WBJEE - 2019

Answer Keys by

Aakash Institute, Kolkata Centre

PHYSICS & CHEMISTRY

Q.No.	✿	□	○	+
01	B	A	D	A
02	B	C	A	D
03	D	C	C*	D
04	D	C	B	C #
05	D	B	B	B
06	B	A	D	C
07	B	D	D	D
08	C	A	D	A
09	D	A	B	D
10	C	D	B	A
11	C	D	C	C*
12	A	C #	D	B
13	C	B	C	B
14	C	C	C	D
15	C	D	A	D
16	B	A	C	D
17	A	D	C	B
18	D	A	C	B
19	A	C*	B	C
20	A	B	A	D
21	D	B	D	C
22	D	D	A	C
23	C #	D	A	A
24	B	D	D	C
25	C	B	D	C
26	D	B	C #	C
27	A	C	B	B
28	D	D	C	A
29	A	C	D	D
30	C*	C	A	A
31	A	A	C	A
32	A	A	A	C
33	A	C	A	A
34	A	A	A	A
35	C	A	A	A
36	B, D	A, D	B, D	A, C
37	B	A, C	B, D	B, D
38	A, D	B, D	B	B, D
39	A, C	B, D	A, D	B
40	B, D	B	A, C	A, D
41	C	C	A	A
42	A	D	B	B
43	D	C	D	D
44	B	C	B	A
45	A	C	D	B
46	B	A	D	D
47	C	B	D	B
48	B	D	B	A
49	D	A	C	B
50	B	B	A	D
51	C	D	D	B
52	D	B	B	D
53	C	A	A	D
54	C	B	B	D
55	C	D	C	B
56	A	B	B	C
57	B	D	D	A
58	D	D	B	D
59	A	D	C	B
60	B	B	D	A
61	D	C	C	B
62	B	A	C	C
63	A	D	C	B
64	B	B	A	D
65	D	A	B	B
66	B	B	D	C
67	D	C	A	D
68	D	B	B	C
69	D	D	D	C
70	B	B	B	C
71	D	A	A	D
72	D	D	D	A
73	A	A	D	D
74	D	D	A	D
75	A	D	D	A
76	A, B	B, C, D	D	A, C
77	A, B	A, C	A, B	D
78	B, C, D	D	A, B	A, B
79	A, C	A, B	B, C, D	A, B
80	D	A, B	A, C	B, C, D

 # The actual answer is $5\mu_0 I/24\pi_{\varnothing}$; π_0 is missing in the given option

*** The data given lead to large angular position for which trigonometric approximation should not have been valid**

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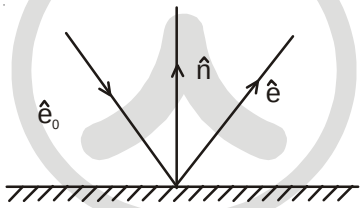
ANSWERS & HINT
for
WBJEE - 2019
SUB : PHYSICS & CHEMISTRY

PHYSICS

CATEGORY - I (Q1 to Q30)

Carry 1 mark each and only one option is correct. In case of incorrect answer or any combination of more than one answer, ¼ mark will be deducted.

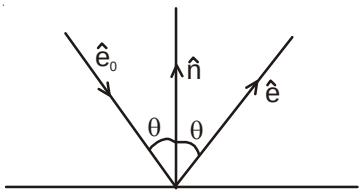
1. A ray of light is reflected by a plane mirror. $\hat{e}_0$, $\hat{e}$ and $\hat{n}$ be the unit vectors along the incident ray, reflected ray and the normal to the reflecting surface respectively. Which of the following gives an expression for $\hat{e}$?



(A) $\hat{e}_0 + 2(\hat{e}_0.\hat{n})\hat{n}$ (B) $\hat{e}_0 - 2(\hat{e}_0.\hat{n})\hat{n}$ (C) $\hat{e}_0 - (\hat{e}_0.\hat{n})\hat{n}$ (D) $\hat{e}_0 + (\hat{e}_0.\hat{n})\hat{n}$

Ans : (B)

Hint :



$\hat{e}_0.\hat{n} = 1 \text{ x} 1.\cos(180 - \theta)$

$\hat{e}_0.\hat{n} = -\cos\theta$.....(i)

$\hat{e}.\hat{n} = 1 \times 1 \times \cos\theta$.....(ii)

$\hat{e}.\hat{n} - \hat{e}_0.\hat{n} = 2\cos\theta$

$(\hat{e} - \hat{e}_0).\hat{n} = 2\left[-\hat{e}_0.\hat{n}\right]$

$(\hat{e} - \hat{e}_0)\hat{n}.\hat{n} = -2(\hat{e}_0.\hat{n})\hat{n}$

$\hat{e} = \hat{e}_0 - 2(\hat{e}_0.\hat{n})\hat{n}$

2. A parent nucleus X undergoes α-decay with a half-life of 75000 years. The daughter nucleus Y undergoes β-decay with a half-life of 9 months. In a particular sample, it is found that the rate of emission of β-particles is nearly constant (over several months) at 10^7/hour. What will be the number of α-particles emitted in an hour ?

(A) 10^2 (B) 10^7 (C) 10^{12} (D) 10^{14}

Ans : (B)

Hint : $\lambda_P N_P = \lambda_D N_D = 10^7$/hour (at steady state)

3. A proton and an electron initially at rest are accelerated by the same potential difference. Assuming that a proton is 2000 times heavier than an electron, what will be the relation between the de Broglie wavelength of the proton (λ_p) and that of electron (λ_e) ?

(A) $\lambda_p = 2000\lambda_e$ (B) $\lambda_p = \frac{\lambda_e}{2000}$ (C) $\lambda_p = 20\sqrt{5}\lambda_e$ (D) $\lambda_p = \frac{\lambda_e}{20\sqrt{5}}$

Ans : (D)

Hint : $\lambda = \frac{h}{mv} = \frac{h}{\sqrt{2m(KE)}} = \frac{h}{\sqrt{2mqV}} \Rightarrow \lambda \propto \frac{1}{\sqrt{m}}$

$\therefore \frac{\lambda_{proton}}{\lambda_{electron}} = \sqrt{\frac{m_{electron}}{m_{proton}}} = \sqrt{\frac{1}{2000}} = \frac{1}{20\sqrt{5}}$

4. To which of the following the angular velocity of the electron in the n-th Bohr orbit is proportional ?

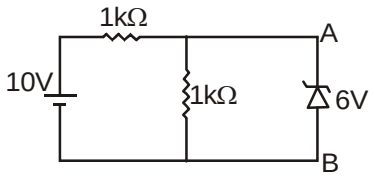
(A) n^2 (B) $\frac{1}{n^2}$ (C) $\frac{1}{n^{3/2}}$ (D) $\frac{1}{n^3}$

Ans : (D)

Hint : $L = mr^2\omega = \frac{nh}{2\pi}$, $\omega \propto \frac{n}{r^2}$,

$\omega \propto \frac{n}{(r_0 n^2)^2}$, $\omega \propto \frac{1}{n^3}$

5. In the circuit shown, what will be the current through the 6V zener ?



(A) 6 mA, from A to B (B) 2 mA, from A to B (C) 2 mA, from B to A (D) Zero

Ans : (D)

Hint : Since breakdown voltage of Zener diode is 6V and potential difference across the diode is 5V, therefore it will not conduct.

