# CLASS XII
SAMPLE PAPER
PHYSICS

SECTION –A

1. The dielectric constant of water is 80 . what is its permittivity ?

2. How many electrons flow per second through an electric bulb rated 220V , 100W. ?

3. State Curie's law in ferromagnetic substances .

4. Why is interference patterns not detected ,when the two coherent sources are far apart ?

5. In the nuclear decay reaction $_1^1H \rightarrow\ _0^1n + _Q^P X$ find P , Q and identify X.

SECTION –B

6. By what factor does the capacitance of a metal sphere increases if its volume is tripled ?

7. I-V graph of a metallic wire at two different temperatures $T_1 \ and \ T_2$ is as shown in fig. Which of the
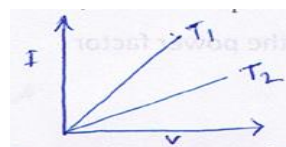

two temperatures is lower and why ?

8. Two long and parallel straight wires A and B carrying current of 8.0A and 5.0A in the same direction are separated by a distance of 4.0 cm . Estimate the force on a 10 cm section of wire A .

9. The electric current in a circuit is given by $i = i_0\ \dfrac{3t^2}{\tau}$ for some time . Calculate the rms current for the period $t = 0 \ to \ t = \tau$.

10. Calculate the angle of minimum deviation for an equilateral triangular prism of refractive index $\sqrt{3}$.

SECTION –C

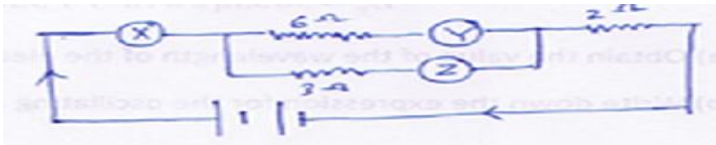11. Three concentric metallic shells A,B and C of radii a ,b and c (a<b<c) have surface charge densities +σ
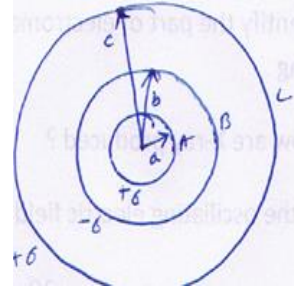
, -σ and +σ respectively .

(i) Find potential of three shells A ,B ,and C.

(ii) If shell A and C are at the same potential

Obtain the relation between a,b and c .

12. In fig. X , Y and Z are ammeters

(i) What are the readings in ammeters X and Z ?

(ii) What is total resistance of the circuit ?

13. A charged particle (q) moving with velocity (V) at a certain angle (θ) made with an uniform magnetic field (B) . Explain the nature of the trajectory of the charged particle . Is th frequency of the particle depends on the angle θ ? Find the expression of frequency .

14. An electron moves around the nucleus in a hydrogen atom of radius $0.51 \overset{0}{A}$, with a velocity of $2\times10^{6}ms^{-1}$ Calculate the following :

(i) the equivalent current due to orbital motion of electron .

(ii) the magnetic field produced at the centre of the nucleus .

(iii) the magnetic moment associated with the electron .

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15. State Faraday's law of electromagnetic induction .

   A metallic rod of length x is rotated at an angular speed ω in a plane normal to magnetic field B .Derive the expression for the (i) emf induced in the rod (ii) current induced (iii) heat dissipated , if the resistance of rod is R .

16. a) In the following circuit calculate :
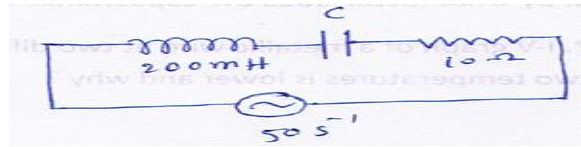
(i) the capacitance of the capacitor , if the power factor

Of circuit is unity.

(ii) calculate the Q-factor of the circuit .

b) What is power factor ? With the phasor diagram explain the wattles current in LCR series circuit .

17. a) which of the following if any , can act as a source of electromagnetic wave :

(i) A charge moving with constant velocity .

(ii) A charge moving in a circular orbit .

(iii) A charge at rest .

Give reason .

b) Identify the part of electromagnetic spectrum , to which waves of frequency (i) $10^{20}\,Hz$ (ii) $10^{9}\,Hz$ belong .

C) How are X-ray produced ?

