NEET PHYSICS 2018-19 - Chennai

Periodic Test : 17 **Test ID :** 029

Number of questions: 50 **Test date: 06.04.2019**

Name: _____ **Time**: 3HRS

ID No: _____

Negative Marks : 4 marks for correct attempt & 1 mark deducted for every wrong attempt.

1. The de-Broglie wavelength of a neutron in thermal equilibrium with heavy water at a temperature T in (kelvin) and mass in m, is
   a) $\frac{h}{\sqrt{3mKT}}$
   b) $\frac{2h}{\sqrt{3mKT}}$
   c) $\frac{2h}{\sqrt{mKT}}$
   d) $\frac{h}{\sqrt{mKT}}$

2. The photoelectric threshold wavelength of silver is 3250 x 10^{-10} m . The velocity of the electron ejected from a silver surface by ultraviolet light of wavelength 2536 x 10^{-10}m is [given h=4.14 × 10^{-15} eV s and c=3×10^{-10}ms^{-1}]
   a) $\approx 0.6 \times 10^6$ ms^{-1}
   b) $\approx 0.61 \times 10^3$ ms^{-1}
   c) $\approx 0.3 \times 10^6$ ms^{-1}
   d) $\approx 6 \times 10^5$ ms^{-1}

3. Electrons of mass m with de-Broglie wavelength λ fall on the target in an X-ray tube. The cutoff wavelength (λ_0) of the emitted X-ray is
   a) $\lambda_0 = \frac{2mc\lambda^2}{h}$
   b) $\lambda_0 = \frac{2h}{mc}$
   c) $\lambda_0 = \frac{2m^2c^2\lambda^3}{h^2}$
   d) $\lambda_0 = \lambda$

4. Photons with energy 5 eV are incident on a cathode C in a photoelectric cell. The maximum energy of emitted photoelectrons is 2 eV. When photons of energy 6 eV are incident on C, no photoelectrons will reach the anode A, if the stopping potential of A relative to C is
   (a) +3 V
   (b) +4 V
   (c) -1 V
   (d) -3 V

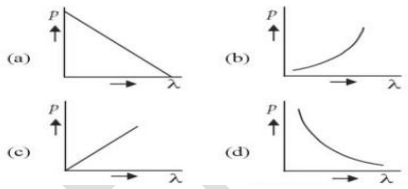
5. An electron of mass in and a photon have same energy E, The ratio of de-Broglie wavelengths associated with them is
   a) c$(2mE)^{\frac{1}{2}}$
   b) $\frac{1}{c}\left(\frac{2m}{E}\right)^{\frac{1}{2}}$
   c) $\frac{1}{c}\left(\frac{E}{2m}\right)^{\frac{1}{2}}$
   d) $\left(\frac{E}{2m}\right)^{\frac{1}{2}}$

6. When a metallic surface is illuminated with radiation of wavelength λ, the stopping potential is V. If the same surface is illuminated with radiation of wavelength 2λ, the stopping potential is $\frac{V}{4}$. The threshold wavelength for metallic surface is
   a) $\frac{5}{2}\lambda$
   b) 3λ
   c) 4λ
   d) 5λ

7. Photoelectric surface is illuminated successively by monochromatic light of wavelength λ and If the maximum kinetic energy of the emitted photoelectrons in the second case is 3 times that in the first case, the work function of the surface of the material is (h = Planck's constant, c = speed of light)
   a) $\frac{2hc}{\lambda}$
   b) $\frac{hc}{3\lambda}$
   c) $\frac{hc}{2\lambda}$
   d) $\frac{hc}{\lambda}$

8. Light of wavelength 500 nm is incident on a metal with work function 2.28 eV. The de Broglie wavelength of the emitted electron is
   a) $\geq 2.8 \times 10^{-9}$ m
   b) $\leq 2.8 \times 10^{-12}$ m
   c) $< 2.8 \times 10^{-10}$ m
   d) $< 2.8 \times 10^{-9}$ m