6. Each of the two inputs A and B can assume values either 0 or 1. Then which of the following will be equal to $\bar{A}.\bar{B}$?

(A) A + B (B) $\overline{A+B}$ (C) $\overline{A.B}$ (D) $\bar{A}+\bar{B}$

Ans : (B)

Hint : By De Morgan's Law

$\therefore \bar{A}.\bar{B} = \overline{A+B}$

7. The correct dimensional formula for impulse is given by

(A) ML^2T^{-2} (B) MLT^{-1} (C) ML^2T^{-1} (D) MLT^{-2}

Ans : (B)

Hint : [Impulse] = $[MLT^{-1}]$

8. The density of the material of a cube can be estimated by measuring its mass and the length of one of its sides. If the maximum error in the measurement of mass and length are 0.3% and 0.2% respectively, the maximum error in the estimation of the density of the cube is approximately

(A) 1.1% (B) 0.5% (C) 0.9% (D) 0.7%

Ans : (C)

Hint : Density (ρ) = $= \frac{\text{Mass (m)}}{\text{Volume (V)}}$

$V = L^3$

$$\therefore \left(\frac{\Delta\rho}{\rho}\right)_{max} = \frac{\Delta m}{m} + \frac{\Delta V}{V} = \frac{\Delta m}{m} + \frac{3\Delta L}{L} \qquad \left[\because \frac{\Delta V}{V} = \frac{3\Delta L}{L}\right]$$

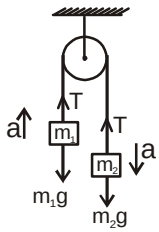
$$\therefore \left(\frac{\Delta\rho}{\rho}\right)_{max} \times 100 = [0.3 + 3(0.2)]\% = 0.9\%$$

9. Two weights of the mass m_1 and m_2 ($> m_1$) are joined by an inextensible string of negligible mass passing over a fixed frictionless pulley. The magnitude of the acceleration of the loads is

(A) g (B) $\frac{m_2 - m_1}{m_2}g$ (C) $\frac{m_1}{m_2 + m_1}g$ (D) $\frac{m_2 - m_1}{m_2 + m_1}g$

Ans : (D)

Hint :



$m_2g - T = m_2a$

$T - m_1g = m_1a$

Solving these we get

$$a = \left(\frac{m_2 - m_1}{m_2 + m_1}\right)g$$

10. A body starts from rest, under the action of an engine working at a constant power and moves along a straight line. The displacement S is given as a function of time (t) as

(A) $S = at + bt^2$, a, b are constants (B) $S = bt^2$, b is a constant

(C) $S = a\,t^{3/2}$, a is a constant (D) $S = at$, a is a constant

Ans : (C)

Hint : $P = \frac{\Delta KE}{\Delta t} = \frac{\frac{1}{2}mv^2}{t}$

$\therefore v \propto \sqrt{t}$, $\frac{dx}{dt} \propto \sqrt{t}$,

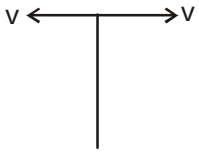
$\therefore x \propto t^{3/2}$

11. Two particles are simultaneously projected in the horizontal direction from a point P at a certain height. The initial velocities of the particles are oppositely directed to each other and have magnitude v each. The separation between the particles at a time when their position vectors (drawn from the point P) are mutually perpendicular, is

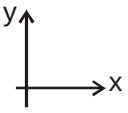
(A) $\frac{v^2}{2g}$ (B) $\frac{v^2}{g}$ (C) $\frac{4v^2}{g}$ (D) $\frac{2v^2}{g}$

Ans : (C)

Hint :



$\vec{r_1} = vt\,\hat{i} - \frac{1}{2}gt^2\,\hat{j}$, $\vec{r_2} = vt\,(-\hat{i}) - \frac{1}{2}gt^2\,\hat{j}$



$\vec{r_1}.\vec{r_2} = 0$, $\Rightarrow -v^2t^2 + \frac{1}{4}g^2t^4 = 0$,

$v^2 = \frac{1}{4}g^2t^2$, $v = \frac{gt}{2}$,

$\Delta x = 2vt = 2 \times v \times \frac{2v}{g} = \frac{4v^2}{g}$

12. Assume that the earth moves around the sun in a circular orbit of radius R and there exists a planet which also moves around the sun in circular orbit with an angular speed twice as large as that of the earth. The radius of the orbit of the planet is

(A) $2^{-2/3}R$ (B) $2^{2/3}R$ (C) $2^{-1/3}R$ (D) $\frac{R}{\sqrt{2}}$

Ans : (A)

Hint : $T^2 \propto r^3$, $\frac{r_E}{r_P} = \left(\frac{T_E}{T_P}\right)^{2/3} = \left(\frac{\omega_P}{\omega_E}\right)^{2/3}$

$\frac{R}{r_P} = (2)^{2/3}$, $r_p = 2^{-2/3}R$

13. A compressive force is applied to a uniform rod of rectangular cross-section so that its length decreases by 1%. If the Poisson's ratio for the material of the rod be 0.2, which of the following statements is correct ?

"The volume approximately ....."

(A) decreases by 1% (B) decreases by 0.8% (C) decreases by 0.6% (D) increases by 0.2%

Ans : (C)

Hint : $V = Al = abl$; $\frac{\Delta a}{a} = \frac{\Delta b}{b}$ $\left[\because \sigma = \frac{-\Delta a/a}{\Delta l/l} = \frac{\Delta b/b}{\Delta l/l}\right]$

$\Rightarrow \frac{\Delta V}{V} = 2\frac{\Delta a}{a} + \frac{\Delta l}{l} = -2\sigma\frac{\Delta l}{l} + \frac{\Delta l}{l} \Rightarrow \frac{\Delta V}{V} = \frac{\Delta l}{l}(1 - 2\sigma) = -1(1-2\times0.2) = -1(1-0.4) = -0.6$

$\therefore$ The volume approximately decreases by 0.6%.

14. A small spherical body of radius r and density ρ moves with the terminal velocity v in a fluid of coefficient of viscosity η and density σ. What will be the net force on the body ?

(A) $\frac{4\pi}{3}r^3(\rho - \sigma)g$ (B) $6\pi\eta rv$ (C) Zero (D) Infinity

Ans : (C)

Hint : $V_{terminal} \Rightarrow F_{net} = 0$

15. Two black bodies A and B have equal surface areas and are maintained at temperatures 27°C and 177°C respectively. What will be the ratio of the thermal energy radiated per second by A to that by B?

