Most Important 50 Questions(Physics)
Class 12 CBSE Board 2021-22(Term II)

1. A thin prism of 60° angle gives a deviation of 30°. What is the refractive index material of prism?

Ask Filo

2. What do you mean by dispersive power of the material of a prism?

Ask Filo

3. Why semiconductors behave as insulators at $0\ K$?

Ask Filo

4. In the figure below, is the diode D forward or reverse biased?

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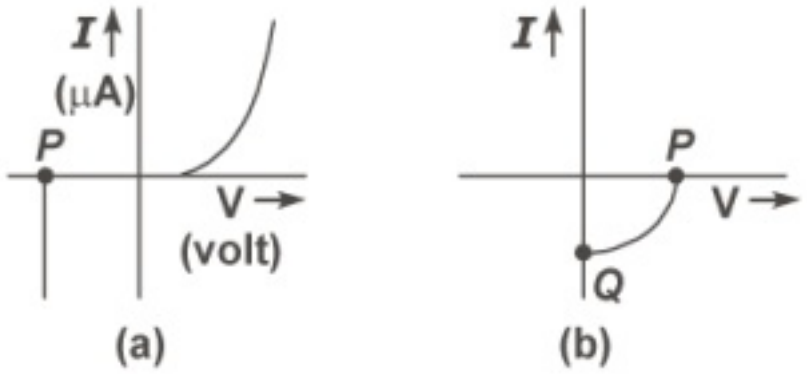
5. (a) Name the type of a diode whose characteristics are shown in figure (a) and figure (b).



(b) What does the point P in figure (a) represent?
(c) What does the points P and Q in figure (b) represent?

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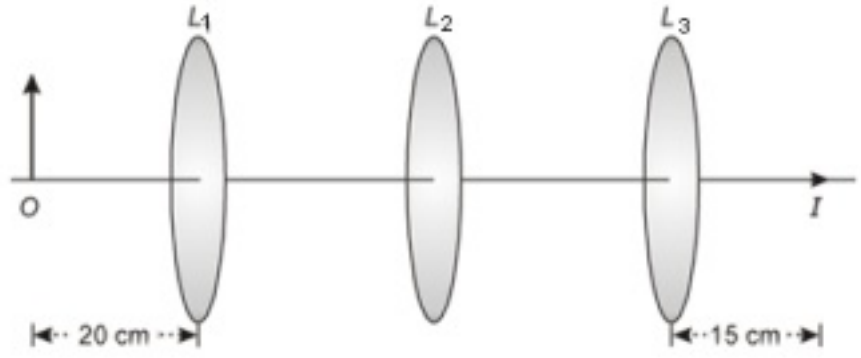
6. Three photo diodes D_1, D_2 and D_3 are made of semiconductors having band gaps of $2.5\ eV$, $2\ eV$ and $3\ eV$, respectively. Which ones will be able to detect light of wavelength $6000 \mathring{A}$?

Ask Filo

7. You are given three lenses L_1, L_2 and L_3 each of focal length $15\ cm$. An object is kept at $20\ cm$ in front of L_1 as shown in Fig.



The real image is formed at the focus 1 of L_3. Find the separations between L_1, L_2 and L_3.

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8. Violet colour is seen at the bottom of the spectrum, when white light is dispersed by a prism. Why?

9. With the help of energy band diagrams, distinguish between the conductors, insulators and semiconductors.

Ask Filo

10. (a) Why silicon or germanium cannot be used in LEDs?
(b) Describe briefly with the help of a necessary circuit diagram, the working principle of a solar cell.

Ask Filo

11. Draw a labelled diagram of a full wave rectifier circuit. State its working principle. Show the input-output waveforms.

