JEE EXPERT

ANSWER KEY

REGULAR TEST SERIES - (RTS-03)

11TH A01 (Zenith)

Date 14.07.2019

PHYSICS

1	(D)	2	(A)	3	(D)	4	(D)	5	(D)
6	(A)	7	(C)	8	(C)	9	(B)	10	(A)
11	(B)	12	(D)	13	(C)	14	(B)	15	(D)
16	(B)	17	(D)	18	(A)	19	(B)	20	(B)
21	(B)	22	(A)	23	(C)	24	(B)	25	(C)
26	(C)	27	(B)	28	(C)	29	(C)	30	(C)

CHEMISTRY

31	(A) or (C)	32	(A)	33	(C)	34	(A)	35	(C)
36	(D)	37	(D)	38	(A)	39	(D)	40	(D)
41	(B)	42	(C)	43	(C)	44	(D)	45	(D)
46	(A)	47	(A)	48	(A)	49	(B)	50	(C)
51	(C)	52	(D)	53	(B)	54	(C)	55	(C)
56	(D)	57	(A)	58	(B)	59	(C)	60	(A)

MATHEMATICS

61	(B)	62	(C)	63	(B)	64	(C)	65	(C)
66	(A)	67	(C)	68	(A)	69	(C)	70	(A)
71	(D)	72	(D)	73	(B)	74	(D)	75	(C)
76	(A)	77	(D)	78	(A)	79	(A)	80	(D)
81	(B)	82	(C)	83	(A)	84	(B)	85	(A)
86	(C)	87	(B)	88	(C)	89	(C)	90	(A)

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SOLUTIONS

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CHEMISTRY

31. **(A) or (C)** According to Bohr's model of H-atom, both
(i) total energy of the electron is quantized and
(ii) angular momentum of the electron is quantized and is given as $\sqrt{l(l+1)} \cdot \frac{h}{2\pi}$ and true.

32. **(A)** Any orbital with l = 0 has spherical symmetry irrespective of the value of its principal quantum number.

33. **(C)** $KE_1 = h\nu_1 - h\nu_0$
$KE_2 = h\nu_2 - h\nu_0$
$\frac{KE_1}{KE_2} = \frac{h(\nu_1 - \nu_0)}{h(\nu_2 - \nu_0)}$; $\frac{2}{1} = \frac{\nu_1 - \nu_0}{\nu_2 - \nu_0}$; $\nu_0 = \frac{\mathbf{2\nu_2 - \nu_1}}{\mathbf{2-1}}$.

34. **(A)** For the same orbit radius $\propto \frac{1}{\text{atomic number}}$

35. **(C)** $E_2 - E_1 = \left[\frac{-E_1}{4} + E_1\right] = \frac{+3E_1}{4}$, $E_4 - E_3 = \frac{-E_1}{16} + \frac{E_1}{9} = \frac{7E_1}{16\times 9}$

$\frac{E_2 - E_1}{E_4 - E_3} = \frac{3}{4} \times \frac{144}{7} = \frac{108}{7} = \frac{108}{7} \simeq \mathbf{15}$.

36. **(D)** $\lambda = \frac{h}{\sqrt{2\,m\,KE}}$; (K.E. = e·V); $\lambda = \left[\frac{h}{\sqrt{2\,m\,e\cdot V}}\right] = \left[\frac{h^2}{2m\cdot eV} \times 10^{20}\right]^{\frac{1}{2}} A^o$

$= \left[\frac{150}{V}\right]^{\frac{1}{2}} A^o = \frac{12.27}{\sqrt{V}} A^o$

37. **(D)** Magnetic moment = $\sqrt{n(n+2)}$ B.M where n is the number of unpaired electrons.

For Fe^{3+} ion n = 5 so, $\mu = \sqrt{5(5+2)} = \sqrt{35}$ B.M

38. **(A)**

39. **(D)** $\dfrac{\lambda_1}{\lambda_2} = \sqrt{\dfrac{E_2}{E_1}}$ where 'E' is the K.E. of a particle.

As per the above relation, when K.E. is doubled, its wavelength becomes $\dfrac{1}{\sqrt{2}}$ times.