(A) 4:9 (B) 2:3 (C) 16:81 (D) 27:177

Ans : (C)

Hint : $Q = \sigma AT^4$, $\frac{Q_1}{Q_2} = \left(\frac{T_1}{T_2}\right)^4 = \left(\frac{273+27}{273+177}\right)^4 = \left(\frac{300}{450}\right)^4 = \left(\frac{2}{3}\right)^4 = \frac{16}{81}$

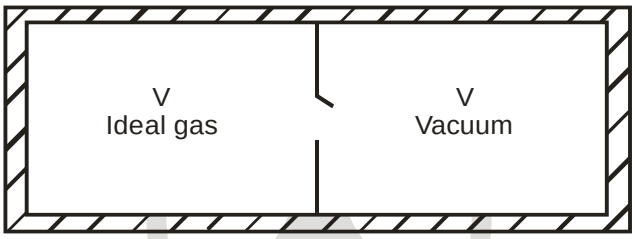
16. What will be the molar specific heat at constant volume of an ideal gas consisting of rigid diatomic molecules?

(A) $\frac{3}{2}R$ (B) $\frac{5}{2}R$ (C) R (D) 3R

Ans : (B)

Hint : f = 5 for diatomic gas $\therefore C_V = \frac{f}{2}R \Rightarrow \frac{5}{2}R$

17. Consider the given diagram. An ideal gas is contained in a chamber (left) of volume V and is at an absolute temperature T. It is allowed to rush freely into the right chamber of volume V which is initially vacuum. The whole system is thermally isolated. What will be the final temperature of the system after the equilibrium has been attained ?

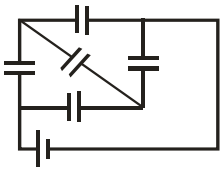


(A) T (B) $\frac{T}{2}$ (C) 2T (D) $\frac{T}{4}$

Ans : (A)

Hint : free expansion, $\Delta U = 0$, $\therefore T_i = T_f$

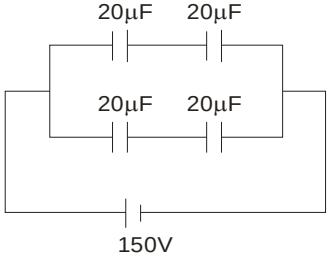
18. Five identical capacitors, of capacitance 20μF each, are connected to a battery of 150V, in a combination as shown in the diagram. What is the total amount of charge stored?



(A) 15×10^{-3} C (B) 12×10^{-3}C (C) 10×10^{-3}C (D) 3×10^{-3}C

Ans : (D)

Hint : Balanced Wheatstone's Bridge



$\Rightarrow C_{eff} = 20\ \mu F$

$\therefore Q = C_{eff}V = 20\times10^{-6}\times150 = 3\times10^{-3}$C

19. Eleven equal point charges, all of them having a charge +Q, are placed at all the hour positions of a circular clock of radius r, except at the 10 hour position. What is the electric field strength at the centre of the clock ?

(A) $\frac{Q}{4\pi\varepsilon_0 r^2}$ from the centre towards the mark 10

(B) $\frac{Q}{4\pi\varepsilon_0 r^2}$ from the mark 10 towards the centre

(C) $\frac{Q}{4\pi\varepsilon_0 r^2}$ from the centre towards the mark 6

(D) Zero

Ans : (A)

Hint : $E = \frac{KQ}{r^2}$ towards the missing corner

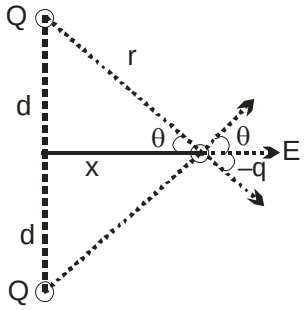
$\vec{E}_1 + \vec{E}_2 + ... + \vec{E}_{10} + \vec{E}_{11} + \vec{E}_{12} = 0 \quad \therefore \ \vec{E}_1 + \vec{E}_2 + ... + \vec{E}_9 + \vec{E}_{11} + \vec{E}_{12} = -\vec{E}_{10}$

20. A negative charge is placed at the midpoint between two fixed equal positive charges, separated by a distance 2d. If the negative charge is given a small displacement x (x << d) perpendicular to the line joining the positive charges, how the force (F) developed on it will approximately depend on x ?

(A) $F \propto x$ (B) $F \propto \frac{1}{x}$ (C) $F \propto x^2$ (D) $F \propto \frac{1}{x^2}$

Ans : (A)

Hint :



$E = \frac{2KQ}{r^2}\cos\theta = \frac{2KQ}{r^2} \times \frac{x}{r} \quad \therefore F = \frac{2KQx}{r^3}, \quad E = \frac{2KQx}{\left(d^2 + x^2\right)^{3/2}} \quad \therefore F = \frac{-2KQqx}{\left(d^2 + x^2\right)^{3/2}}$

for x<<d , x^2 can be neglected $\therefore F = \frac{-2KQqx}{d^3}$, $F \propto x$

21. To which of the following quantities, the radius of the circular path of a charged particle moving at right angles to a uniform magnetic field is directly proportional ?

(A) energy of the particle (B) magnetic field

(C) charge of the particle (D) momentum of the particle

Ans : (D)

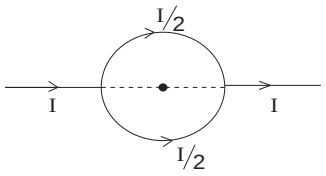
Hint : $R = \frac{mV}{qB}$ $\therefore R \propto$ momentum

22. An electric current 'I' enters and leaves a uniform circular wire of radius r through dfiametrically opposite points. A particle carrying a charge q moves along the axis of the circular wire with speed v. What is the magnetic force experienced by the particle when it passes through the centre of the circle ?

(A) $qv\frac{\mu_0 i}{a}$ (B) $qv\frac{\mu_0 i}{2a}$ (C) $qv\frac{\mu_0 i}{2\pi a}$ (D) Zero

Ans : (D)

Hint :



Net magnetic field at centre = 0

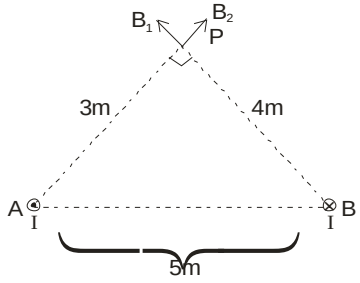
$\vec{F} = q\vec{V} \times \vec{B} = 0$

23. A current 'I' is flowing along an infinite, straight wire, in the positive Z-direction and the same current is flowing along a similar parallel wire 5m apart, in the negative Z-direction. A point P is at a perpendicular distance 3m from the first wire and 4 m from the second. What will be magnitude of the magnetic field $\vec{B}$ at P?

