Atomic Energy Central Schoool No.4 Rawatbhata

Multiple Choice Questions Test (November-December 2018-19)

M:M: 60 Time Class XII, Physics, Chemistry, Mathematics1 Hour

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1 . A particle is dropped from a height *H*. The de Broglie wavelength of the particle as a function of height is proportional to

A) H B) $H^{1/2}$ C) H^{0} D) $H^{-1/2}$

2 The wavelength of a photon needed to remove a proton from a nucleus which is bound to the nucleus with 1 MeV energy is nearly

A) 1.2 nm B) 1.2 × 10–3 nm C) 1.2 × 10–6 nm D) 1.2×10^{1} nm

3 Consider a beam of electrons (each electron with energy *E0*) incident on a metal surface kept in an evacuated chamber. Then A)no electrons will be emitted as only photons can emit electrons.

B) electrons can be emitted but all with an energy, E0

C) electrons can be emitted with any energy, with a maximum of *E0* –θ, where θis the work function).

D) electrons can be emitted with any energy, with a maximum of *E0*.

4 An electron is moving with an initial velocity $\mathbf{v} = v_0\hat{\mathbf{i}}$ and is in a magnetic field $\mathbf{B} = B_0\hat{\mathbf{j}}$. Then it's de Broglie wavelength

A) remains constant. B) increases with time. C) decreases with time. D) increases and decreases periodically.

5 Taking the Bohr radius as $a0$ = 53pm, the radius of Li++ ion in its ground state, on the basis of Bohr's model, will be about

A) 53 pm B) 27 pm C) 18 pm D) 13 pm

6 The simple Bohr model cannot be directly applied to calculate the energy levels of an atom with many electrons. This is because

A) of the electrons not being subject to a central force. B) of the electrons colliding with each other C) of screening effects D) the force between the nucleus and an electron will no longer

7 For the ground state, the electron in the H-atom has an angular momentum = h , according to the simple Bohr model. Angular momentum is a vector and hence there will be infinitely many orbits with the vector pointing in all possible directions. In actuality, this is not true,

A) because Bohr model gives incorrect values of angular momentum. B) because only one of these would have a minimum energy C) angular momentum must be in the direction of spin of electron. D) because electrons go around only in horizontal orbits.

8 O_2 molecule consists of two oxygen atoms. In the molecule, nuclear force between the nuclei of the two atoms

A) is not important because nuclear forces are short-ranged.

B) is as important as electrostatic force for binding the two atoms.

C) cancels the repulsive electrostatic force between the nuclei.

D) is not important because oxygen nucleus have equal number of neutrons and protons.

9 Two H atoms in the ground state collide inelastically. The maximum amount by which their combined kinetic energy is reduced is

A) 10.20 eV B) 20.40 eV C) 13.6 eV D) 27.2 eV

10 A set of atoms in an excited state decays.

A) in general to any of the states with lower energy. B) into a lower state only when excited by an external electricfield. C) all together simultaneously into a lower state. D) to emit photons only when they collide.

11 Suppose we consider a large number of containers each containing initially 10000 atoms of a radioactive material with a half life of 1 year. After 1 year,

A) all the containers will have 5000 atoms of the material.

B) all the containers will contain the same number of atoms of the material but that number will only be

approximately 5000.

C) the containers will in general have different numbers of the atoms of the material but their average will be close to 5000.

D) none of the containers can have more than 5000 atoms.

12 When a nucleus in an atom undergoes a radioactive decay, the electronic energy levels of the atom

A) do not change for any type of radioactivity .

B) change for α & β radioactivity but not for γ radioactivity.

C) change for α radioactivity but not for others

D) change for β radioactivity but not for others.

13 Heavy stable nucle have more neutrons than protons. This is because of the fact that

A) neutrons are heavier than protons.

B) electrostatic force between protons are repulsive.

C) neutrons decay into protons through beta decay.

D) nuclear forces between neutrons are weaker than that between protons.

14 In a nuclear reactor, moderators slow down the neutrons which come out in a fission process. The moderator used have light nuclei. Heavy nuclei will not serve the purpose because

A) they will break up.

B) elastic collision of neutrons with heavy nuclei will not slow them down.

C) net weight of the reactor would be unbearably high.

D) substances with heavy nuclei do not occur in liquid or gaseous state at room temperature.

15 . In Bohr model the hydogen atom, the lowest orbil corresponds to

A) Infinite energy B) zero energy C) The minimum energy D) The maximum energy

16 . The control rod in a nuclear reactor is made of

A) uranium B) Cadmium C) plutomium D) graphite

17 If 13.6 eV energy is required to ionige the hydrogen atom the energy required to remove the electron form n=2 state is

A) Zero B) 10.2 eV C) 6.8 eV D) 3.4 eV

18 which of the following can not be emitted in radioactive decay of the substance?