40. **(D)** Energy of single electron system is only depend on the principle quantum number, so that energy of different orbitals of same principle quantum number is same.

41. **(B)** Atomic number 20 $\longrightarrow$ $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$

42. **(C)** $r_n = 0.529 \dfrac{n^2}{Z}$ Å

$r_2 = 0.529 \times \dfrac{4}{Z} = R$ (for n = 2)

$r_3 = 0.529 \times \dfrac{9}{Z} = 9 \times \dfrac{R}{4}$ (for n = 3)

43. **(C)** ns^2np^5

44. **(D)** $\dfrac{hc}{\lambda} = w_0 + KE$ (but KE = 0) ; $\lambda = \dfrac{6.626 \times 10^{-34} \times 3 \times 10^8}{4 \times 1.6 \times 10^{-19}} = 3.1 \times 10^{-7}$ m = **3100 Å**.

45. **(D)** For (d), the value of n + *l* = 3 + 2 = 5. In other cases the value of (n + *l*) is less than 5. The orbital having higher (n + *l*) value has higher energy.

46. **(A)** $BaCl_2 + H_2SO_4 \longrightarrow BaSO_4 + 2HCl$

	$BaCl_2$	H_2SO_4	$BaSO_4$	$2HCl$
Moles taken initially	0.5 mol	1 mol	0	0
	0	0.5 mol	0.5 mol	1 mol

The limiting reagent is $BaCl_2$. Hence, a maximum of 0.5 mole of $BaSO_4$ will be obtained.

47. **(A)** $\dfrac{1}{\lambda} = RZ^2\left[\dfrac{1}{n_1^2} - \dfrac{1}{n_2^2}\right]$ $n_1 = 2, n_2 = 3, Z = 1$

$\dfrac{1}{\lambda} = R\left[\dfrac{1}{4} - \dfrac{1}{9}\right]$ $\dfrac{1}{\lambda} = \dfrac{5R}{36}$ cm^{-1}

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48. **(A)** $\frac{1}{\lambda} = R_H Z^2\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right) = 109670\left(\frac{1}{1} - \frac{1}{4}\right) = \frac{3}{4}(109670)\ cm^{-1}$

$\lambda = 1215.8 \times 10^{-8}$ cm i.e., $\lambda =$ **1215.8 Å**

49. **(B)**

50. **(C)**

51. **(C)** Percentage polarity $= \frac{\text{observed dipole moment of molecules} \times 100}{\text{calculated dipole moment}}\%$

Here observed dipole moment of HCl = 1.03 D

Calculated dipole moment of HCl $= 4.8 \times 10^{-10} \times 1.275 \times 10^{-8} = 4.8 \times 1.275$ D

Therefore, % polarity = $\frac{1.03}{4.8 \times 1.275} \times 100\%$.

52. **(D)**

53. **(B)**

54. **(C)** Oxygen will have half–filled subshell.

55. **(C)**

56. **(D)** Ca^{2+} is the smaller cation and SO_4^{2-} is the larger anion. According to Fajan's rule $CaSO_4$ must be most covalent and least soluble.

57. **(A)** Due to presence of more polarizing power of Al^{3+}.

58. **(B)** $X(g) \longrightarrow X^+(g) + e$

If I is ionization energy then

$$\frac{1}{2}(I) = E_1$$

$$I = \mathbf{2E_1}$$

If E is electron affinity then

$$\frac{1}{2}(E) = E_2$$

$$E = \mathbf{2E_2}$$

59. **(C)** % ionic characters = $\dfrac{\text{observed dipole moment}}{\text{calculated dipole moment assuming 100\% ionic character}} \times 100$

$$= \left[\frac{1.92\ \text{D}}{(4.80\times10^{-10})\times(2\times10^{-8}\,\text{cm})}\right]\times100$$

$$= \frac{1.92\ \text{D}}{(4.8\times2)\text{D}}\times100 = \mathbf{20\%}.$$

60. **(A)** MgS has the least ionic character due to smaller size of Mg^{2+} ion and larger size of S^{2-} ion.

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