Ask Filo

12. Identify the following electromagnetic. radiations as per the wavelengths given below. Write one application of each.
(a) $1\ mm$
(b) $10^{-12}\ m$
(c) $10^{-8}\ nm$

Ask Filo

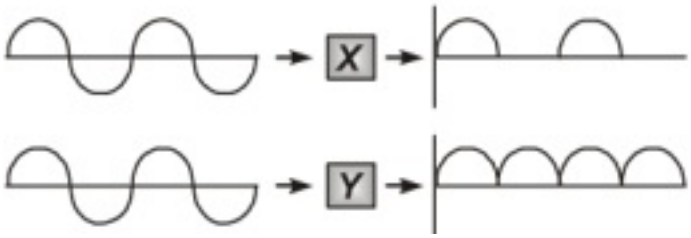
13. (a) Explain the formation of 'depletion layer' and 'barrier potential' in $p-n$ junction.
(b) With the help of a labelled circuit diagram explain the use of a $p-n$ junction diode as a full wave rectifier. Draw the input and output waveforms.

Ask Filo

14. (a) Draw a circuit arrangement for studying $V-I$ characteristics of a $p-n$ junction diode in (i) forward bias and (ii) reverse bias
Show the typical $V-I$ characteristics of a silicon diode.
(b) State the main practical application of LED.

Ask Filo

15. An a.c. signal is fed into two circuits ' X ' and ' Y ' and the corresponding output in the two cases have the waveforms as shown.



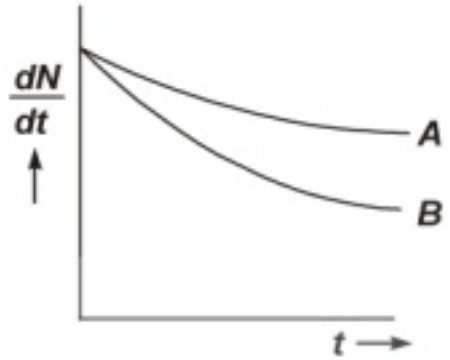
(a) Identify the circuits ' X ' and ' Y '. Draw their labelled circuit diagrams.
(b) Briefly explain the working of circuit Y.
(c) How does the output waveform from circuit Y get modified when a capacitor is connected across the output terminals parallel to the load resistor?

Ask Filo

16. Is displacement current, like conduction current, a source of magnetic field?

Ask Filo

17. Which sample, A or B shown in figure has shorter mean-life?



18. Why chain reaction can not occur in natural uranium? Ask Filo

19. What characteristic property of nuclear force explains the constancy of binding energy per nucleon (B.E./A) in the range of mass number A lying $30 < A < 170$? Ask Filo

20. What is unpolarised light? Ask Filo

21. Two lenses of focal lengths $5\ cm$ and $50\ cm$ are to be used for making a telescope. Which will you use for the objective? Ask Filo

22. A particle of mass M at rest decays into two particles of masses m_1 and m_2 having non zero velocities. What is the ratio of the de-Broglie wavelengths of the two particles? Ask Filo

23. State the laws of photoelectric emission. Ask Filo

24. Give two differences between fringes formed in single slit diffraction and Young's double slit experiment. Ask Filo

25. You are given following three lenses. Which two lenses will you use an eyepiece and objective to construct an astronomical telescope? Ask Filo

Lens	Power (P)	Aperture (A)
L_1	3 D	8 cm
L_2	6 D	1 cm
L_3	10 D	1 cm

26. A beam of light converges to a point P. A lens is placed in the path of the converges to a point P. A lens is placed in the path of the convergent beam $12\ cm$ from the point P. At what point the beam converges, if the lens is (a) a convex lens of focal length $20\ cm$, (b) a concave lens of focal length $16\ cm$? Do the required calculations. Ask Filo

27. With a concave mirror, the magnification is found to be four times as large, when the object was $25\ cm$ from the mirror as it was with the object at $40\ cm$ from the mirror, the image being real in both the cases. Find the focal length of the concave mirror. Ask Filo

28. Why convex mirror is used as a rear-view mirror? Ask Filo

29. Identify the part of the electromagnetic spectrum, which is Ask Filo
(a) suitable for radar system used in aircraft navigation.
(b) adjacent to the low frequency end of the electromagnetic spectrum.
(c) produced in nuclear reaction.
(d) Produced by bombarding a metal target by high speed electrons.

