AA(2)-Phy(2)

Subs/Gen

2020

Time : 3 Hrs Full Marks : 75

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

All questions carry equal marks.

Answer five questions in all, selecting two questions each from group-A & B. Q.No.-1 is Compulsory.

1. Answer the following questions by choosing appropriate alternatives given for each of them: 10×1½= 15

(i) The work done is establishing a current 'i' in a coil of self inductance 'L' is equal to:

(a) Li (b) Li^2

(c) $\frac{1}{2}Li$ (d) $\frac{1}{2}Li^2$

(ii) The power factor fo an A.C.Circuit in which Q is the phase difference between current and e.m.f. is given by

(a) $Sin\theta$ (b) $Cos\theta$

(c) $tan\theta$ (d) $Cot\theta$

(iii) Electron-volt is the unit of:

P.T.O.

(a) Charge (b) Potential difference

(c) Current (d) Energy

(iv) The phenomenon which confirms that light waves are transverse in nature is:

(a) Interference (b) Diffraction

(c) Polarization (d) Dispersion

(v) Neutral temperature of a thermo-couple is the temperature at which the thermo-e.m.f. is:

(a) Zero (b) Maximum

(c) Minimum (d) Changes Sign

(vi) Quality factor Q of a coil is given by:

(a) $Q = \frac{WL}{R}$ (b) $Q = WLR$

(c) $Q = \frac{R}{WL}$ (d) $Q = \frac{1}{WLR}$

(vii) Ohm's law in vector form is expressed as:

(a) $\vec{E} = \vec{J}\sigma$

(b) $E = \frac{\vec{J}}{\sigma}$

(c) $E = \frac{\sigma}{\vec{J}}$

(d) none of the above

(viii) Distructive interferences occurs when the path difference between two coherent sources is equal to:

(a) $n\lambda$

(b) $(2n+1)\lambda/2$

(c) both (a) & (b)

(d) neither (a) nor (b)

(ix) Energy density in a magnetic field having field strength B is equal to:

(a) $\frac{B}{2\mu_o}$

(b) $\frac{B^2\mu_o}{2}$

(c) $\frac{B^2}{2\mu_o}$

(d) $\frac{1}{2}\mu_o^2 B^2$

(x) Time constant of an electric circuit is the time in which the current decays to..... of its original value.

(a) 25%

(b) 37%

(c) 50%

(d) 37%

Group-A

2. Derive Einstein's photoelectric equation and explain threshold frequency and work function.

3. Explain Peltier and Thomson effects and derive the relation $\sigma_a - \sigma_b = T\frac{d^2E}{dT^2}$ on thermodynamic considerations.

4. Find the expression for instantaneous current is an a.c.circuit containing L, C, R. Also discuss the case of resonance.

5. Discuss Langevin's theory of diamagnetism.

Group-B

6. Explain the theory of formation of Newton's ring and describe the experimental arrangement for the determination of wavelength of monochromatic light using the method of Newtons rings.

7. Give the theory of plane transmission grating and explain how would you measure the wavelength of sodium light using the plane grating.

8. Give an account of Bohr's theory of hydrogen atom and explain the different spectral series.

9. Write short notes on any two of the following: $2\times7\frac{1}{2}=15$

(a) Resolving power of a prism

(b) Babinel's compensator

(c) Fermats principle

(d) Ruby Laser

(e) Nicol prism

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