CBSE 12th Physics 2017 Unsolved Paper All India

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TIME - 3HR. | QUESTIONS - 30

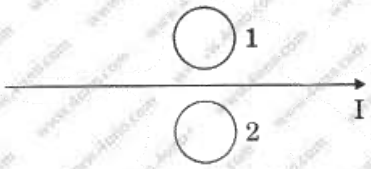
THE MARKS ARE MENTIONED ON EACH QUESTION

SECTION - A

Q.1. How does the angle of minimum deviation of a glass prism vary, if the incident violet light is replaced by red light? Give reason *1 mark*

Q.2. Name the phenomenon which shows the quantum nature of electromagnetic radiation. *1 mark*

Q.3. What is the direction of induced currents in metal rings 1 and 2 when current I in the wire is increasing steadily? *1 mark*



Q.4. In which directions do the electric and magnetic field vectors oscillate in an electromagnetic wave propagating along the x-axis? *1 mark*

Q.5. Nichrome and copper wires of same length and same radius are connected in series. Current I is passed through them. Which wire gets heated up more? Justify Your answer. *1 mark*

Q.6. Write two properties of a material suitable for making (a) a permanent magnet, and (b) an electromagnet. *1 mark*

Q.7. Draw the intensity pattern for single slit diffraction and double slit interference. Hence, state two differences between interference and diffraction patterns. *1 mark*

OR

Unpolarised light is passed through a polaroid P_1. When this polarised beam passes through another polaroid P_2 and if the pass axis of P_2 makes angle 0 with the pass axis of P_1, then write the expression for the polarised beam passing through P_2. Draw a plot showing the variation of intensity when θ varies from 0 to 2π.

Q.8. Why does current in a steady state not flow in a capacitor connected across a battery? However momentary current does flow during charging or discharging of the capacitor. Explain *2 marks*

Q.9. The ground state energy of hydrogen atom is – 13.6 eV If an electron makes a transition from an energy level – 1.51 eV to – 3.4 eV calculate the wavelength of the spectral line emitted and name the series of hydrogen spectrum to which it belongs. *2 marks*

Q.10. Find the condition under which the charged particles moving with different speeds in the presence of electric and magnetic field vectors can be used to select charged particles of a particular speed. *2 marks*

SECTION – B

Q.11. (a) Monochromatic light of wavelength 589 nm is incident from air on a water surface. If μ for water is 1'33, find the wavelength, frequency and speed of the refracted light.

(b) A double convex lens is made of a glass of refractive index 1.55, with both faces of the same radius of curvature. Find the radius of curvature required, if the focal length is 20 cm. *3 marks*

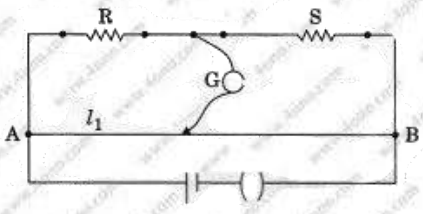
Q.12. Define mutual inductance between a pair of coils. Derive an expression for the mutual inductance of two long coaxial solenoids of same length length wound one over the other. *3 marks*

OR

Define self-inductance of a coil. Obtain the expression for the energy stored in an inductor L connected across a source of emf.

Q.13. (a) Write the principle of working of a metre bridge.

(b) In a metre bridge, the balance point is found at a distance l_1 with resistances R and S as shown in the figure.

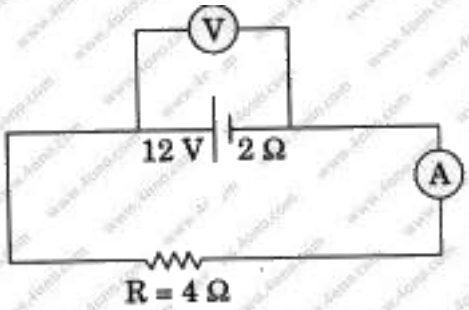


14. (a) Draw the circuit diagram of an n-p-n transistor amplifier in common emitter configuration.

(b) Derive an expression for voltage gain of the amplifier and hence show that the output voltage is in opposite phase with the input voltage. *3 marks*

Q.15. (a) The potential difference applied across a given resistor is altered so that the heat produced per second increases by a factor of 9. By what factor does the applied potential difference change?

(b) In the figure shown. an ammeter A and a resistor of 4Ω are connected to the terminals of the source. The emf of the source is 12 V having an internal resistance of 2 Ω Calculate the voltmeter and ammeter readings. *3 marks*



Q.16. Draw a block diagram of a generalized communication system. Write the functions of each of the following: *3 marks*

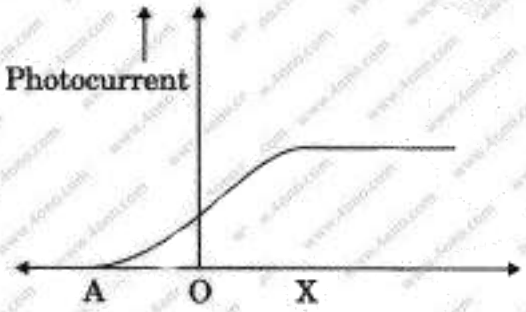
(a) Transmitter
(b) Channel
(c) Receiver

Q.17. (a) Draw a ray diagram for the formation of image by a compound microscope.