(A) $\frac{5}{12}(\mu_0 I)$ (B) $\frac{7}{24}(\mu_0 I)$ (C) $\frac{5}{24}(\mu_0 I)$ (D) $\frac{25}{288}(\mu_0 I)$

Ans : (C)

Hint :



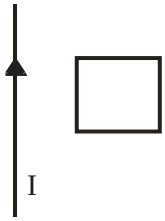
B_1 = magnetic field due to first wire = $\frac{\mu_0 \times I}{2\pi \times 3}$

B_2 = magnetic field due to second wire = $\frac{\mu_0 \times I}{2\pi \times 4}$

B = net magnetic field = $\sqrt{B_1^2 + B_2^2}$ = $\frac{\mu_0 I}{2\pi}\sqrt{\frac{1}{9}+\frac{1}{16}}$ = $\frac{\mu_0 I \times 5}{2\pi \times 3 \times 4}$ = $\frac{5}{24} \times \frac{\mu_0 I}{\pi}$

B = $\frac{5}{24\pi}\mu_0 I$; **but the exact answer is not given, so best possible answer is C**

24. A square conducting loop is placed near an infinitely long current carrying wire with one edge parallel to the wire as shown in the figure. If the current in the straight wire is suddenly halved, which of the following statements will be true?



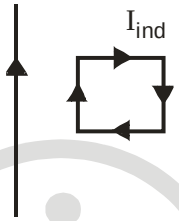
"The loop will ..... "

(A) stay stationary (B) move towards the wire

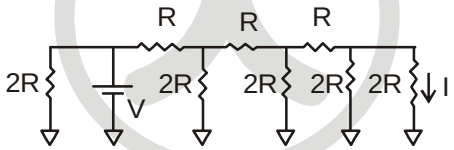
(C) move away from the wire (D) move parallel to the wire

Ans : (B)

Hint : induced current in loop will be in clockwise direction



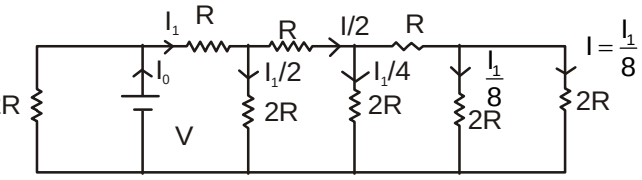
25. What is the current I shown in the given circuit?

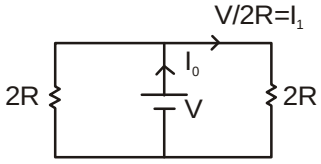


(A) $\frac{V}{2R}$ (B) $\frac{V}{R}$ (C) $\frac{V}{16R}$ (D) $\frac{V}{8R}$

Ans : (C)

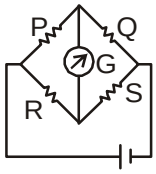
Hint :





$$\therefore I_1 = \frac{V/2R}{8} = \frac{V}{16R}$$

26. When the value of R in the balanced Wheatstone bridge, shown in the figure, is increased from 5W to 7W, the value of S has to be increased by 3W in order to maintain the balance. What is the initial value of S?



(A) 2.5 W (B) 3 W (C) 5 W (D) 7.5 W

Ans : (D)

Hint : $\frac{P}{Q}=\frac{R}{S}$

Since P and Q is constant $\frac{P}{Q}$ will be constant $\therefore \frac{R}{S}$=Constant

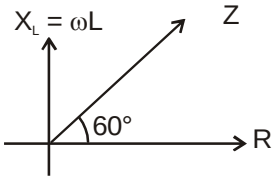
$\frac{R}{S}=\frac{5}{S}=\frac{7}{S+3}\Rightarrow 5(S+3)=7S$ or, 15 = 2S $\therefore S=7.5\,W$

27. When a 60 mH inductor and resistor are connected in series with an AC voltage source, the voltage leads the current by 60°. If the inductor is replaced by a 0.5 mF capacitor, the voltage lags behind the current by 30°. What is the frequency of the AC supply?

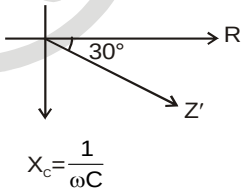
(A) $\frac{1}{2\pi}\times 10^4 Hz$ (B) $\frac{1}{\pi}\times 10^4 Hz$ (C) $\frac{3}{2\pi}\times 10^4 Hz$ (D) $\frac{1}{2\pi}\times 10^8 Hz$

Ans : (A)

Hint :



$\tan 60° = \frac{\omega L}{R}$....(i)



$X_C=\frac{1}{\omega C}$

$\tan 30° = \frac{1/\omega C}{R} = \frac{1}{\omega CR}$ .....(ii)

from (i) and (ii)

$\frac{\tan 60°}{\tan 30°} = \frac{\omega L}{R\times\frac{1}{\omega CR}} = \omega^2 LC$

$\frac{\sqrt{3}}{1/\sqrt{3}} = \omega^2\times 60\times 10^{-3}\times\frac{0.5}{10}\times 10^{-6}\Rightarrow 3=\omega^2\times 3\times 10^{-8}$ or, $\omega^2=10^8$ or, $\omega=10^4$

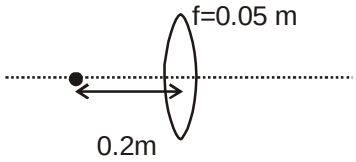
$2\pi f = 10^4 \therefore f=\frac{10^4}{2\pi}$

28. A point object is placed on the axis of a thin convex lens of focal length 0.05 m at a distance of 0.2 m from the lens and its image is formed on the axis. If the object is now made to oscillate along the axis with a small amplitude of A cm, then what is the amplitude of oscillation of the image? [you may assume, $\frac{1}{1+x} \approx 1-x$, where x < < 1]

(A) $\frac{4A}{9}\times10^{-2}$m (B) $\frac{5A}{9}\times10^{-2}$m (C) $\frac{A}{3}\times10^{-2}$m (D) $\frac{A}{9}\times10^{-2}$m

Ans : (D)

Hint :



u = –0.2, f = 0.05; $\frac{1}{v}=\frac{1}{f}+\frac{1}{u}=\frac{100}{5}-\frac{10}{2}=20-5=15$ or, $v=\frac{1}{15}$m

$-\frac{dv}{v^2}=-\frac{du}{u^2}\therefore dv=A.\frac{v^2}{u^2}$

$A_{image}=A\times\frac{1\times25}{225\times1}cm=\frac{A}{9}$ cm or, $A_{image}=\frac{A}{9}\times10^{-2}$m

29. In Young's experiment for the interference of light, the separation between the silts is d and the distance of the screen from the slits is D. If D is increased by 0.5% and d is decreased by 0.3%, then for the light of a given wavelength, which one of the following is true?

"The fringe width....."

(A) increases by 0.8% (B) decreases by 0.8% (C) increases by 0.2% (D) decreases by 0.2%

Ans : (A)

Hint : $\beta=\frac{\lambda D}{d}$

$\frac{\Delta\beta}{\beta}\times100=\frac{\Delta D}{D}\times100-\frac{\Delta d}{d}\times100=0.5-(-0.3)=0.8\%$

Fringe width increases by 0.8%

30. When the frequency of the light used is changed from 4×10^{14} s^{-1} to 5×10^{14} s^{-1}, then angular width of the principal (central) maximum in a single slit Fraunhoffer diffraction pattern changes by 0.6 radian. What is the width of the slit (assume that the experiment is performed in vacuum)?