9. Which of the following figures represent the variation of particle momentum and the associated de-Broglie wavelength?



10. A certain metallic surface is illuminated with monochromatic light of wavelength λ, The stopping potential for photo-electric current for this light is 3 Vo. If the same surface is illuminated with light of wavelength 2λ, the stopping potential is V_0. The threshold wavelength for this surface for photo-electric effect is
    a) $\frac{\pi}{4}$
    b) $\frac{\lambda}{6}$
    c) 6λ
    d) 4λ

11. When the energy of the incident radiation isincreased by 20%, the kinetic energy of the photoelectrons emitted from a metal surface increased from 0.5 eV to 0.8eV. The work function of the metal is
    a) 0.65 eV
    b) 1.0 eV
    c)1.3 eV
    d) 1.5 eV

12. If the kinetic energy of the particle is increased to 16 times its previous value, the percentage change in the de Broglie wavelength of the particle is
    a) 25
    b)75
    c) 60
    d)50

13. The wave length λ_e of an electron and λ_p of a photon of same energy E, are related by
    a) $\lambda_p \propto \sqrt{\lambda_e}$
    b) $\lambda_p \propto \frac{1}{\sqrt{\lambda_e}}$
    c) $\lambda_p \propto {\lambda_e}^2$
    d) $\lambda_p \propto \lambda_e$

14. For photoelectric emission from certain metal the cut off frequency is ν, If radiation of frequency 2ν impinges on the metal plate. The maximum possible velocity of the emitted electron will be $(m\ is\ the\ electron\ mass)$
    a) $\sqrt{\frac{2h\nu}{m}}$
    b) $2\sqrt{\frac{h\nu}{m}}$

c) $\sqrt{\frac{h\nu}{(2m)}}$

d) $\sqrt{\frac{h\nu}{m}}$

15. A source of light is placed at a distance of 50 cm from a photo cell and the stopping potential is found to be V_0. If the distance between the light source and photo cell is made 25 cm, the new stopping potential will be
    a) $\frac{V_0}{2}$
    b) ν_0
    c) $4\nu_0$
    d) $2\nu_0$

16. The de-Broglie wavelength of neutrons in thermal equilibrium at temperature T is
    a) $\frac{3.08}{\sqrt{T}}$Å
    b) $\frac{0.308}{\sqrt{T}}$Å
    c) $\frac{.0308}{\sqrt{T}}$Å
    d) $\frac{30.8}{\sqrt{T}}$Å

17. A 200 W sodium street lamp emits yellow light of wavelength 0.6 .trn. Assuming it to be 25% efficient in converting electrical energy to light, the number of photons of yellow light it emits per second is
    a) 1.5×10^{20}
    b) 6×10^{18}
    c) 62×10^{20}
    d) 3×10^{19}

18. Monochromatic radiation emitted when electron on hydrogen atom jumps from first excited to the ground state irradiates a photosensitive material. The stopping potential is measured to 3.57 V. The threshold frequency of the material is
    a) 4 x 10^{15}Hz
    b) 5 x 10^{15}Hz
    c) 1.6 x 10^{15}Hz
    d) 2.5 x 10^{15}Hz

19. An α-particle moves in a circular path of radius0.83 cm in the presence of a magnetic field of 0.25 Wb/m2. The de Broglie wavelength associated with the particle will be
    a) 1Å
    b) 0.1 Å
    c) 10Å
    d) 0.01Å

20. If the momentum of an electron is changed by p, then the de Broglie wavelength associated with it changes by 0.5 %. The initial momentum of electron will be
    a) 200P
    b) 400P
    c) $\frac{P}{200}$
    d) 100P

21. Two radiations of photons energies 1 eV and2.5 eV, successively illuminate a photosensitive metallic surface of work function 0,5eV. The ratio of the maximum speeds of the emitted electrons is
    a) 1:4
    b) I:2
    c) 1:1
    d) 1:5