A) Helium-nucleus B) Electrons C) Neutrions D) Proton

19 The ionigation Potential of hydrogen atom is 13.6 eV. An electron in the ground state absords Photon of energy 12.75 eV. How many dirrerent spectral lines can one expect when electron make a down ward transition

A) 1 B) 2 C) 6 D) 4

20 The half life time of a radidactive elements of x is the same as the mean life of another radioactive element Y. Initially they have same number of atoms, then

A) y will decay faster thean x

B) x will decay faster then y

C) x and y will decay at the same rate at all time

D) x and y will decay at the same rate intially.

21 The electronic structure of chromium is

A) $3d^6 4s^0$ B) $3d^5 4s^1$ C) $3d^4 4s^2$ D) $3d^3 4s^2 4p^1$

22 One of the characteristics of transition metals to from the complex ion is

A) Having unpaired electrons in d-subshell

B) Having paired electrons in d-subshell

C) Providing empty d-orbitals

D) Having small charge/size ratio

23 Which of the ions will give colourless aqueous solution?

A) Ni^{2+} B) Fe^{2+} C) Cu^{2+} D) Cu^{+}

24 Which of the following has more unpaired electrons?

A) Zn^{+} B) Fe^{2+} C) Ni^{3+} D) Cu^{+}

25 Which of the following belongs to the actinide series of elements?

A) Y B) Ta C) U D) Ac

26 Manganese exhibits maximum oxidation state in

A) K_2MnO_4 B) $KMnO_4$ C) MnO_2 D) Mn_3O_4

27 Which forms the interstitial compounds?

A) Fe B) Co C) Ni D) All

28 Which lanthanide is most commonly used?

A) Lanthanum B) Nobelium C) Thorium D) Cerium

29 The valancy of Cr in the complex $[Cr(H_2O)_4Cl_2]^+$ is

A) 1 B) 3 C) 5 D) 6

30 Which of the following ions has zero magnetic movement?

A) Cu^+ B) Co^{2+} C) Ni^{2+} D) Fe^{3+}

31 The number of moles of $KMnO_4$ that will be needed to react with one mole of sulphite in an acidic solution is

A) 2/5 B) 3/5 C) 4/5 D) 1

32 Potassium ferrocyanide is a

A) Normal salt B) Mixed salt C) Double salt D) Complex salt

33 In the formation of $K_4[Fe(CN)_6]$, the hybridisation involved is

A) sp^2 B) d^2sp^3 C) d^3sp^2 D) dsp^2

34 $[Co(NH_3)_5Br]SO_4$ and $[Co(NH_3)_5SO_4]$ Br are related to each other as

A) Ionization isomers B) Linkage isomers C) Coordination isomers D) Optical isomers

35 How many ions are produced from $[Co(NH_3)_6]CI_2$ in solution?

A) 6 B) 4 C) 3 D) 2

36 Which one of the following cationdoesnotform an ammine complex with excess of ammonia?

A) Ag^+ B) Cu^{2+} C) Cd^{2+} D) Na^+

37 The oxidation number of cobalt in $K[Co(CO)_4]$ is

A) +1 B) +3 C) -1 D) -3

38 Which of the following is *π-acid ligand?*

A) NH_3 B) CO C) F^- D) Ethylene diamine

39 Which of the following has square planar structure?

A) $[NiCl_4]^{2-}$ B) $[Ni(CO)_4]$ C) $[Ni(CN)_4]^2$ D) None of these

40 Which of the following shall form an octahedral complex?

A) d^4 (low spin) B) d^8(high spin) C) d^6 (low spin) D) All of these

41 The area between the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1 \; and \; \frac{x}{a} + \frac{y}{b} = 1 \; is$

A) $\frac{1}{2}\pi ab$ B) $\frac{1}{4}ab$ C) $\frac{1}{2}ab$ D) $\frac{\pi ab}{4} - \frac{ab}{2}$

42 The area of region enclosed by y = x, x=e, y = 1/x & +ve x-axis is

A) 3/2 sq units B) 5/2 sq units C) 1/2 sq units D) 1 sq unit

43 Area of the region enclosed by y= cos x between x = 0 & x= π is,

A) 2 sq units B) 4 sq units C) 3 sq units D) 1 sq unit

44 Area of region bounded by curve y = x + 1 & lines x = 2 & x = 3 is

A) 7/2 sq units B) 9/2 sq units C) 11/2 sq units D) 13/2 sq units

45 The unit vector perpendicular to the vectors $\hat{i} + \hat{j}$ and $\hat{i} - \hat{j}$ forming aright handed system is

A) $\hat{k}$ B) $-\hat{k}$ C) $\frac{\hat{i}+\hat{j}}{\sqrt{2}}$ D) $\frac{\hat{i}-\hat{j}}{\sqrt{2}}$

46 If $\vec{a}$ and $\vec{b}$ are unit vectors, then what is the angle between themfor $3\vec{a} - \vec{b}$ to be a unit vector?