(b) You are given the following three lenses. Which two lenses will you use as an eyepiece and as an objective to construct a compound microscope? *3 marks*

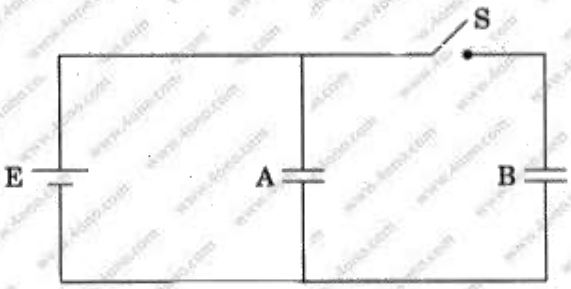
Lenses	Power (D)	Aperture (cm)
L_1	3	8
L_2	6	1
L_3	10	1

Q.18. The following graph shows the variation of photocurrent for a photosensitive metal: *3 marks*



(a) Identify the variable X on the horizontal axis.
(b) What does the point A on the horizontal axis represent?
(c) Draw this graph for three different values of frequencies of incident radiation v_1, v_2 and $v_3 (v_1 > V_2 > V_3)$ for same intensity.
(d) Draw this graph for three different values of intensities of incident radiation I_1, I_2 and $I_3 (I_1 > I_2 > I_3)$ having same frequency.

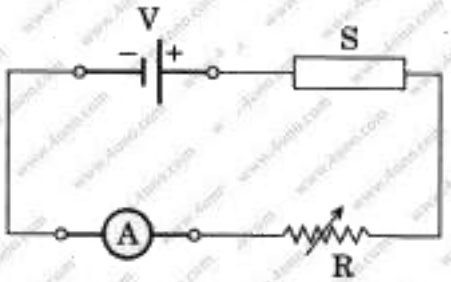
Q.19. Two identical parallel plate capacitors A and B are connected to a battery of V volts with the switch S closed. The switch is now opened and the free space between the plates of the capacitors is filled with a dielectric of dielectric constant K. Find the ratio of the total electrostatic energy stored in both capacitors before and after the introduction of the dielectric. *3 marks*



Q.20. (a) How is amplitude modulation achieved?

(b) The frequencies of two side bands in an AM wave are 640 kHz and 660 kHz respectively. Find the frequencies of carrier and modulating signal. What is the bandwidth required for amplitude modulation?

Q.21. (a) In the following diagram 'S' is a semiconductor. Would you ' increase or decrease the value of R to keep the reading of the ammeter A constant when S is heated? Give reason for your answer.



(b) Draw the circuit diagram of a photodiode and explain its working. Draw its I - V characteristics. *3 marks*

Q.22. (a) State Biot - Savart law and express this law in the vector form.

(b) Two identical circular coils. P and Q each of radius R, carrying currents 1 A and $\sqrt{3}$ A respectively, are placed concentrically and perpendicular to each other lying in the XY and YZ planes. Find the magnitude and direction of the net magnetic field at the centre of the coils. *3 marks*

SECTION – D

Q.23. Asha's mother read an article in the newspaper about a disaster that took place at Chernobyl. She could not understand much from the article and asked a few questions from Asha regarding the article. Asha tried to answer her mother's questions based on what she learnt in Class XII Physics. *4 marks*

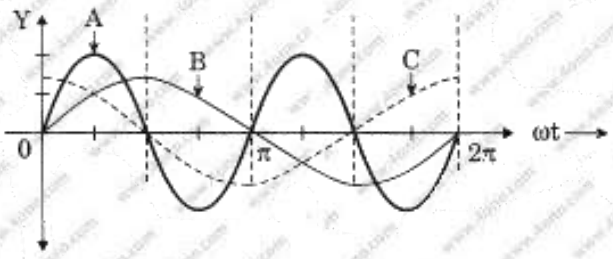
(a) What was the installation at Chernobyl where the disaster took place? What, according to you, was the cause of this disaster?

(b) Explain the process of release of energy in the installation at Chernobyl.

(c) What, according to you, were the values displayed by Asha and her mother?

SECTION – E

Q.24. A device X' is connected to an ac source V = V_0 sin ot. The variation of voltage, current and power in one cycle is shown in the following graph:



(a) Identify the device 'X'.
(b) Which of the curves A, B and C represent the voltage, current and the power consumed in the circuit? Justify your answer.
(c) How does its impedance vary with frequency of the ac source? Show graphically.
(d) Obtain an expression for the current in the circuit and its phase relation with ac voltage.
(a) Draw a labelled diagram of an ac generator. Obtain the expression for the emf induced in the rotating coil of N turns each of cross-sectional area A, in the presence of a magnetic field $\vec{B}$.

(b) A horizontal conducting rod 10 m long extending from east to west is falling with a speed 5.0 ms^2at right angles to the horizontal component of the Earth's magnetic fielit, 0.8 x 10-a Wb m-2. Find the instantaneous value of the emf induced in the rod. *5 marks*

Q.25. (a) Define wave front. 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. *5 marks*

OR

(a) Draw a ray diagram to show the image formation by a combination of two thin convex lenses in contact. Obtain the expression for the power of this combination in terms of the focal lengths of the lenses.

(b) A ray of light passing from air through an equilateral glass prism undergoes minimum deviation when the angle of incidence is $\frac{3}{4}th$ of the angle of prism. Calculate the speed of tight in the prism.

26. (a) Derive an expression for the electric field E due to a dipole of length '2a' at a point distant r from the centre of the dipole on the axial line. *5 marks*

(b) Draw a graph of E versus r for r >> a.

(c) If this dipole were kept in a uniform external electric field E_0, diagrammatically represent the position of the dipole in stable and unstable equilibrium and write the expressions for the torque acting on the dipole in both the cases.

OR

(a) Use Gauss's theorem to find the electric field due to a uniformly charged infinitely large plane thin sheet with surface charge density σ.

(b) An infinitely large thin plane sheet has a uniform surface charge density $+\sigma$. Obtain the expression for the amount of work done in bringing a point charge q form infinity a point, distant r, in front of the charged plane sheet.