22. Photoelectric emission occurs only when the incident light has more than a certain minimum
    a) power
    b) wavelength
    c) intensity
    d) frequency

23. In the Davisson and Germer experiment, the velocity of electrons emitted from the electron gun can be increased by
    a) increasing the potential difference between the anode and filament
    b) increasing the filament current
    c) decreasing the filament current
    d)decreasing the potential difference between the anode and filament

24. Light of two different frequencies whose photons have energies 1 eV and 2.5 eV respectively illuminate a metallic surface whose work function is 0.5 eV successively. Ratio of maximum speeds of emitted electrons will be
    a) 1:4
    b) 1 : 2
    c) 1 :1
    d) 1 :5

25. Electrons used in an electron microscope are accelerated by a voltage of 25 kV. If the voltage is increased to 100 kV then the de-Broglie wavelength associated with the electrons would
    a) increase by 2 times
    b) decrease by 2 times
    c) decrease by 4 times
    d) increase by 4 times

26. In photoelectric emission process from a metal of work function 1.8eV, the kinetic energy of most energetic electrons is 0.5 eV. The corresponding stopping potential is
    a) 1.8 V
    b) 1.3 V
    c) 0.5 V
    d) 2.3 V

27. The threshold frequency for a photosensitive metal is 3.3 x 10^{14} Hz. If light of frequency8.2 x 10^{14} Hz is incident on this metal, the cut-off voltage for the photoelectron emission is nearly
    (a) 1 V
    (b) 2 V
    (c) 3 V
    (d) 5 V

28. A beam of cathode rays is subjected to crossed electric (E) and magnetic fields (B). The fields are adjusted such that the beam is not deflected. The specific charge of the cathode rays is given by
    a) $\frac{B^2}{2VE^2}$
    b) $\frac{2VB^2}{E^2}$
    c) $\frac{2VE^2}{B^2}$
    d) $\frac{E^2}{2VB^2}$

    $\left(where\ V\ is\ the\ potential\ difference\ between\ cathode\ and\ anode\right)$

29. A source S_1 is producing, 10^{15} photons persecond of wavelength 5000 Å. Another source S_2 is producing 1.02 x 10^{15} photons per second of wavelength 5100 Å .Then, (power of S_2)/(power of S_1S1) is equal to
    a) 1.00
    b) 1.02
    c) 1.04
    d) 0.98

30. The potential difference that must he applied to stop the fastest photoelectrons emitted by a nickel surface, having work function 5.01 eV, when ultraviolet light of 200 nm falls on it, must be
    a)2.4 V
    b)-1.2 V
    c) -2.4 V
    d) 1.2 V

31. The kinetic energy of an electron, which is accelerated in the potential difference of 100 volts, is
(a) 416.6 cal
(b) 6.636 cal
(c) 1.602×10^{-17}
(d) 1.6×10^{4} J

32. An electron beam has a kinetic energy equal to 100 eV. Find its wavelength associated with a beam, if mass of electron = 9.1 x 10-3' kg and 1 eV =- 1.6 x 10-19 J/eV. (Planck's constant = 6.6 x 10-" Js)
(a) 24.6 Å
(b) 0.12 Å
(c) 1.2 Å
(d) 6.3 Å.

33. In a discharge tube at 0.02 mm, there is formation of
(a) Crooke's dark space
(b) Faraday's dark space
(c) both space partly
(d) none of these.

34. An electron of mass m and charge e is accelerated from rest through a potential difference V in vacuum. Its final velocity will be

(a) $\sqrt{\frac{2eV}{m}}$ (b) $\sqrt{\frac{eV}{m}}$
(c) $\frac{eV}{2m}$ (d) $\frac{eV}{m}$.