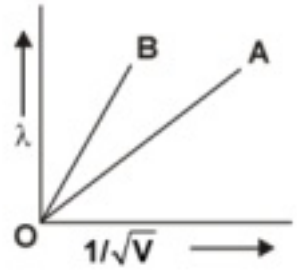
30. The magnetic field in a plane electromagnetic wave is given by Ask Filo
$B_y = 2 \times 10^{-7} \sin \left[0.5 \times 10^3 x + 1.5 \times 10^{11} t\right]$
What is the wavelength and frequency of the wave?

31. An electromagnetic wave of wavelength λ is incident on a photosensitive surface of negligible Ask Filo

work function. If the photo-electrons emitted from this surface have de-Broglie wavelength λ_1, prove that
$\lambda = \frac{2mc}{h}\lambda_1^2$

Ask Filo

32. The two lines marked A and B in figure show a plot of de-Broglie wavelength (λ) as a function of $1/\sqrt{V}$ (V is the accelerating potential) for two nuclei ${}_1H^2$ and ${}_1H^3$.



(a) What does the slope of the lines represent?
(b) Identify, which lines correspond to these nuclei?

Ask Filo

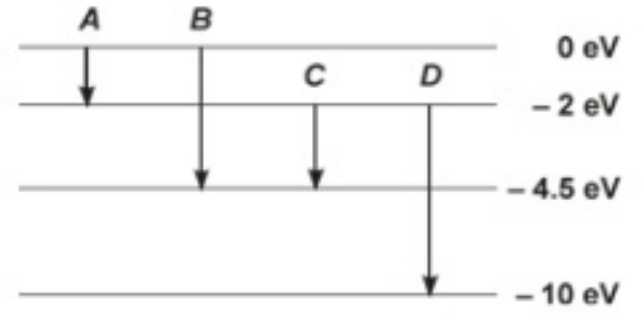
33. $4\ g$ of radioactive material of half-life 10 years is kept in a store for 15 years. How much material is disintegrated?

Ask Filo

34. Consider a radioactive nucleus A which decays to a stable nucleus C through the following sequence:
$A \longrightarrow B \longrightarrow C$
Here B is an intermediate nuclei which is also radioactive. Considering that there are N_0 atoms of A initially, plot the graph showing the variation of number of atoms of A and B versus time.

Ask Filo

35. The energy levels of an atom are as shown in the figure below.



(a) Which one of these transitions will result in the emission of a photon of wavelength $275\ mm$?
(b) Which transition corresponds to emission of radiation of maximum wavelength?

Ask Filo

36. The de-Broglie wavelength of a particle of kinetic energy K is λ. What would be the wavelength of the particle, if its kinetic energy were $K/4$?

Ask Filo

37. Draw a schematic diagram of the experimental arrangement used by Davisson and Germer to establish the wave nature of electrons. Explain briefly how the de-Broglie relation was experimentally verified in case of electrons?

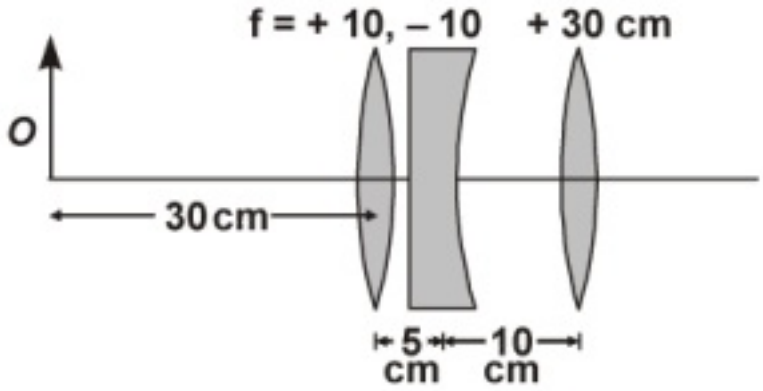
Ask Filo

38. The figure given below shows an experimental set up for Young's double slit experiment to observe interference of light on the screen OP.

