ANSWER KEY (AIPMT-2009)

Ques.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans	2	4	2	3	2	3	3	2	3	1	4	4	2	2	1	3	4	1	4	1
Ques.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Ans	3	4	1	3	4	2	4	2	2	2	2	1	4	2	2	3	3	2	4	3
Ques.	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans	3	1	1	3	2	1	3	1	4	1	4	2	2	4	4	2	2	2	2	2
Ques.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Ans	3	2	2	2	3	1	4	4	1	2	3	1	3	3	2	2	2	4	4	3
Ques.	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Ans	4	2	2	1	1	2	1	1	2	4	2	2	3	2	1	1	4	2	4	1
Ques.	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Ans	4	3	4	2	2	3	4	4	3	1	2	1	4	1	4	1	4	4	2	2
Ques.	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
Ans	3	2	3	2	4	3	1	1	2	1	3	4	3	4	1	1	4	3	4	2
Ques.	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
Ans	1	1	1	1	4	4	1	4	1	1	3	2	3	3	3	3	2	3	3	2
Ques.	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
Ans	1	1	3	4	4	2	3	3	2	3	4	2	3	3	2	3	1	2	3	2
Ques.	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
Ans	2	1	3	4	4	1	3	3	2	4	4	3	3	2	3	2	4	3	1	4

HINTS & SOLUTIONS

1. $[P] = \frac{F}{A} = \left[\frac{MLT^{-2}}{L^2}\right] = [ML^{-1}T^{-2}]$

2. $s = \frac{1}{2}at^2$

3. $\frac{s_2}{s_1} = \left(\frac{20}{10}\right)^2 = 4$

   $s_2 = 4s_1$

4. $S_r = v_r t$

   $1000 = (v - 10) \times 100$

   $v = 20$ m/s

5. $\Sigma F = ma$

   $\Rightarrow T - mg = ma$

   $a = \frac{T - mg}{m} = 4$ m/s^2

   $\vec P_1 + \vec P_2 + \vec P_3 = 0$

   $|\vec P_3| = |\vec P_1 + \vec P_2|$

   $m \times 4 = \sqrt{P_1^2 + P_2^2} = \sqrt{12^2 + 16^2}$

   $m = 5$ kg

6. Loss in grav. PE = gain in spring PE

   At maximum elongation

   $Mgx = \frac{1}{2}kx^2 \Rightarrow x = \frac{2Mg}{k}$

7. $\vec R_{cm} = \frac{m_1\vec r_1 + m_2\vec r_2}{m_1 + m_2} = \frac{2\hat i - \hat j + \hat k}{2}$

8. $I = 4 \times \left[\frac{ML^2}{12} + M\left(\frac{L}{2}\right)^2\right]$ the parallel axis theorem $= \frac{4ML^2}{3}$

9. Apply conservation of angular momentum.

   $L_i = L_f$

   $MR^2\omega = (M + 2m)R^2\omega'$

   $\omega' = \frac{M\omega}{M + 2m}$

10. $\vec F = 6\hat i - 8\hat j + 10\hat k$

    $|\vec F| = \sqrt{6^2 + 8^2 + 10^2} = 10\sqrt{2}$

11. $m = \frac{|\vec F|}{|\vec a|} = \frac{10\sqrt{2}}{1} = 10\sqrt{2}$ kg

    $\vec\tau = \vec r \times \vec F$

    $\vec\tau$ is perpendicular to $\vec r$ and $\vec F$.

12. Kepler's 2nd law

⇒ ΔA = constant
Δt planet
A1= A2
t1t2
2A = A⇒
t1t2
⇒ t1 = 2t2

13. mv = dmdu×= dm= Rate of flowing mass
du dt dt

F= dmv(mv)vmv2av ×= =
dt222
dK mv2 mv3
p == × v =
dt23

14. Loss of energy = 1mv2 – mgh = 20 J
2

15. For steady state dQ = kA(T1−T2)
dtL

16. Isochoric → Volume constant

17. P ∝ T4
P42
= 1000
P1 500

18. P2 = 16P1 = 112

19. dU = Q – W = 8400 – 500 = 7900 J

n' = c+uν
c – u

20. = 600330+30 = 720 Hz
330−30

ω A2 −x2
21. v =

22. = 2π2a2a= πa3−
T 4 T

In SHM, Frestoring ∝ – x
As the coefficient of x is negative, it is moving along +ve x-axis and equating the equation

