an expression for electric field due to an infinite plane sheet of charge.

33. Derive an expression

by a magnetic dipole in a uniform magnetic field. Hence obtain the expression for potential energy of the dipole.

34. With the help of a block diagram, explain the working of modern fibre optic communication line.

35. A 10 μF capacitor is charged by a 30 V dc supply and then connected across an uncharged 50 μF capacitor. Calculate (i) the final potential difference across the combination and (ii) the initial and final energies. How will you account for the differences in energy.

36. Using Biot - Savart law, deduce an expression for the magnetic field on the axis of a circular current loop. Draw the magnetic field lines due to a circular current carrying loop.

37. Define the terms 'half life period' and 'decay constant' of a radioactive sample. Derive the relation between these terms.

38. The magnifying power of an astronomical telescope in the normal adjustment position is 100. The distance between the objective and the eye-piece is 101 cm. Calculate the lengths of the objective and the eyepiece.

39. A compound microscope with an objective of 1 cm focal length and an eyepiece of 2 cm focal length has a tube length of 20 cm. Calculate the magnifying power of the microscope, if the final image is formed at the near point of the eye.

40. What is meant by the term 'mutual induction'? Deduce an expression for the mutual inductance between a pair of coils having no. of turns N_1 and N_2 and

over an air core.

Questions carrying 5 marks.

41. Draw a ray diagram for an astronomical refracting telescope in normal adjustment, showing the paths through the instrument of three rays from a distant object. Derive an expression for its magnifying power.

Define magnifying power of an optical telescope.

Write the significance of diameter of the objective lens on the optical performance of the Telescope.

42. Define the term root-mean-square (rms) value of a.c. Derive the relation between rms and peak value of a.c.

A 1 μF capacitor is connected to a 220V, 50 Hz a.c source. Calculate the rms value of the current through the circuit. Also find the peak value of voltage across the capacitor.

43. An a.c source $E = E_0 \sin \omega t$ is applied across an inductor of inductance L. Show mathematically that current lags the voltage by a phase angle of $\pi/2$.

A 10 Ω resistance and an inductance of 0.05 henary are connected in series across the ends of this circuit is connected a 130 V alternating voltage of frequency 50 cycles per second. Calculate the current in the circuit and potential difference across the inductance.

44. Derive an expression for the capacitance of a parallel plate capacitor with a dielectric

'k' between its plates. Obtain also the expression for energy stored in the above case.

45. Describe with the help of a labelled diagram the principle, construction and working of a cyclotron.

46. Derive the lens makers formula in case of a double convex lens. State the assumptions made and convention of signs used.

47. Draw a labelled diagram of an a.c generator while the principle on which it works. An a.c generator consists of a coil of 100 turns and cross sectional area of $3\ m^2$, rotating at a constant angular speed of 60 radians/sec in a uniform magnetic field of 0.04 T. The resistance of the coil is 500 Ω. Calculate
(i) maximum current drawn from the generator
(ii) maximum power dissipation in the coil.

48. Draw the graph to show variation of binding energy per nucleon with mass number of different nuclei.
Calculate binding energy per nucleon of $^{40}_{20}Ca$ nucleus
[Given: mass of $^{40}_{20}Ca$ = 39.962589 u
mass of proton = 1.007825 u
mass of neutron = 1.008665 u
1 amu = 931 MeV]

49. Give the principle and working of Van de Graff generator. With the help of labelled diagram describe its construction and working. How is the leakage of charge minimised from the generator?

50. Draw the circuit diagram of a common emitter amplifier using n-p-n transistor. Show input and output voltages in the circuit.

amplifies is 59. If the emitter current is 6.0 mA, find (i) base current and (ii) collector current.

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