(A) 1.5×10^{-7} m (B) 3×10^{-7} m (C) 5×10^{-7} m (D) 6×10^{-7} m

Ans : (C)

Hint : $\theta=\frac{2\lambda}{d}$ or, $\Delta\theta=\frac{2\Delta\lambda}{d}$ or, $d=\frac{2\Delta\lambda}{\Delta\theta}$

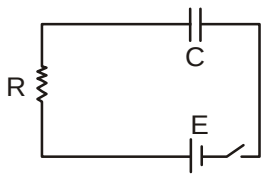
$\Delta\lambda=\frac{3\times10^8}{4\times10^{14}}-\frac{3\times10^8}{5\times10^{14}}=10^6(0.75-0.6)=0.15\times10^{-6}=1.5\times10^{-7}$

$d=\frac{2\times1.5\times10^{-7}}{0.6}=\frac{2\times15\times10^{-7}}{6}=5\times10^{-7}$

Category II (Q31 to Q 35)

Carry 2 marks each and only one option is correct. In case of incorrect answer or any combination of more than one answer, ½ mark will be deducted

31. A capacitor of capacitance C is connected in series with a resistance R and a DC source of emf E through a key. The capacitor starts changing when the key is closed. By the time the capacitor has been fully charged, what amount of energy is dissipated in the resistance R?



(A) $\frac{1}{2}CE^2$ (B) 0 (C) CE^2 (D) $\frac{E^2}{R}$

Ans : (A)

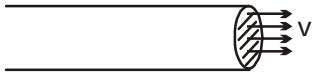
Hint : $W_{bb} = \Delta U + H \Rightarrow (CE)E = \left(\frac{1}{2}CE^2 - 0\right) + H \therefore H = \frac{1}{2}CE^2$

32. A horizontal fire hose with a nozzle of cross-sectional area $\frac{5}{\sqrt{21}} \times 10^{-3}$ m² delivers a cubic metre of water in 10s. What will be the maximum possible increase in the temperature of water while it hits a rigid wall (neglecting the effect of gravity)?

(A) 1°C (B) 0.1°C (C) 10°C (D) 0.01°C

Ans : (A)

Hint :



$$A = \frac{5}{\sqrt{21}} \times 10^{-3} m^2$$

$$\frac{dv}{dt} = Av = \frac{1}{10}, \quad v = \frac{1}{10A}, \frac{1}{2}mv^2 = ms\Delta\theta$$

$$\Delta\theta = \frac{v^2}{2s}$$

33. Two identical blocks of ice move in opposite directions with equal speed and collide with each other. What will be the minimum speed required to make both the blocks melt completely, if the initial temperatures of the blocks were –8°C each?

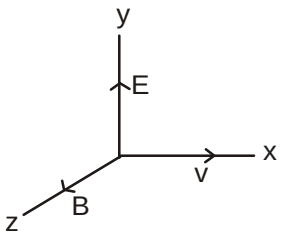
(Specific heat of ice is 2100 $Jkg^{-1}K^{-1}$ and Latent heat of fusion of ice is 3.36×10^5 Jkg^{-1})

(A) 840 ms^{-1} (B) 420 ms^{-1} (C) 8.4 ms^{-1} (D) 84 ms^{-1}

Ans : (A)

Hint : $KE_{maxloss} = \frac{1}{2}\mu v_{rel}^2 = \frac{1}{2}\left(\frac{m}{2}\right)(2u)^2 = mu^2 \therefore mu^2 = (ms\Delta\theta + mL) \times 2 \therefore u = \sqrt{2(2100 \times 8 + 336000)} = 840 m/s$

34. A particle with charge q moves with a velocity v in a direction perpendicular to the directions of uniform electric and magnetic fields, E and B respectively, which are mutually perpendicular to each other. Which one of the following gives the condition for which the particle moves undeflected in its original trajectory?



(A) $v = \frac{E}{B}$ (B) $v = \frac{B}{E}$ (C) $v = \sqrt{\frac{E}{B}}$ (D) $v = q\frac{B}{E}$

Ans : (A)

Hint : $qE=qvB \therefore v = \frac{E}{B}$

35. A parallel plate capacitor in series with a resistance of 100 W, an inductor of 20 mH and an AC voltage source of variable frequency shows resonance at a frequency of $\frac{1250}{\pi}$ Hz. If this capacitor is charged by a DC voltage source to a voltage 25 V, what amount of charge will be stored in each plate of the capacitor?

(A) 0.2 mC (B) 2 mC (C) 0.2 mC (D) 0.2 C

Ans : (C)

Hint : $\omega_0 = 2\pi f_0 = \frac{1}{\sqrt{LC}} \Rightarrow 4\pi^2 \times \frac{1250 \times 1250}{\pi^2} = \frac{1}{20 \times 10^{-3} \times C}$

$\therefore C = \frac{1000}{20 \times 4 \times 1250 \times 1250} = 8 \times 10^{-6} F$

$\backslash Q_{ss} = CV = 8 \times 10^{-6} \times 25 = 0.2mC$

Category III (Q36 to Q40)

Carry 2 marks each and one or more option (s) is/are correct. If all correct answers are not marked and also no incorrect answer is marked then score = 2 × number of correct answers marked ¸ actual number of correct answers. If any wrong option is marked or if any combination including a wrong option is marked, the answer will be considered wrong, but there is no negative marking for the same and zero mark will be awarded.

36. Electrons are emitted with kinetic energy T from a metal plate by an irradiation of light of intensity J and frequency n. Then which of the following will be true?

(A) T µ J (B) T linearly increasing with n

(C) T µ time of irradiation (D) Number of electrons emitted µ J

Ans : (B,D)

Hint : $J = \left(\frac{dN}{dt}\right)(h\nu) \propto i_{sat} = \frac{dq}{dt} \quad \backslash h\nu = \phi + T$

37. The initial pressure and volume of a given mass of an ideal gas $\left(\text{with}\frac{C_p}{C_v}=\gamma\right)$, taken in a cylinder fitted with a piston, are P_0 and V_0 respectively. At this stage the gas has the same temperature as that of the surrounding medium which is T_0. It is adiabatically compressed to a volume equal to $\frac{V_0}{2}$. Subsequently the gas is allowed to come to thermal equilibrium with the surroundings. What is the heat released to the surroundings ?