E = 2.5 cos[(2π × 106)t – (π × 10−2y)x]

with y = A cos(ωt – kx)
ω = 2π × 106
ω
⇒ f = = 106 Hz
2π
k = π × 10−2
= 2π⇒ λ
k

2π
= 200m
π×10
5λ = 4

23. λ = 4
5
k = 2π=10π = 7.85
λ 4

24. wave moves along positive X-direction

= V– VV = 11Δν
2− l12l22l1l2

25. 1 T
= 11
2− μ 1l2

26. In series, Ceq = C,
3
Veq = 3V
Total resistance of wire = 12 Ω × 2π × 10−1
= 2.4π

Resistance of each half = 2.4π = 1.2π
2
and as about diameter both parts are in parallel

Req. = 1.2π = 0.6 πΩ

27. 2
W = MB (cosθ1 – cosθ2)
= 2 × 104 × 6 × 10−4 (cosθ – cos60º)
= 12 × 1 = 6 J

28. 2
r r r
F = q(ν×B)
= – 2 × 10−6[(2î ^+3ĵ ^)×106×2ĵ ^]= – (8N)k^ ^

29.

e = dφ= d(Bπr2)
dtdt
= 2πrB dr
dt
= 2 × π × 2 × 10−2 × 4 × 10−2 × 2 × 10−3
= 3.2 × 10−6 πVol = 3.2 πμV

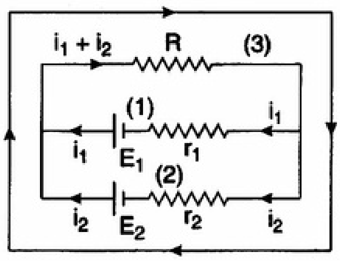
30. V = – x2y – xz3 + 4

r
E V= δδδ = –– î ^+ĵ ^+k^
δx δy δz

(−x2−xz3+4)

= (2xy + z3)î ^ + x2ĵ ^ + 3xz2 k^ ^

31.



For loop (3)

$E_1 - (i_1 + i_2) R - i_1r_1 = 0$

For loop (4)

$- E_1 + i_1r_1 - i_2r_2 + E_2 = 0$

For loop (1)

$E_2 - (i_1 + i_2) R - i_2r_2 = 0$

32. $I_g = 1.0A, G = 60q, I = 5.0$ A

$S = gG \frac{I}{I - Ig}$

$G = \frac{1.0 = 60}{5.0 - 1.0}$

= 15 Ω in parallel

33. $T = \frac{2\pi m}{2B}$

34. T is time period

$P_{av} = E_{rms} . I_{rms} \cos \varphi$

.ε2.R = Rε

zz2 z ε

R =

2 2 2

35. R L 1ω − ω

C π2σ

$q_A = 4a$ π2σ

$q_B = - 4b$ π2σ

$q_C = 4c, c = a + b$

A B

VA = 1qqq++C = 2σ

4π∈0 a b c ∈ 0

VB = 1qAq+Bq+C

4π∈0 a b c

2 σ a σ a

= bc = ∈ b − + ∈ a + 2

0 q b

V1AC = q 4π∈0 a + qBq b + c C

σ a 2

= b − + c=2a ∈ σ

∈ 0c 0

c So, V = VA ≠ VB

36. E = V + Ir

⇒ V = E − Ir

Comparing with y = mx + c

Slope = − r, intercept = E

37. Out of the four structures, when the circular and elliptical loops come out from the field, equal are is not traced in equal interval of time. So any induced in both is not constant.

38. As diamagnetic substances have negative intensity of magnetisation, they are weekly repelled by the external field.

39. No. of photoelectrons emitted is independent of frequency but depends on intensity.

40. No. of photons = $\frac{E}{(hc/\lambda)}$

$= \frac{9\times10^{-3}\times6.67\times10^{-7}}{6.6\times10^{-34} \times3\times10^{8}}$

$= 3 \times 10^{16}$

41. As a and b have same stopping potential and c has greater stopping potential, then vc > va = vb as b and c have same saturation current and a has lesser value.

