Date Planned : __ / __ / __	Daily Tutorial Sheet - 2	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	JEE Main (Archive)	Exact Duration :_____

16. The energy of an electron in the first Bohr orbit of H-atom is $-13.6\,eV$. The possible energy value of the excited state for electrons in Bohr orbits of hydrogen is : **(2015)**

(A) $-3.4\,eV$ **(B)** $-4.2\,eV$ **(C)** $-6.8\,eV$ **(D)** $+6.8\,eV$

17. Which of the following is the energy of a possible excited state of hydrogen ? **(2015)**

(A) $+13.6\,eV$ **(B)** $-6.8\,eV$ **(C)** $-3.4\,eV$ **(D)** $+6.8\,eV$

18. If the principal quantum number n = 6, the correct sequence of filling of electrons will be : **(2015)**

(A) $ns \to np \to (n-1)d \to (n-2)f$ **(B)** $ns \to (n-2)f \to (n-1)d \to np$

(C) $ns \to (n-1)d \to (n-2)f \to np$ **(D)** $ns \to (n-2)f \to np \to (n-1)d$

19. At temperature T, the average kinetic energy of any particle is $\frac{3}{2}kT$. The de Broglie wavelength follows the order. **(2015)**

(A) Thermal proton > Visible photon > Thermal electron

(B) Thermal proton > Thermal electron > Visible photon

(C) Visible photon > Thermal electron > Thermal neutron

(D) Visible photon > Thermal neutron > Thermal electron

20. The total number of orbitals associated with the principal quantum number 5 is: **(2016)**

(A) 5 **(B)** 10 **(C)** 20 **(D)** 25

21. A stream of electrons from a heated filament was passed between two charged plates kept at a potential difference *V* esu. If *e* and *m* are charge and mass of an electron, respectively, then the value of $\frac{h}{\lambda}$ (where λ is wavelength associated with electron wave) is given by : **(2016)**

(A) $2\,meV$ **(B)** $\sqrt{meV}$ **(C)** $\sqrt{2meV}$ **(D)** meV

22. The radius of the second Bohr orbit for hydrogen atom is: (Planck's Constant $h = 6.6262 \times 10^{-34}$ Js; mass of electron = 9.1091×10^{-31} kg; charge of electron $e = 1.60210 \times 10^{-19}$ C; permittivity of vacuum $\epsilon_0 = 8.854185 \times 10^{-12} kg^{-1}m^{-3}A^2$) **(2017)**

(A) 2.12 Å **(B)** 1.65 Å **(C)** 4.76 Å **(D)** 0.529 Å

23. If the shortest wavelength in Lyman series of hydrogen atom is A, then the longest wavelength in Paschen series of He^+ is : **(2017)**

(A) $\frac{5A}{9}$ **(B)** $\frac{9A}{5}$ **(C)** $\frac{36A}{5}$ **(D)** $\frac{36A}{7}$

24. The electron in the hydrogen atom undergoes transition from higher orbitals to orbital of radius 211.6 pm. This transition is associated with: **(2017)**

(A) Lyman series **(B)** Balmer series **(C)** Paschen series **(D)** Brackett series

25. Ejection of the photoelectron from metal in the photoelectric effect experiment can be stopped by applying 0.5 V when the radiation of 250 nm is used. The work function of the metal is **(2018)**

(A) 5 eV **(B)** 4 eV **(C)** 5.5 eV **(D)** 4.5 eV

26. The de-Broglie's wavelength of electron present in first Bohr orbit of 'H' atom is : **(2018)**

(A) $\frac{0.529}{2\pi}\text{Å}$ **(B)** $2\pi \times 0.529\text{Å}$

(C) 0.529Å **(D)** $4 \times 0.529\text{Å}$

27. Which of the following statements is false? **(2018)**

(A) Photon has momentum as well as wavelength

(B) Splitting of spectral lines in electrical field is called Stark effect

(C) Frequency of emitted radiation from a black body goes from a lower wavelength to higher wavelength as the temperature increases

(D) Rydberg constant has unit of energy

28. For emission line of atomic hydrogen form $n_i = 8$ to $n_f = n$, the plot of wave number $(\bar{\nu})$ against $\left(\frac{1}{n^2}\right)$ will be : (the Rydberg constant, R_H is in wave number unit) **(2019)**

(A) Linear with slope $-R_H$ **(B)** Non linear

(C) Linear with slope R_H **(D)** Linear with intercept

29. Which of the following combination of statements is true regarding the interpretation of the atomic orbital? **(2019)**

(a) An electron in an orbital of high angular momentum stays away from the nucleus than an electron on the orbital of lower angular momentum.

(b) For a given value of the principal quantum number, the size of the orbit is universally proportional to the azimuthal quantum number.

(c) According to wave mechanics, the ground state angular momentum is equal to $\frac{h}{2\pi}$.

(d) The plot of ψ vs r for various azimuthal quantum numbers, shows peak shifting towards higher *r* value.