A) 30° B) 45° C) 60° D) 90°

47 The 2 vectors $\hat{j} + \hat{k}$ and $3\hat{i} - \hat{j} + 4\hat{k}$ represents the two sides AB andAC, respectively of a ΔABC. The length of the median through A is

A) $\frac{\sqrt{34}}{2}$ B) $\frac{\sqrt{48}}{2}$ C) $\sqrt{18}$ D) None of these

48 Number of vectors of unit length& $\perp$ to vectors $\vec{a} = 2\hat{i} + \hat{j} + 2\hat{k}$ & $\vec{b} = \hat{j} + \hat{k}$ is

A) one B) two C) three D) infinite

49 If $\vec{a}, \vec{b}, \vec{c}$ are unit vectors such that $\vec{a} + \vec{b} + \vec{c} = \vec{0}$,evaluate $\vec{a}.\vec{b} + \vec{b}.\vec{c} + \vec{c}.\vec{a}$

A) 1 B) -2/3 C) –3/2 D) None of these

50 If $|\vec{a} \times \vec{b}| = 4$ and $|\vec{a}.\vec{b}| = 2$ then $|\vec{a}|^2 |\vec{b}|^2 = ?$

A) 2 B) 6 C) 8 D) 20

51 The solution of differential equation $\frac{dy}{dx} + \sqrt{\frac{1-y^2}{1-x^2}} = 0$ is

A)$\tan^{-1}x + \cot^{-1}x = c$ B)$\sin^{-1}x + \sin^{-1}y = c$ C)$\sec^{-1}x + \operatorname{cosec}^{-1}x = c$ D)None

52 Integrating factor of differential equation $x \log x \frac{dy}{dx} + y = 2 \log x$ is

A) x B) e^x C) log x D) log(log x)

53 The differential equation (x+y)dx +xdy=0 is

A)homogenous, not linear B)linear, not homogenousC)both homogenous & linear D)none

54 The order of differential equation of all circles of given radius *a* is

A) 1 B) 2 C) 3 D) 4

55 The order and degree of the differential equ$\left[1 + \left(\frac{dy}{dx}\right)^2\right]^2 = \frac{d^2y}{dx^2}$

A) 1, 2 B) 2, 2 C) 2, 1 D) 4, 2

56 Solution of differential equation $2xdy/dx - y = 3$ shows a family of

A) straight lines B) circles C) parabolas D) ellipses

57 If $\frac{dy}{dx} = y + 3 > 0$ and y(0) = 2, then y(ln2) is equal to

A) 13 B) -2 C) 7 D) 5

58 Solution of the diff. equation cos x dy = y(sin x - y)dx, $0 < x < \frac{\pi}{2}$, is

A) sec x = (tan x + c)y B) sec x = tan x +c C) ytan x= sec x + c D) tan x = (sec x + c)y

59 The solution of the differential equation is $\frac{dy}{dx} = \frac{(x^2+xy+y^2)}{x^2}$ is

A) $\tan^{-1}\frac{x}{y} = \log y$ B) $\tan^{-1}\frac{y}{x} = \log x$ C) $\tan^{-1}\frac{x}{y} = \log x$ D) $\tan^{-1}\frac{y}{x} = \log y$

60 Differential equation of family of lines passing through origin is

A) $\frac{dy}{dx} = x$ B) $\frac{dy}{dx} = y$ C) $x\frac{dy}{dx} + y = 0$ D) $x\frac{dy}{dx} - y = 0$

Answer Key

1	2	3	4	5	6	7	8	9	10
D	B	D	A	C	A	A	A	A	A
11	12	13	14	15	16	17	18	19	20
C	B	B	B	C	B	D	D	C	A
21	22	23	24	25	26	27	28	29	30
B	C	D	B	C	B	D	D	B	A
31	32	33	34	35	36	37	38	39	40
A	D	B	A	C	D	C	B	C	D
41	42	43	44	45	46	47	48	49	50
		d	c	a	a	b	d	a	d
51	52	53	54	55	56	57	58	59	60
		c	a	b	c	d	b	d	c