So Ia < Ib = Ic

42. XYA4AZZ−2ZP →

As the resulting daughter and parent nucleus has same atomic number. So they are isotope.

43. $\frac{n(n-1)}{2} = 6$

⇒ n = 4

For maximum wavelength energy difference between states should be minimum because

$\lambda = \frac{hc}{\Delta E}$

So, transition state in n = 4 to n = 3

44. Energy = $\frac{1Z1Z2}{4\pi\in_0 r_0}$

45. XA β→ YAα→BA−4yZZ+1 Z−1 →

BA−4Z−1

46. qV = 2eV

$\Rightarrow 1.6 \times 10^{-19}V = 2 \times 1.6 \times 10^{-19}$ V

⇒ V = 2V

$E = \frac{V}{d}$

$\Rightarrow E = 2V= 5 \times 10^7 \frac{}{4\times10^{-8}}$

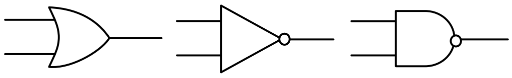
47. $\frac{\sqrt{3}a}{2} = 3.7$ Å

$\Rightarrow$ a = $\frac{2 \times 3.7}{\sqrt{3}}$ = 4.3 Å

48. $\lambda_{max} = \frac{hc}{eV}$

$= \frac{1242 eVÅ}{2.5 eV}$ = 4968 Å

49.



50. (OR) (NOT) (NAND)

ΔI_B = 100 μA

ΔI_C = 5 mA

$\beta = \frac{\Delta I_C}{\Delta I_B} = \frac{5 \times 10^{-3}}{100 \times 10^{-6}} = 50$

51. $H_2 + \frac{1}{2}O_2 \rightarrow H_2O$
2g 16g 18g

10g H_2 required O_2 = 80 which is not present 64 g O_2 required 8 g of H_2 and H_2 left = 2g. Thus, O_2 is the limiting reactant and H_2 is excess reactant.

Hence, H_2O formed from 64 of O_2

$= 18 \times \frac{64}{16}$

$= 72$ g $= \frac{72}{18}$ mole = 4 mole

52. PO_4^{3-}, oxidation no. of P $\Rightarrow$ +5

SO_4^{2-}, oxidation no. of S $\Rightarrow$ +6

$Cr_2O_7^{2-}$, oxidation no. of Cr $\Rightarrow$ +6

53. Maximum no. of electrons in any subshell
= 4*l* + 2

54. m value – *l* to + *l*

55. ΔH = dissociation energy of reactant – Bond dissociation of energy of product.

ΔH = (606.10 + 4 × 410.5 + 431.37)
– (6 × 410.50 + 336.49)

= – 120.0 kJ/mol

56. $K_h = \frac{K_w}{K_b} = \frac{10^{-14}}{7 \times 10^{-5}} = \frac{10^{-10}}{1.7} = 5.65 \times 10$

57. $Cu^{2+} + 2e^- \rightarrow Cu$

E° = 0.337 V

ΔG = – nFE°cell

= – 2 × F × 0.337 = – 0.674

$Cu^{2+} \rightarrow Cu^{2+} + e^-$

E° = – 0.153 V

ΔG = – 1 × F × 0.153

Final

$Cu^+ + e^- \rightarrow Cu$

ΔG = – 0.52 V

ΔG = – nFE°cell

E°cell = 0.52 V

58. 20 mL of 0.50 M HCl = 20×0.050 m mol
= 1.0 m mol = 1.0 meq. of HCl

30 mL of 0.10 M $Ba(OH)_2$
= 30 × 0.1 m mol
= 3m mol = 3 × 2 meq
= 6 meq $Ba(OH)_2$

1 meq of HCl will neutralize 1 meq of $Ba(OH)_2$

$Ba(OH)_2$ left = 5 meq.