(A) (a), (b) **(B)** (b), (c) **(C)** (a), (d) **(D)** (a), (c)

30. The ground state energy of hydrogen atom is $-13.6\,\text{eV}$. The energy of second excited state He^+ ion in eV is : **(2019)**

(A) -27.2 **(B)** -3.4 **(C)** -54.4 **(D)** -6.04

31. Heat treatment of muscular pain involves radiation of wavelength of about $900\,\text{nm}$. Which spectral line of H-atom is suitable for this purpose ? $\left[R_H = 1 \times 10^5 \text{cm}^{-1},\ h = 6.6 \times 10^{-34}\text{Js},\ c = 3 \times 10^8 \text{ms}^{-1}\right]$ **(2019)**

(A) Paschen, $\infty \to 3$ **(C)** Lyman, $\infty \to 1$

(C) Paschen, $5 \to 3$ **(D)** Balmer, $\infty \to 2$

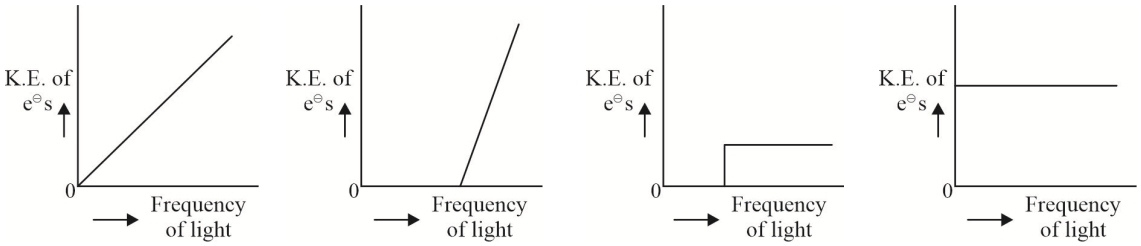
32. What is the work function of the metal if the light of wavelength 4000 Å generates photoelectrons of velocity $6 \times 10^5 \text{ms}^{-1}$ from it ? (Mass of electron $= 9 \times 10^{-31}$ kg, Velocity of light $= 3 \times 10^8\,\text{ms}^{-1}$, Planck's constant $= 6.626 \times 10^{-34}$ Js, Charge of electron $= 1.6 \times 10^{-19}\text{Je V}^{-1}$) **(2019)**

(A) 2.1 eV **(B)** 3.1 eV **(C)** 0.9 eV **(D)** 4.0 eV

33. If the de Broglie wavelength of the electron in nth Bohr orbit in a hydrogenic atom is equal to $1.5\pi a_0$ (a_0 is Bohr radius), then the value of n/z is : **(2019)**

(A) 1.50 **(B)** 0.75 **(C)** 1.0 **(D)** 0.40

34. Which of the graphs shown below does not represent the relationship between incident light and the electron ejected from metal surface? **(2019)**



(A) **(B)** **(C)** **(D)**

35. The de Broglie wavelength (λ) associated with a photoelectron varies with the frequency (ν) of the incident radiation as [ν_0 is threshold frequency] : **(2019)**

(A) $\lambda \propto \frac{1}{(\nu-\nu_0)^{\frac{3}{2}}}$ **(B)** $\lambda \propto \frac{1}{(\nu-\nu_0)^{\frac{1}{4}}}$ **(C)** $\lambda \propto \frac{1}{(\nu-\nu_0)^{\frac{1}{2}}}$ **(D)** $\lambda \propto \frac{1}{(\nu-\nu_0)}$

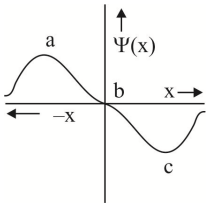
36. The electrons are more likely to be found: **(2019)**

(A) in the region a and c

(B) only in the region a

(C) in the region a and b

(D) only in the region c



37. Among the following, the energy of 2s orbital is lowest in : **(2019)**

(A) K **(B)** Li **(C)** Na **(D)** H

38. Which one of the following about an electron occupying the 1s orbital in a hydrogen atom is incorrect? (The Bohr radius is represented by a_0): **(2019)**

(A) The electron can be found at a distance $2a_0$ from the nucleus

(B) The magnitude of the potential energy is double that of its kinetic energy on an average

(C) The total energy of the electron is maximum when it is at a distance a_0 from the nucleus

(D) The probability density of finding the electron is maximum at the nucleus

39. If p is the momentum of the fastest electron ejected from a metal surface after the irradiation of light having wavelength λ, then for 1.5 p momentum of the photoelectron, the wavelength of the light should be: (Assume kinetic energy of ejected photoelectron to be very high in comparison to work function):

(A) $\frac{4}{9}\lambda$ **(B)** $\frac{3}{4}\lambda$ **(C)** $\frac{1}{2}\lambda$ **(D)** $\frac{2}{3}\lambda$ **(2019)**