Or , the oscillating electric field of an electromagnetic wave is given by :

$$E_y = 30\sin[2\times10^{11}t + 300\pi x]\ Vm^{-1}$$

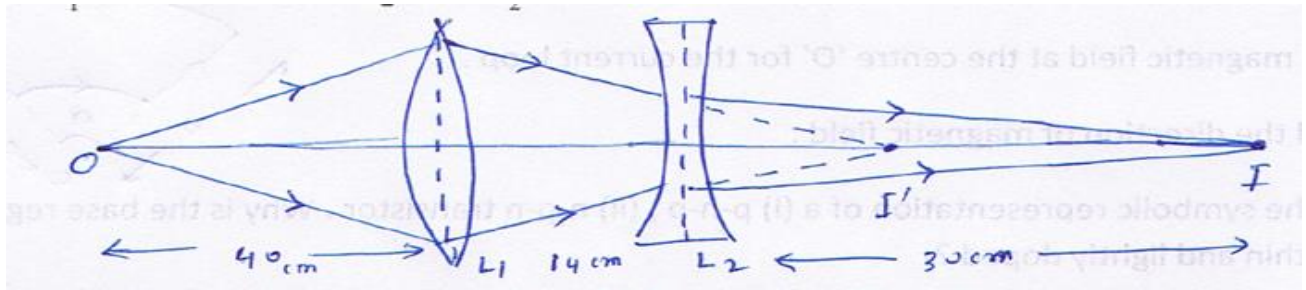a) Obtain the value of the wavelength of the electromagnetic wave .

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b) Write down the expression for the oscillating magnetic field .

c) What is the direction of propagation of wave?

18) a) Write the lens maker formula .

b) In the following diagram are given positions of an object 'O' image 'I' . and two lenses L_1 and L_2 , the focal length of L_1 . Find the focal length of L_2 .

19) a) Apply Huygens' principle to prove the law of refraction (Snell's law) in wave theory.

b) Explain why no backward waveform is possible .

20) a) What is angle of polarization ? Write Brewster's law of Polarization .

b) In a double slit interference experiment , the two coherent beams have slightly different intensities I and $I + \Delta I$ $(\Delta I << I)$. Show that resultant intensity at the maxima is nearly $4I$, while that at the minima is nearly $\dfrac{|\Delta I|^2}{4I}$.

21) Define the terms (i) 'Cut-off voltage ' and (ii) threshold frequency in relation to the phenomenon of photoelectric effect .

 Write Einstein's photoelectric equation .Using the equation show how the Cut-off Voltage and threshold frequency for a given photosensitive material can be determined with the help of a suitable plot / graph.

22. a) Which state of the triply ionized beryllium $\left(Be^{3+} \right)$ has the same orbital radius as that of the ground state of hydrogen ?

b) show that the ionization potential of hydrogen atom is 13.6 Volt.

SECTION –D

23. Arnab was taking on his mobile to his friend for a long time . After his conversation was over , his sister Anita advised him that if his conversation was of such a long duration , it would be better to talk through a land line .

a) Why it is considered harmful to use a mobile phone for a long time ?

b) Which values are reflected in the advice of his sister Anita ?

c) A message signal of frequency 10KHz is superposed to modulated carrier wave of frequency 1MHz .Determine the sidebands produced .

SECTION –E

24. a) State Ampere's circuital law . Apply this law to find the expression of magnetic field for a long straight solenoid .

b) A positive charge of 1.5μC is moving with a speed of $2\times10^6 ms^{-1}$ along the positive x-axis . A magnetic field $\vec{B}=\left(0.2\hat{j}+0.4\hat{k}\right)$ tesla acts in space . Find the magnetic force acting on the charge .

c) Find the magnetic field at the centre 'O' for the current loop .
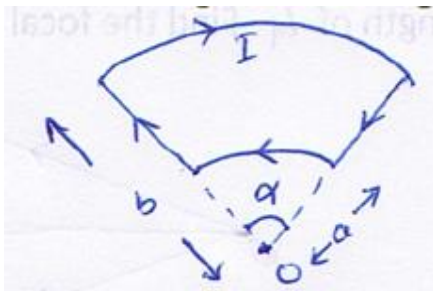
Also find the direction of magnetic field .

25. Draw the symbolic representation of a (i) p-n-p , (ii) n-p-n transistor . Why is the base region of transistor thin and lightly doped ?

With proper circuit diagram , show the biasing of a p-n-p transistor in common emitter configuration . Explain the movement of charge carriers through different parts of the transistor in such a configuration and show that $I_E = I_C + I_B$.

OR, Draw labeled diagram of an astronomical telescope . Write mathematical expression of its magnifying power . How does magnifying power get affected on increasing the apparture of the objective lens and why?

26. State the laws of radioactive decay and on their basis establish a relationship between the number N of nuclei present at any time t in terms of number N_0 of nuclei present at time t=0 and the disintegration constant λ.

Hence Define the half – life $T_{1/2}$ and disintegration constant λ .

OR, Along a straight line there is an infinite number of alternating positive and negative charges $\pm q$, all adjacent charges being separated by the same distance r . Show that the potential energy of one charge is $-\left(\dfrac{q^2}{2\pi\varepsilon_0 r} \right)\log(2)$.

What is the principle of Potentiometer ? How it can be used to measure the internal resistance of a cell ?

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