Tatal volume = 50 mL

$Ba(OH)_2$ conc. in final solution

$= \frac{5}{50}N = 0.1$ N = 0.05 M

$[OH^-]$ = 2 × 0.05 M = 0.10 M

Alternatively,

$Ba(OH)_2 + 2HCl \rightarrow BaCl_2 + 2H_2O$

2 m mol of HCl neutralize 1 m mole of $Ba(OH)_2$

1 m mol of HCl neutralize 0.5 m mol of $Ba(OH)_2$

$Ba(OH)_2$ left = 3 – 0.5 m mol = 2.5 m mol

$[Ba(OH)_2] = \frac{2.5}{50}M = 0.05$ M

or $[OH]^-$ = 2 × 0.05 = 0.1 M

59. KE = $4.4 \times 10^{-19} - 4.0 \times 10^{-19}$

KE/molecule = 0.4×10^{-19}

KE/atom = $\frac{0.4 \times 10^{-19}}{2}$

= 2×10^{-20} J

60. $-\frac{1}{3}\frac{d[H_2]}{dt} = \frac{1}{2}\frac{d[NH_3]}{dt}$

$-\frac{d[H_2]}{dt} = \frac{3}{2}\frac{d[NH_3]}{dt}$

61. $-\frac{d[H_2]}{dt} = 3 \times 2 \times 10^{-4} = 3 \times 10^{-4}$ mol L^{-1} s^{-1}

62. Rate = $k[A][B]^2$
= $k[2A][2B]^2 = k \times 8[A][B]^2$

$\alpha = \frac{\Lambda_C}{\Lambda_\infty} = \frac{8}{400}$

$K_a = C\alpha^2$

$= 1 \times \frac{8}{400} \times \frac{8}{400} = 1.25 \times 10^{-5}$

32

63. $\Delta T_f = ik_f . m$

$i = \Delta T_f = 0.00732 = 0.00732$
$k_f.m$ 1.86×0.002 0.00372

$i = 2$

Compound will be $[Co(NH_3)_5]NO_5NO_2]Cl$
Total possible ions = 2

64. 1 d(Br−)
− = 1d(Br)−2
4dt3dt

65. d(Br) d(Br−2
= 3)−
dt 5 dt

for bcc type of unit cell

$\sqrt{3}a = 4r$

$r = \sqrt{3}a = 1.732 \times 351 = 151.98$
4 4

66. Kc = K1a(CH
3COOH) ×
Ka(HCN)

$= 1.5 \times 10^{-5} \times 1$

4.5×10^{-10}

$\cong 3 \times 10^4$

67. For a spontaneous reaction

$\Delta G = -ve$

Or ar eq. $\Delta G = 0$

$\Delta H = T\Delta S$

$T = \Delta H = 170 \times 10^3 = 1000$ K
ΔS 170

68. $K = 0.693 = 0.693 = 0.5 \times 10^{-3}$ S^{-1}
$t_{1/2}$ 1386

69. Both BF andNO− is sp232 hybridized.

70. $F_2 \rightarrow$ reduction potential very high so strongest oxidizing agent.

71. $N_2 = 14e = B.O. = 3$

$N_2^- = 15e = B.O. = 2.5$

$N_2^{-2} = 16e = B.O. = 2$

72. MI > MBr > MCl > MF
Down the group increases covalent character

73. Since CaO itself is basic, It will not react with NaOH

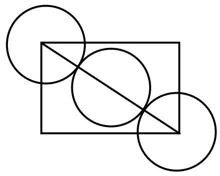
74. $W = E \times I \times t$
96500

$W = 9 \times 4.0 \times 10^4 \times 6 \times 3600$
96500

$= 8.1 \times 10^4$ g

75. +I stability down the group increase due to inert pair effect
Al < Ga < In < Tl

76. Cu fcc lattice



$4r = \sqrt{2}a$

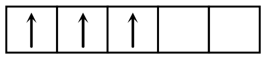
$r = 1a$
$2 \ 2\sqrt{}$

$r = 1 \times 361 = 128$
$2 \ 2\sqrt{}$

77. Inter molecular force in alcohol H- is mainly bonding

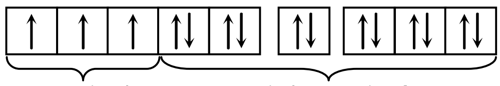
78. $Cr^{3+} \rightarrow 1s^2, 2s^22p^6, 3s^23p^63d^3$

3d3



$[Cr(NH_3)_6]^{3+}$

3d3 4s 4p



Unpaired electron

Six lone pair of ligand

Unpaired electron shows colour so absorb visible light.