35. An electric of mass m, when accelerated through a potential difference V, has de Broglie wavelength λ. The de Broglie wavelength associated with a proton of mass M accelerated through the same potential difference ,will be
(a) $\lambda\frac{M}{m}$
(b) $\lambda\frac{m}{M}$
(c) $\lambda\sqrt{\frac{M}{m}}$
(d) $\lambda\sqrt{\frac{m}{M}}$

36. If we consider electrons and photons of same wavelength, then they will have same
(a) momentum
(b) angular momentum
(c) energy
(d) velocity

37. When light of wavelength 300 nm (nanometer) falls on a photoelectric emitter ,photoelectrons are liberated. For another emitter, however, light of 600 nm wavelength is sufficient for creating photoemission. What is the ratio of the work functions of the two emitters?
(a) 1:2
(b) 2:1
(c) 4:1
(d) 1:4

38. Number of ejected photoelectrons increases with increase
(a)in intensity of light
(b) in wavelength of light
(c) in frequency of light
(d) never

39. Momentum of photon wavelength λ is
(a) $\frac{h\nu}{c}$
(b) zero
(c) h λ/c^2
(d) h λ/c

40. The cathode of a photoelectric cell is changed such that the work function changes from W_1 to $W_2(W_2 > W_1)$ If the

current before and after changes are I_1 and I_2, all other conditions remaining unchanged ,then (assuming $h\nu > \underline{W_2}$)

(a) $I_1 = I_2$
(b) $I_1 < I_2$
(c) $I_1 > I_2$
(d) $I_1 < I_2 < 2I_1$

41. Photoelectric work function of a metal is eV. Light of wavelength λ = 3000 Å falls on it. The photo electrons come out with a maximum velocity
(a) 10 metres/secs
(b) 10^2 metres/secs
(c) 10^4 metres/secs
(d) 10^6 metres/secs

42. the wavelength of a 1 keV photon is 1.24 x 10^{-9} m. What is the freqency of 1 MeV.
(a)1.24 x 10^{15}
(b) 2.4 x 10^{20}
(c) 1.24 x 10^{18}
(d) 2.4 x 10^{23}

43. An electron with (rest mass me) moves with a speed of 0.8 c. Its mass when it mows with this speed is
(a) m^o
(b) $m^o/6$
(c) $5m^o/3$
(d) $3m^o/5$

44. A radio transmitter operates at a frequency 880 kHz and a power of 10 kW. The number of photons emitted per second is
(a) 1.72 x 10^{31}
(b) 1.327 x 10^{25}
(c) 1.327 x 10^{37}
(d) 1.327 x 10^{45}

45. The momentum of a photon of an electromagnetic radiation is 3.3 x 10^{-29} kg ms^{-1}. What is the frequency of the associated waves?[h = 6.6 x 10^{-34} c = 3 x 10^8 ms^{-1}]
(a) 1.5 x 10^{13} Hz
(b) 7.5 x 10^{12} Hz
(c) 6 x 10^3Hz
(d) 3 x 10^5 Hz

46. Ultraviolet radiations of 6.2 eV falls on an aluminium surface. Kinetic energy of fastest electron emitted is (work function = 4.2 eV)
(a) 3.2 x 10^{-21} J
(b) 3.2 x 10^{-19} J
(c) 7 x 10^{-25} J
(d) 9 x 10^{-32} J

47. The de Broglie wave corresponding to a particle of mass m and velocity v has a wavelength associated with it
(a) h/mv
(b) hmv
(c) mh/v
(d) m/hv

48. The energy of a photon of wavelength x is
(a) $hc\lambda$
(b) hc/λ
(c) λ/hc
(d) $\lambda h/c$

49. Thermions are
(a) protons
(b) electrons
(c) photons
(d) positrons

50. The threshold frequency for photoelectric effect on sodium to a wavelength of 5000 .Its work function is
(a)4 x 10^{-19} J
(b) 1 J
(c)2 x 10^{-19} J
(d) 3 x 10^{-19} J