Here path difference $SS_2 - SS_1 = \lambda/4$. Obtain the condition for (a) constructive, and (b) destructive interference at any point P in terms of path difference, $\Delta = S_2P - S_1P$

Ask Filo

39. Find the position of the image formed by the lens combination given in the figure.



Ask Filo

40. Suppose a parallel plate capacitor of plate area A is being charged. Show that the displacement current across the capacitor between the plates and parallel to it is equal to the conduction current in the connecting wires.

Ask Filo

41. An electromagnetic wave of wavelength λ is incident on a photosensitive surface of negligible work function. If the photo-electrons emitted from this surface have the de Broglie wavelength λ_1, prove that $\lambda = \left(\frac{2mc}{h}\right)\lambda_1^2$.

Ask Filo

42. Draw a schematic arrangement of the Geiger-Marsden experiment. How did the scattering of α-particles by a thin foil of gold provide an important way to determine an upper limit on the size of the nucleus? Explain briefly.

Ask Filo

43. Sketch a graph showing the variation of potential energy of a pair of nucleons as function of their separation. Write three characteristic properties of nuclear force which distinguish it from the electrostatic force.

Ask Filo

44. (a) Draw a graph showing the variation of potential energy of a pair of nucleons as a function of their separation. Indicate the regions in which nuclear force is (i) attractive and (ii) repulsive.

(b) Write two characteristic features of nuclear force, which distinguish it from the Coulomb force.

Ask Filo

45. (a) Draw the plot of binding energy per nucleon (BE/A) as a function of mass number A. Write two important conclusions that can be drawn regarding conclusions of nuclear force.
(b) Use this graph to explain the release of energy in both the processes of nuclear fusion and fission.
(c) Write the basic nuclear process of neutron undergoing β-decay. Why is the detection of neutrinos found very difficult?

46. The ground state energy of hydrogen atom is $-13.6\ eV$. The photon emitted during the transition of electron from $n = 3$ to $n = 1$ state, is incident on a photosensitive material of unknown work function.
The photoelectrons are emitted from the materials with a maximum kinetic energy of 9eV. Calculate the threshold wavelength of the material used.

Ask Filo

47. (a) Define the Q-value of a nuclear process. When can nuclear process not proceed spontaneously? if both the number of protons and the number neutrons are conserved in a nuclear reaction, in what way is mass converted into energy (or vice -versa) in the nuclear reaction?

(b) A neutron is absorbed by a_3Li^6 nucleus with subsequent emission of an α-particle. Write the corresponding nuclear reaction. Calculate the energy released in this reaction. Given:
$m\left({}_3Li^6\right) = 6.015126$ a.m.u., $m\left({}_2He^4\right) = 4.0026044$ a.m.u
$m\left({}_0n^1\right) = 1.0086654$ a.m.u $m\left({}_1H^3\right) = 3.016049$ a.m.u

Ask Filo

48. (a) How does an unpolarized light incident on a polaroid get polarized?
Describe briefly, with the help of necessary diagram, the polarization of light by reflection from a transparent medium.

(b) Two polaroids ' A ' and ' B ' are kept in crossed position. How should a third polaroid ' C ' be placed between them so that the intensity of polarized light transmitted by polaroid B reduces to $1/8^{\text{th}}$ of the intensity of unpolarized light incident on A ?

Ask Filo

49. Using Bohr's postulates, obtain the expression for the total energy of the electron in the stationary states of the hydrogen atom. Hence draw the energy level diagram showing how the line spectral corresponding to Balmer series occur due to transition between energy levels.

Ask Filo

50. (a) State Huygen's principle. Using this principle draw a diagram to show how a plane wave front incident at the interface of the two media gets refracted when it propagates from a rarer to a denser medium. Hence verify Snell's law of refraction.

(b) When monochromatic light travels from a rarer to a denser medium, explain the following, giving reasons:
(i) Is the frequency of reflected and refracted light same as the frequency of incident light?
(ii) Does the decrease in speed imply a reduction in the energy carried by light wave?

Ask Filo