Class : XII

Physics (Theory)

Pre-Final - 2

Time : 3 Hours **Marks : 70**

A. Choose the correct options. 1x8=8

1. When 'Si' semiconductor is dopped with 'Al' then the semiconductor obtained is called **P type / N type** semiconductor.
2. Which of the following option express wheatstone bridge principle as given in your textbook.

(a) $\frac{R_1}{R_2}=\frac{R_3}{R_4}$; when $ig=0$ (b) $\frac{R_1}{R_3}=\frac{R_2}{R_4}$; when $ig\neq 0$

3. Which of the following options is correct.

(a) $C^2=\frac{1}{\mu_0 \in_0}=\frac{E_0^{\ 2}}{B_0^{\ 2}}$ (b) $C^2=\frac{1}{\mu_0 \in_0}=\frac{B_0^{\ 2}}{E_0^{\ 2}}$

(c) Both (a) and (b) (d) None of these.

4. Accelerated charge can show

(a) Interference only (b) Diffration only (c) Both (a) and (b)

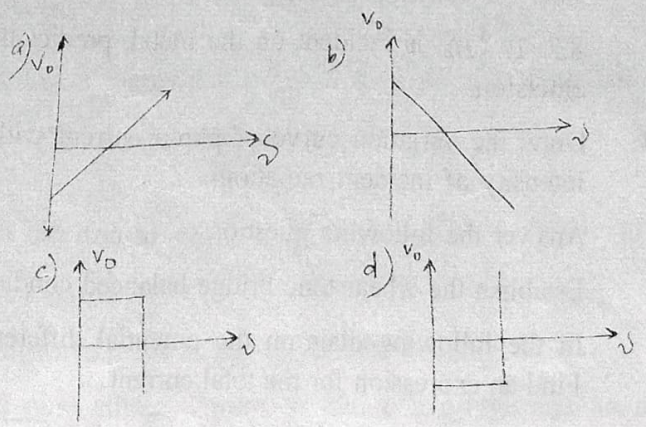
5. Name the process of the following nuclear reaction.

$${}_1^1H+{}_1^1H\rightarrow {}_1^2H+e^++\nu+0.42MeV$$

(a) Fission (b) Fusion (c) Both (a) and (b) (d) None of these

6. Guess the shape of the curve which shows the variation of V_0 and ν in case of photoelectric emission shown by the relation.

$$V_0=\left(\frac{h}{e}\right)\nu-\frac{\phi_0}{e}.$$



7. A Charge particle is thrown in a magnetic field, perpendicular to the field then force experience by charge particle is.

(a) $qVB\sin\theta$ (b) qVB (c) Zero (d) None of these

8. An ac generator converts mechanical energy into **Electrical / Chemical** energy.

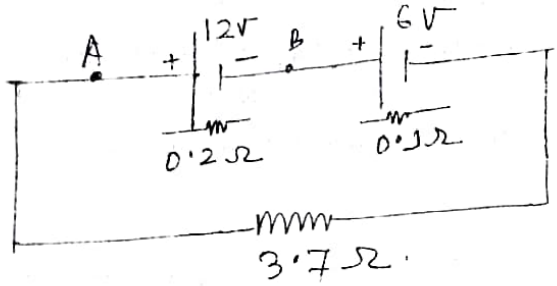
$2\times10=20$

B. Answer the following question :

1. If $\vec{E}=(3\hat{i}+6\hat{j}+4\hat{k})\,N/C$, calculate electric flux through a surface of area $20cm^2$ in y-z plane.

2. Mention two factors on which capacity of a capacitor does depend.

3. In the circuit given below, find the potential difference between A and B



4. A charged particle enters a magnetic field with velocity v in a direction perpendicular to the field. Find an expression for the radius of the circular path of the particle.

5. A rectangular coil of turns n and area 'A' is rotating with angular velocity ω in a uniform magnetic field B. Find an expression for the emf generated in the coil.

6. A plane EM wave moving with a velocity $3\times10^8\,m/s$ has an electric field which oscillates sinusoidally with a frequency $2\times10^{10}\,Hz$ and amplitude 48 v/m, what is the amplitude of the oscillating magnetic field.

7. Draw a ray diagram for the formation of an image by a reflecting telescope.

8. Prove that ratio of the intensities at maxima and minima is

$$\frac{I_{max}}{I_{min}}=\left(\frac{r+1}{r-1}\right)^2 ;\ Where\ r=\frac{a_1}{a_2}$$

is the ratio of amplitudes.

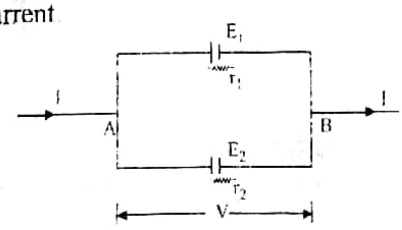
9. The threshold frequency for a certain metal is $3.3\times10^{14}\,Hz$. If light of frequency $8.2\times10^{14}\,Hz$ is incident on the metal, predict the cut off voltage for the photoelectric emission.

10. Draw the variation curve of photo current with collector plate potential for different intensity of incident radiation.

C. Answer the following question : $3\times9=27$

1. Establish the wheatstone bridge balanced condition as given in your text book.

2. In the following diagram the potential difference between the points A and B is V. Find an expression for the total current $2+1=3$



Write one difference between emf and terminal potential difference.

3. A circular coil of wire consisting of 80 turns each of radius 50mm carries a current of 0.25A what is the magnetic field $\bar{B}$ at the centre of the coil. Find Dimenssional formula of $\bar{B}$.

4. A galvanometer coil has a resistance of 10Ω and the meter shows full scale deflection for a current of 2.5 mA. How will you convert the meter into an ammeter of range o to 4A.

5. When a coil of area $5m^2$ and number of turns 100 is placed perpendicular to a magnetic field of 10T, the flux passing through it is 5×10^3 Wb. If the coil is removed from the field in 0.1S calculate the induced emf.

6. Show that the power associate with RLC series circuit is, $P = E_{rms}\ I_{rms}\ Cos\phi$, where the sumbols have their usual meaning.

7. Two slits are made 1mm apart and is placed 0.8m away in young's double slit experiment. What is the fringe separation when blue-green light of wavelength 500nm is used.

Draw the graph of the intensity distribution in young's double slit experiment.

8. Deduce the expression for refractive index of a prism which is given by.

$$n = \frac{\text{Sin}\left[\frac{A+Dm}{2}\right]}{\text{Sin } A/2}$$

9. Establish the following Lens makers formula.

$$\frac{1}{f} = \left(\frac{n_2}{n_1} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$

D. Answer the following questions : 3×5=15

1. A 600 μF capacitor is charged by a 200V supply. It is then disconnected from the supply and is connected to another uncharged 600 μF capacitor. How much electrostatic energy is lost in the process.

The work done in moving a charge $2\times10^{-9}C$ from a point of potential – $3kv$ to another point P is $5\times10^{-5}J$. Find the potential at point 'P'. 3+2=5

2. Show that total energy of the electron in a hydrogen atom is $E_n = -\frac{13.6}{n^2}eV$ What is the significance of the negative sign.

3. Draw a circuit diagram of a fullwave rectifier and explain its working.

How will you dope a pure silicon crystal to obtain a p-type and an n-type semiconductor. 3+2=5

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