AA(2) — Phy (2)

Sub / Gen

2019

Time : 3 hours

Full Marks : 75

Candidates are required to give their answers in their own words as far as practicable.

The questions are of equal value.

*Answer **five** questions in all, selecting **two** questions each from Group – B and C, in which Group – A is compulsory .*

Group – A

1. Answer all questions by choosing correct alternatives given for each :

   (a) The energy density of an electric field is equal to :

   (i) $\frac{1}{2}\epsilon_0 E^2$

(ii) $\frac{1}{2}\epsilon_0^2 E^2$

(iii) $E^2/2\epsilon_0$

(iv) $\frac{1}{2}\epsilon_0 E$

(b) The time constant of an L-R circuit is given by :

(i) $\frac{L}{R}$

(ii) $\frac{R}{L}$

(iii) LR

(iv) L + R

(c) The phenomenon of emission or absorption of energy at the junctions of a thermocouple due to the passage of electric current through it is called :

(i) Jows effect

(ii) Peltier effect

(iii) Seebeck effect

(iv) Thomson effect

(d) When two plane polarized waves of unequal amplitudes with a phase difference of $\pi/2$ radians combine, they produce :

(i) Plane polarized light

(ii) Circular polarized light

(iii) Elliptically polarized light

(iv) All of these

(e) In Fraunhofer class of diffraction, the source of light and the screen are effectively at :

(i) Zero distance

(ii) Finite distance

(iii) Infinite distance

(iv) Both (i) and (ii)

(f) The relation $\vec{D} = \epsilon_0 \vec{E} + \vec{P}$ holds good :

(i) Only is vacuum

(ii) Only inside the dielectric

(iii) Only outside the dielectric

(iv) Everywhere

(g) Bragg's law is given as :

(i) $2d \sin\theta = n\lambda$

(ii) $2d \cos\theta = n\lambda$

(iii) $d \sin\theta = n\lambda$

(iv) $d \cos\theta = n\lambda$ (λ = wavelength and d= interatomic spacing)

(h) At resonance, the impedance of the circuit is :

(i) Purely capalitive

(ii) Purely in ducting

(iii) Purely resistive

(iv) None of the above statements is correct

(i) The ground state energy of a hydrogen atom is equal to :

(i) 13.6 eV

(ii) – 13.6 eV

(iii) 3.4 eV

(iv) – 3.4 eV

(j) The Curve-Weiss Law for ferromagnetic materials is given as :

(i) $\chi \propto \frac{1}{T}$

(ii) $\chi \propto \frac{1}{T - T_c}$

(iii) $\chi \propto \frac{1}{T + T_c}$

(iv) $\chi \propto \frac{1}{T_c}$

Group – B

2. Describe, with necessary theory, the construction and working of a ballistic galvano meter. How can it be made aperiodic ?

3. Discuss the case of discharge of a condenser through an inductance and resistance. Under what conditions the discharge becomes oscillatory ?

4. Give the Weiss theory of ferromagnetism. What is Curic temperature ?

5. What is specific charge of an electron ? Describe, with necessary theory, Thomsons method for the measurement of specific charge of a electron.

Group – C

6. Explain the theory of Newton's ring. Discribe the experimental arrangement for the determination of wavelength of sodium light using the Newton's ring apparatus.

7. Analytically explain Bohr's theory of H-atom and the existence of different spectral lines (series).

8. Discuss the theory of Fraunhofer's diffraction due to a single slit.

9. What is polarization of light ? Discribe how would you produce and detect plane polarized, circularly polarized and ellipticlly polarized light.

OR

Write short not on any two of the following :

(a) Ruby laser

(b) Quarter wave plate

(c) Maxwell's field equations

(d) Babinets compensatior