

**Class – XII**  
**Subject - Physics**

**General Instructions :**

1. All questions are compulsory.
  2. Q. 1 to 5 are Very short Answer type questions (1 Mark each. )
  3. Q. 6 to 12 are short Answer type questions. (2 Marks each. )
  4. Q. 13 to 24 are short answer questions (3 Marks each. )
  5. Q. 25 to 27 are Long Answer type questions, (5 marks each. )
  6. Please write down the serial number of the question before attempting it.
  7. You may use the following values of physical constants where ever necessary:

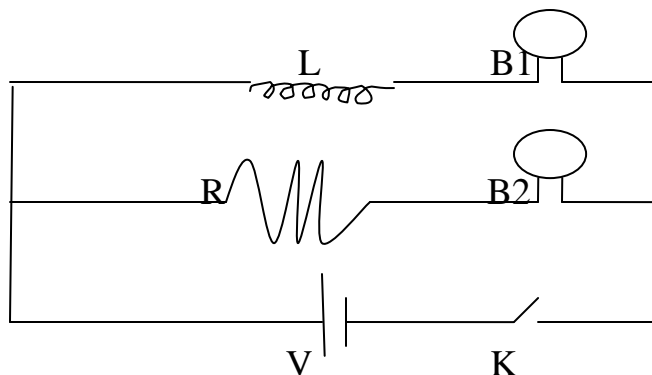
Permittivity in free space ( $\epsilon_0$ )	= $8.85 \times 10^{-12}$ F/meter
Permeability in free space ( $\mu_0$ )	= $4 \pi \times 10^{-7}$ T m A <sup>-1</sup>
Mass of Proton ( $m_p$ )	= $1.67 \times 10^{-27}$ kg
Mass of electron ( $m_e$ )	= $9.1 \times 10^{-31}$ kg.
Charge on electron or proton (e)	= $1.6 \times 10^{-19}$ C
Velocity of Light (C )	= $3 \times 10^8$ m/sec
Avogadro's Number (N)	= $6.023 \times 10^{23}$
Plank's Constant (h)	= $6.626 \times 10^{-34}$ J. Sec
  8. Use of calculators is not permitted. However, you may ask log table for Mathematical tables.
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1. What is the largest voltage you can safely put across a resistor marked  $196 \Omega - 100W$  ?
2. What is the angle of dip at a place where the horizontal and vertical component s of earth's magnetic field is equal?
3. If the maximum kinetic energy of electrons emitted in a photo cell is 5 eV, what is the stopping potential?
4. Draw the graph showing the variation of intensity of polarized light transmitted by an analyzer.
5. What do you mean by discrete nature of charges? Explain.

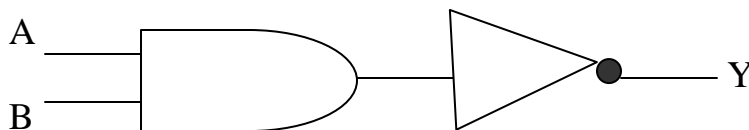
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(2)

6. In a given circuit, inductor L and resistor R have identical resistance. Two similar electric lamps B1 and B2 are connected as shown. When switch S is closed. (i) Which one of the lamp lights up earlier (ii) will the lamps be equally bright after some time? **Justify your answers.**



7. Why is an FM signal less susceptible to noise than an AM signal?
8. If the  $\alpha$ - decay of  ${}_{92}\text{U}^{235}$  is energetically allowed, what prevents it from decaying all at once? Why its half-life is so long? Explain.
9. Write the truth table for the combination of gates shown here:



10. State the conditions for sustained interference of light Draw the variation of intensity with position in the interference pattern of Young's double slit experiment.

OR

On the basis of Huygen's principle explain the laws of reflection of light.

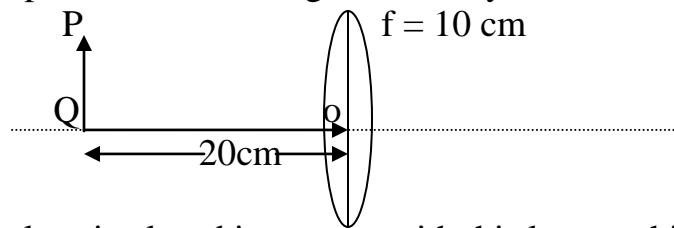
11. Calculate the value of resistance needed to convert a galvanometer of resistance 100 ohm which gives full deflection for a current of 5 mA into a voltmeter of 0 – 5 V.

Conti...3

(3)

12. State and explain the Seebeck effect. And define temperature inversion.
13. The half life period of a radio active substance is 60 days. What is the time taken for  $3/4^{\text{th}}$  of the original mass to disintegrate?
14. An electric dipole is held in a uniform electric field.
- Show that no translatory force acts on it.
  - Obtain the expression for torque acting on it .