(A) 0 (B) $\left(2^{\gamma-1}-1\right)\frac{P_0V_0}{\gamma-1}$ (C) $\gamma P_0V_0\ln 2$ (D) $\frac{P_0V_0}{2(\gamma-1)}$

Ans : (B)

Hint : $T_0V_0^{\gamma-1} = T\left(\frac{V_0}{2}\right)^{\gamma-1} \Rightarrow T = T_0 2^{\gamma-1}$

$\therefore$ After compression, we assume the piston to be fixed.

$$\therefore \Delta Q = nC_v\Delta T = n\frac{R}{\gamma-1}\left(T_0 - T_0 2^{\gamma-1}\right) = \frac{P_0V_0}{\gamma-1}\left(1-2^{\gamma-1}\right)$$

$$\therefore \text{heat released} = \frac{P_0V_0}{\gamma-1}\left(2^{\gamma-1}-1\right)$$

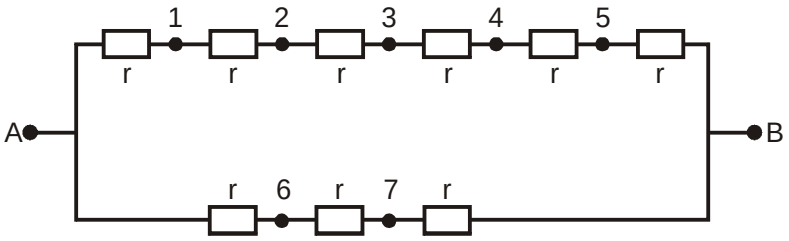
38. A projectile thrown with an initial velocity of 10 ms^{-1} at an angle α with the horizontal, has a range of 5 m. Taking g = 10 ms^{-2} and neglecting air resistance, what will be the estimated value of α ?

(A) 15° (B) 30° (C) 45° (D) 75°

Ans : (A, D)

Hint : $5 = \frac{100\,\text{Sin}(2\theta)}{10}$ $\therefore \text{Sin}(2\theta) = \frac{1}{2}$ $\therefore \theta = 15°, 75°$

39. In the circuit shown in the figure all the resistances are identical and each has the value r Ω. The equivalent resistance of the combination between the points A and B will remain unchanged even when the following pairs of points marked in the figure are connected through a resistance R.



(A) 2 and 6 (B) 3 and 6 (C) 4 and 7 (D) 4 and 6

Ans : (A, C)

Hint : Balanced condition of wheat stone bridge.

40. A metallic loop is placed in a uniform magnetic fileld $\vec{B}$ with the plane of the loop perpendicular to $\vec{B}$. Under which condition(s) given below an emf will be induced in the loop ?

"If the loop is ....."

(A) moved along the direction of $\vec{B}$

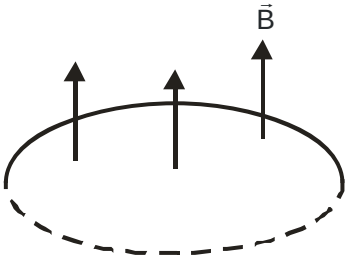
(B) squeezed to a smaller area

(C) rotated about its axis

(D) rotated about one of its diameters

Ans : (B, D)

Hint :



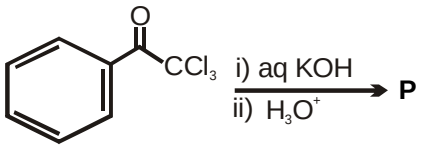
If moved along $\vec{B}$ or rotated about its own axis, flux remains unchanged.

CHEMISTRY

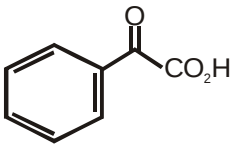
CATEGORY - I (Q41 to Q70)

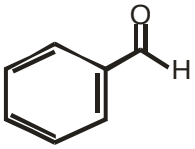
Carry 1 mark each and only one option is correct. In case of incorrect answer or any combination of more than one answer, ¼ mark will be deducted.

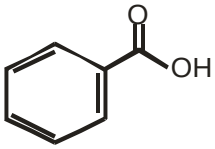
41. One of the products of the following reaction is **P.**

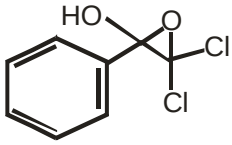


Structure of **P** is

(A) 

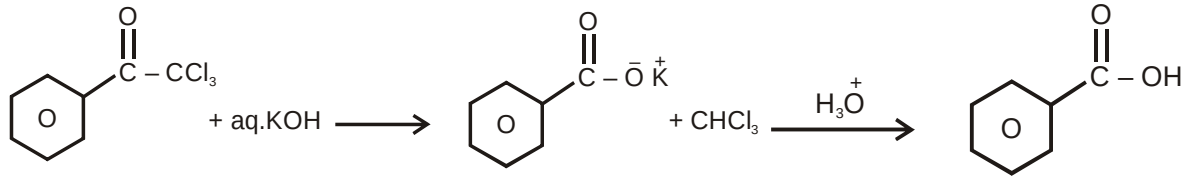
(B) 

(C) 

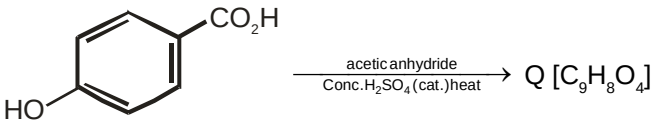
(D) 

Ans : (C)

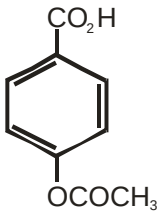
Hint :

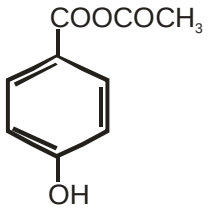


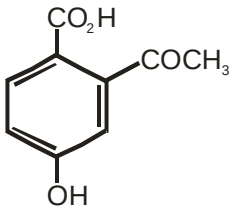
42. For the reaction below, the product is **Q.**

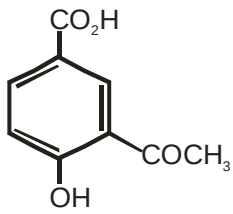


The compound **Q** is

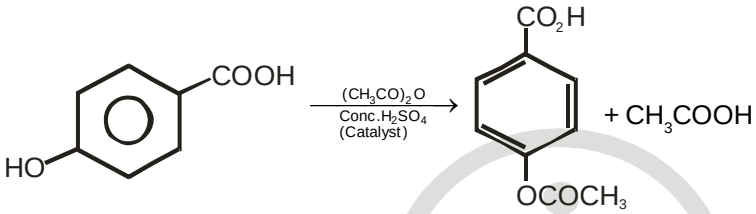
(A) 

(B) 

(C) 

(D) 

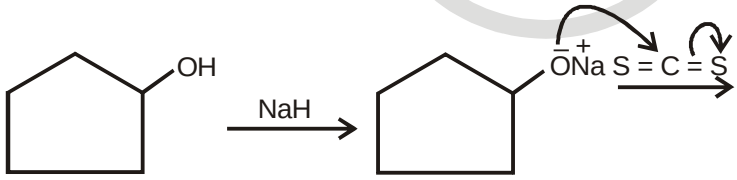
Ans : (A)