79. In both TiF_6^{2-} and Cu_2Cl_2, these no d-electrons or no unpaired electrons so, these are colourless.

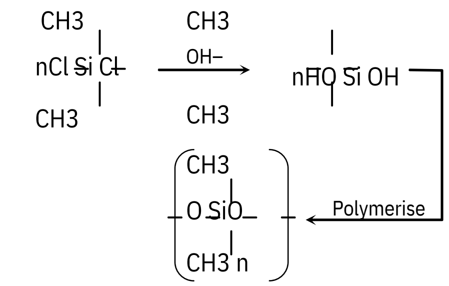
80. As complexes of the type [MA3B3] can show geometrical isomerism knows as facmer isomerism and not optical isomerism. So here $[Co(NH_3)_3Cl_3]^0$ can not show optical isomerism.

81. 7th group → largest number of oxidation state.

82. $(CH_3)_3B \rightarrow$ is electron efficient compound, so behaves as Lewis acid.

83. $[Ne]3s^23p^3$ has highest ionization energy (half-filled)

84.



85. CH ≡ C – CH = CH2
4 3 2 1
1-butene-3-yne

86. CH3CH=CH–CH3
Can exists as

H–C–CH3
||
H–C–CH3
cis

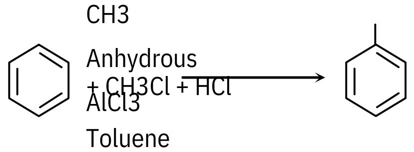
H–C–CH3
||
CH3–C–H
And
Trans

ΔG = ΔH – TΔS

87. CH2–OH | CH2–OH + HIO4 ⟶ 2HCHO + HIO3+H2O

88. CH3–CH2–OH $\xrightarrow{PBr3}$ CH3–CH2–Br
↓ Alc. KOH
CH3–CH2–OH $\xleftarrow[\text{Room temp. (ii) H2O, heat}]{\text{(i) H2SO4}}$ CH2=CH2

89.



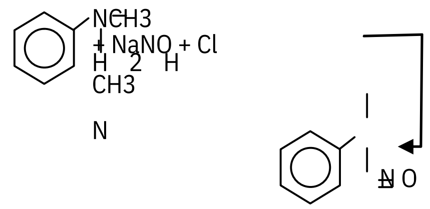
90. HNO3 on nitrating mixture acts as a base.

91. R – X + KOH → R – OH + KX
X– replaced by OH– show nucleophilic substitution reaction

92. Equanil is a diasaccharide [Everday life]

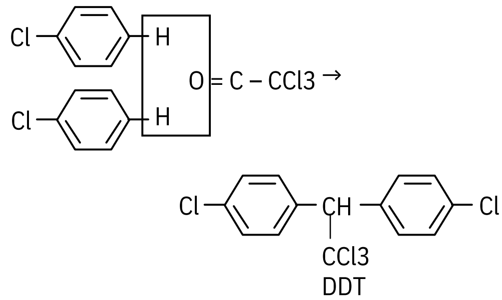
93. Neoprene is
⟮CH2 – C = CH – CH2 – CH2 –⟯
| Cl n

94.

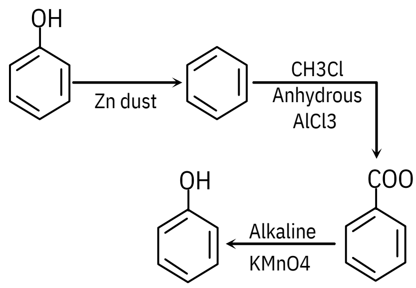


95. O
||
C H 3 – C H 2 – C – O H + B r 2
P
H.V.Z. reaction
Br
|
CH3–C–COOH
|
Br

96.



97.



98. C2 having 2 bond sp →
C hav33ing 4- bond sp →
C hav25ing 3- bond sp →

99. C hav36ing 4- bond sp →

100. Gene →
Thyroxine contains iodine. Its structure is