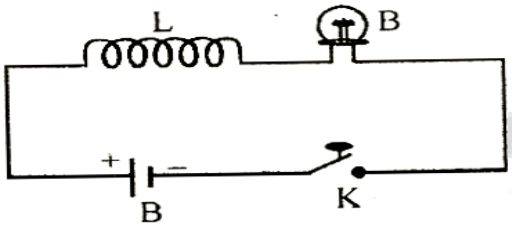
PHYSICS

41. Which one among shows particle nature of light?
(1) Photo-electric effect
(2) Interference
(3) Refraction
(4) Polarization

42. Two radiations of photons energies 1 eV and 2.5 eV, successively illuminate a photosensitive metallic surface of work function 0.5 eV. The ratio of the maximum speeds of the emitted electrons is
(1) 1 : 1 (2) 1 : 5
(3) 1 : 4 (4) 1 : 2

43. In the circuit of fig, the bulb will become suddenly bright if



(1) Contact is made or broken
(2) Contact is made
(3) Contact is broken
(4) Won't become bright at all

44. Two conducting circular loops of radii R_1 and R_2 are placed in the same plane with their centres coinciding. If $R_1 >> R_2$, the mutual inductance M between them will be directly proportional to
(1) $\frac{R_2^2}{R_1}$ (2) $\frac{R_1}{R_2}$ (3) $\frac{R_2}{R_1}$ (4) $\frac{R_1^2}{R_2}$

45. A capacitor of capacitance C, is connected across an ac source of voltage V, given by $V = V_0 \sin\omega t$. The displacement current between the plates of the capacitor, would then be given by
(1) $I_d = V_0\omega C \sin\omega t$ (2) $I_d = V_0\omega C \cos\omega t$
(3) $I_d = \frac{V_0}{\omega C}\cos\omega t$
(4) $I_d = \frac{V_0}{\omega C}\sin\omega t$

46. An electron is accelerated from rest through a potential difference of V volt. If the de-Broglie wavelength of the electron is 1.227×10^{-2} nm, the potential difference is
(1) 10^2 V (2) 10^3 V
(3) 10^4 V (4) 10 V

47. The number of photons per second on an average emitted by the source of mono-chromatic light of wavelength 600 nm, when it delivers the power of 3.3×10^{-3} W will be ($h = 6.6 \times 10^{-34}$ J s)
(1) 10^{15} (2) 10^{18}
(3) 10^{17} (4) 10^{16}

48. An electromagnetic wave of wavelength 'λ' is incident on a photosensitive surface of negligible work function. If 'm' mass is of photoelectron emitted from the surface has de-Broglie wavelength λ_d, then
(1) $\lambda = \left(\frac{2h}{mc}\right)\lambda_d^2$ (2) $\lambda = \left(\frac{2m}{hc}\right)\lambda_d^2$
(3) $\lambda_d = \left(\frac{2mc}{h}\right)\lambda^2$ (4) $\lambda = \left(\frac{2mc}{h}\right)\lambda_d^2$

49. Energy levels A, B, C of a certain atom correspond to increasing values of energy i.e., $E_A < E_B < E_C$. If λ_1, λ_2, λ_3 are the wavelengths of radiation corresponding to the transitions C to B, B to A and C to A respectively, which of the following relation is correct?
(1) $\lambda_3 = \lambda_1 + \lambda_2$ (2) $\lambda_3 = \frac{\lambda_1\lambda_1}{\lambda_1 + \lambda_2}$
(3) $\lambda_1 + \lambda_2 + \lambda_3 = 0$ (4) $\lambda_3^2 = \lambda_1^2 + \lambda_2^2$

50. A nucleus with mass number 240 breaks into two fragments each of mass number 120, the binding energy per nucleon of unfragmented nuclei is 7.6 MeV while that of fragments is 8.5 MeV. The total gain in the binding energy in the process is
(1) 216 MeV (2) 0.9 MeV
(3) 9.4 MeV (4) 804 MeV