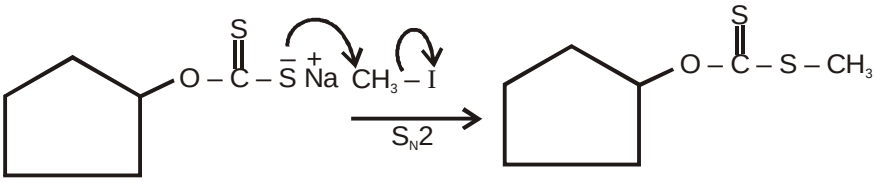
Hint : 

43. Cyclopentanol on reaction with NaH followed by CS_2 and CH_3I produces a/an

(A) ketone (B) alkene (C) ether (D) xanthate

Ans : (D)

Hint : 



44. The compound, which evolves carbon dioxide on treatment with aqueous solution of sodium bicarbonate at 25°C, is

(A) C_6H_5OH (B) CH_3COCl (C) CH_3CONH_2 (D) $CH_3COOC_2H_5$

Ans : (B)

Hint : CH_3COCl hydrolyses to form CH_3COOH even at 25°C, which subsequently reacts with $NaHCO_3$ present in the same medium to form CO_2

45. The indicated atom is **not** a nucleophilic site in

(A) $\overset{\uparrow}{B}H_4^-$ (B) $\overset{\uparrow}{C}H_3MgI$ (C) $CH_3\overset{\uparrow}{O}H$ (D) $CH_3\overset{\uparrow}{N}H_2$

Ans : (A)

Hint : There is no lone pair on 'B' atom of BH_4^-

46. The charge carried by 1 millimole of M^{n+} ions is 193 coulombs. The value of n is

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

Ans : (B)

Hint : 1000 millimole (=1 mole) of M^{n+} Carries 193×1000 = 193000 C (or 2F)

So 'n' must be 2

47. Which of the following mixtures will have the lowest pH at 298 K ?

(A) 10 ml 0.05N CH_3COOH + 5 ml 0.1 N NH_4OH

(B) 5 ml 0.2N NH_4Cl + 5 ml 0.2N NH_4OH

(C) 5 ml 0.01N CH_3COOH + 10 ml 0.05N CH_3COONa

(D) 5 ml 0.1N CH_3COOH + 5 ml 0.1N NaOH

Ans : (C)

Hint : Option (A) gives CH_3COONH_4. Considering pK_a of CH_3COOH and pK_b of NH_4OH same, pH of the solution is 7

Option (B) is a basic buffer, hence pH must be more than 7

Option (C) is an acidic buffer

Option (D) is an aqueous solution of CH_3COONa that hydrolyses to form basic solution

48. Consider the following two first order reactions occuring at 298 K with same initial concentration of A:

(1) $A \rightarrow B$; rate constant, k = 0.693 min^{-1}

(2) $A \rightarrow C$; half – life, $t_{½}$ = 0.693 min

Choose the correct option :

(A) Reaction (1) is faster than Reaction (2).

(B) Reaction (1) is slower than Reaction (2).

(C) Both reactions proceed at the same rate.

(D) Since two different products are formed, rates can not be compared.

Ans : (B)

Hint : For reaction (1); $k_1 = 0.693\ min^{-1}$

For reaction (2); $k_2 = \frac{0.693}{0.693} = 1\,min^{-1}$

Rate of reaction $\propto$ k

49. For the equilibrium $H_2O(\ell) \rightleftharpoons H_2O(v)$, which of the following is correct ?

(A) $\Delta G = 0, \Delta H < 0, \Delta S < 0$ (B) $\Delta G < 0, \Delta H > 0, \Delta S > 0$

(C) $\Delta G > 0, \Delta H = 0, \Delta S > 0$ (D) $\Delta G = 0, \Delta H > 0, \Delta S > 0$

Ans : (D)

Hint : $H_2O(\ell) \rightleftharpoons H_2O(v)$

For this phase equilibrium $\Delta G = 0, \Delta H > 0, \Delta S > 0$

50. For a van der Waal's gas, the term $\left(\frac{ab}{v^2}\right)$ represents some

(A) Pressure (B) Energy (C) Critical density (D) Molar mass

Ans : (B)

Hint : $\frac{ab}{v^2}$ represents energy by dimensional analysis

51. In the equilibrium $H_2+I_2 \rightleftharpoons 2HI$, if at a given temperature the concentrations of the reactants are increased, the value of the equilibrium constant, K_C, will

(A) Increase (B) Decrease

(C) Remain the same (D) Cannot be predicted with certainty

Ans : (C)

Hint : Equilibrium constant doesn't depend on the molar concentration of reactants

52. If electrolysis of aqueous $CuSO_4$ solution is carried out using Cu-electrodes, the reaction taking place at the anode is

(A) $H^+ + e \rightarrow H$ (B) $Cu^{2+}(aq) + 2e \rightarrow Cu(s)$ (C) $SO_4^{2-}(aq) - 2e \rightarrow SO_4$ (D) $Cu(s) - 2e \rightarrow Cu^{2+}(aq)$

Ans : (D)

Hint : $Cu(s) \rightarrow Cu^{2+}(aq) + 2e^{\ominus}$

53. Which one of the following electronic arrangements is absurd ?

(A) n = 3, l = 1, m = –1 (B) n = 3, l = 0, m = 0 (C) n = 2, l = 0, m = –1 (D) n = 2, l = 1, m = 0

Ans : (C)

Hint : For l = 0, value of m should be zero

54. The quantity $h\nu/k_B$ corresponds to

(A) Wavelength (B) Velocity (C) Temperature (D) Angular momentum

Ans : (C)

Hint : $h\nu = \frac{3}{2} k_B T$

55. In the crystalline solid $MSO_4 . nH_2O$ of molar mass 250 $gmol^{-1}$, the percentage of anhydrous salt is 64 by weight. The value of n is

(A) 2 (B) 3 (C) 5 (D) 7

Ans : (C)

Hint : Mass of $H_2O = \frac{36}{100} \times 250 = 90$ g

Moles of $H_2O = \frac{90}{18} = 5$

56. At S.T.P. the volume of 7.5 g of a gas is 5.6L. The gas is

(A) NO (B) N_2O (C) CO (D) CO_2

Ans : (A)

Hint : $\because$ 5.6L at S.T.P weighs 7.5g

$\therefore$ 22.4L at S.T.P weighs $\frac{7.5 \times 22.4}{5.6} = 30$g

Molar mass = 30g/mol

(True for NO)

57. The half-life period of $_{53}I^{125}$ is 60 days. The radioactivity after 180 days will be

(A) 25% (B) 12.5% (C) 33.3% (D) 3.0%

Ans : (B)

Hint : 100% $\xrightarrow{t_{1/2}}$ 50% $\xrightarrow{t_{1/2}}$ 25% $\xrightarrow{t_{1/2}}$ 12.5%

Total time = $3t_{1/2}$ = 180 days

58. Consider the radioactive disintegration

$_{82}A^{210} \rightarrow B \rightarrow C \rightarrow {}_{82}D^{206}$

The sequence of emission can be

(A) β,β,β (B) α,α,β (C) β,β,γ (D) β,β,α

Ans : (D)