15. Find the position of the image formed by the lens shown in the figure.



Another lens is placed in contact with this lens to shift the image further away from the lens. What is the nature of the second lens?

16. Using Kirchoff's law derive the expression for Wheatstone principle  
OR

Obtain an expression for the frequency of revolution of a charged particle moving in a uniform transverse magnetic field. How does the time period of the circulation ions in a cyclotron depend on the speed?

17. With the help of diagrams, difference between pulse–amplitude modulation (PAM) pulse position modulation (PPM) and Pulse code modulation (PCM).

18. Distinguish between diamagnetic and ferromagnetic materials in respect to their i) intensity of magnetization ii) behaviour in a non-uniform magnetic field and iii) Susceptibility.

Conti...4

(4)

19. Electromagnetic waves spectrum with

- i.  $\lambda_1 = 21 \text{ cm}$  are used in \_\_\_\_\_
- ii.  $2.7 \text{ K}$  temperature associated with the isotropic radiation .
- iii.  $\lambda_3$  are absorbed by the ozone layer of the atmosphere.

Identify and name the part of electromagnetic spectrum to which these radiations belong.

20. The length of a potentiometer wire is  $600 \text{ cm}$  and it carries a current of  $40 \text{ mA}$ . For a cell of emf  $2 \text{ V}$  and internal resistance  $10 \text{ ohm}$ , the null point is found to be at  $500 \text{ cm}$ . If voltmeter is connected across the cell, the balancing length is decreased by  $10 \text{ cm}$ . Find

- i) the resistance of the whole wire
- ii) reading of the voltmeter
- iii) resistance of voltmeter.

21. A ground receiver station is receiving a signal at (a)  $5 \text{ MHz}$  and (b)  $100 \text{ MHz}$ , transmitted from a ground transmitter at a height of  $300 \text{ m}$  located at a distance of  $100 \text{ km}$  from the receiver station. Identify whether the signal is coming via space wave propagation or sky wave propagation or via satellite transponder. Radius of earth =  $6.4 \times 10^6 \text{ m}$  Max of Ionosphere =  $10^{12} \text{ per m}^3$ .

22. What are secondary cells. Draw the block diagram and explain the charging and discharging of Alkali accumulator.

23. An ac source of  $220 \text{ V}$  is applied across a series combination of  $R = 40 \text{ ohm}$  and an inductor  $L = 4 \text{ H}$  and capacitance  $C = 100 \mu\text{F}$  Calculate:

- i) What is resonance frequency of the circuit.?
- ii) The impedance of the circuit. & The rms current in the circuit?
- iii) Determine the r.m.s potential drop across  $L$

Explain the Davisson-Germer's experiment. And show that the wavelength of electron is quite matching with the experimental value of de-Broglie wavelengths .

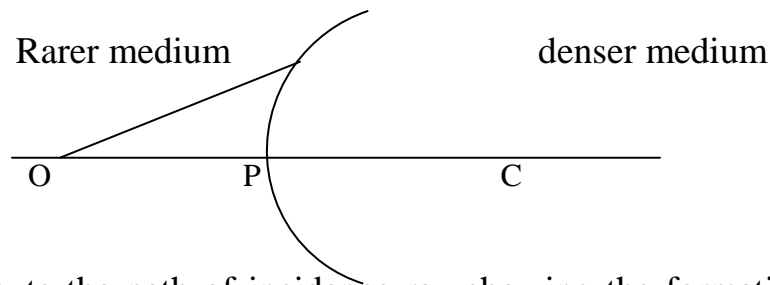
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25. a) Explain the construction and working of a Van de Graaff generator.  
b) A metal wire is bent into a circle of radius 10 cm . It is given a charge of  $200\mu\text{ C}$  which spreads on it uniformly. Calculate the electric potential at its centre.

**OR**

- a) State the theorem which relates the enclosed charge, inside a closed surface, with the electric flux through it. Use this theorem to obtain the electric field at a point due to a uniformly charged thin plate.  
b) An electric charge of  $8.85 \times 10^{-13}\text{ C}$  is placed at the center of a sphere of radius 1m. what is the total electric flux linked with the sphere?
26. a) A spherical surface of radius of curvature R, separates a rarer and denser medium as shown in figure



Compute the path of incidence ray showing the formation of image. Hence derive the relation connecting object distance 'u' image distance 'v' radius of curvature R and refractive indices  $n_1$  and  $n_2$ .

- b) Draw the ray diagram of astronomical telescope .

27. (a) With the help of a circuit diagram explain the working of transistor as oscillator.  
(b) Draw a circuit diagram for a two input OR gate and explain its working With the help of input, output waveforms.

**OR**

- (a) Explain briefly with the help of a circuit diagram how V-I characteristics of a p-n junction diode are obtained in  
(i) forward bias, and (ii) reverse bias.  
(b) A photodiode is fabricated from a semiconductor with a band gap of 2.8 eV. Can it detect wavelength of 6000 nm ? Justify.