Hint : $_{82}A^{210} \xrightarrow{-\beta} {}_{83}B^{210} \xrightarrow{-\beta} {}_{84}C^{210} \xrightarrow{-\alpha} {}_{82}D^{206}$

59. The second Ionisation Energy of the following elements follows the order

(A) Zn > Cd < Hg (B) Zn > Cd > Hg (C) Cd > Hg < Zn (D) Zn < Cd < Hg

Ans : (A)

Hint : Fact

60. The melting points of (i) $BeCl_2$ (ii) $CaCl_2$ and (iii) $HgCl_2$ follows the order

(A) i < ii < iii (B) iii < i < ii (C) i < iii < ii (D) ii < i < iii

Ans : (B)

Hint : Melting Point

$$HgCl_2 < BeCl_2 < CaCl_2$$

Covalent character $\alpha \frac{1}{\text{M.P.}}$

Covalent character : $HgCl_2 > BeCl_2 > CaCl_2$

61. Which of these species will have non-zero magnetic moment ?

(A) Na^+ (B) Mg (C) F^- (D) Ar^+

Ans : (D)

Hint : Ar^+ contains unpaired electron having configuration [Ne] $3s^2 3p^5$.

62. The first electron affinity of C, N and O will be of the order

(A) C < N < O (B) N < C < O (C) C < O < N (D) O < N < C

Ans : (B)

Hint : O > C > N

In periodic table as we move from left to right electron affinity increase due to increase in nuclear charge (Z) but nitrogen has less electron affinity as it has half filled p orbital.

63. The H – N – H angle in ammonia is 107.6°, while the H – P – H angle in phosphine is 93.5°. Relative to phosphine, the p–character of the lone pair on ammonia is expected to be

(A) Less (B) More (C) Same (D) Cannot be predicted

Ans : (A)

Hint : Bond angle decreases, hence p charecter dominates on bond pair & therefore p-character decreases in lone pair.

64. The reactive species in chlorine bleach is

(A) Cl_2O (B) OCl^- (C) ClO_2 (D) HCl

Ans : (B)

Hint : $OCl^- \rightarrow [O] + Cl^-$

65. The conductivity measurement of a coordination compound of Cobalt (III) shows that it dissociates into 3 ions in solution. The compound is

(A) Hexaamminecobalt (III) chloride
(B) Pentaamminesulphatocobalt (III) chloride
(C) Pentaamminechloridocobalt (III) sulphate
(D) Pentaamminechloridocobalt (III) chloride

Ans : (D)

Hint : Pentaaminechloridocobalt (III) chloride

$$\left[Co(NH_3)_5\,Cl\right]Cl_2 \rightarrow \underbrace{\left[Co(NH_3)_5\,Cl\right]^{2+} + 2Cl^-}_{3\text{ ions}}$$

66. In the Bayer's process, the leaching of alumina is done by using

(A) Na_2CO_3 (B) NaOH (C) SiO_2 (D) CaO

Ans : (B)

Hint : NaOH is used as a leaching solvent to dissolve alumina.

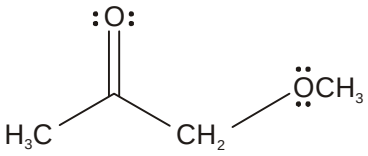
67. Which atomic species cannot be used as a nuclear fuel ?

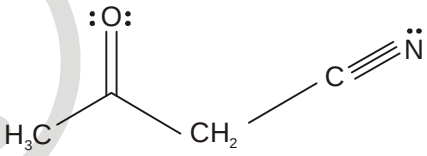
(A) $^{233}_{92}U$ (B) $^{235}_{92}U$ (C) $^{239}_{94}Pu$ (D) $^{238}_{92}U$

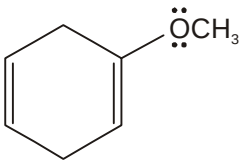
Ans : (D)

Hint : Fact

68. The molecule/molecules that has/have delocalised lone pair(s) of electrons is/are

(I) 

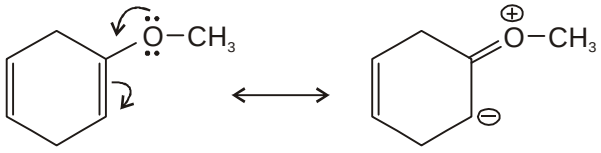
(II) 

(III) 

(IV) $CH_3CH = CHCH_2\ddot{N}HCH_3$

(A) I, II and III (B) I, II and IV (C) I and III (D) only III

Ans : (D)

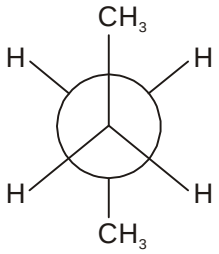
Hint : 

69. The conformations of n-butane, commonly known as eclipsed, gauche and anti-conformations can be interconverted by

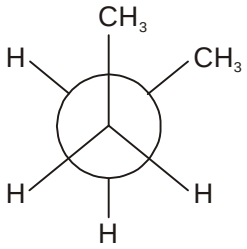
(A) rotation around C-H bond of a methyl group
(B) rotation around C-H bond of a methylene group
(C) rotation around C1-C2 linkage
(D) rotation around C2-C3 linkage

Ans : (D)

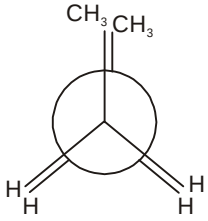
Hint : Rotation around C2–C3 linkage



Anti-conformer



Gauche-conformer



Eclipsed-conformer

70. The correct order of the addition reaction rates of halogen acids with ethylene is

(A) hydrogen chloride > hydrogen bromide > hydrogen iodide
(B) hydrogen iodide > hydrogen bromide > hydrogen chloride
(C) hydrogen bromide > hydrogen chloride > hydrogen iodide
(D) hydrogen iodide > hydrogen chloride > hydrogen bromide

Ans : (B)

Hint : HI > HBr > HCl (Reactivity or Acidic strength)

CATEGORY - II (Q71 to Q75)

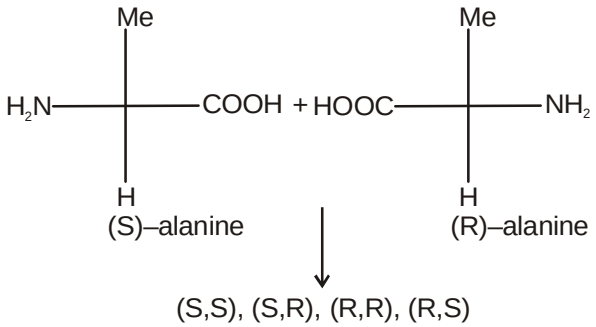
Carry 2 marks each and only one option is correct. In case of incorrect answer or any combination of more than one answer, ½ mark will be deducted.

71. The total number of isomeric linear dipeptides which can be synthesized from racemic alanine is

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

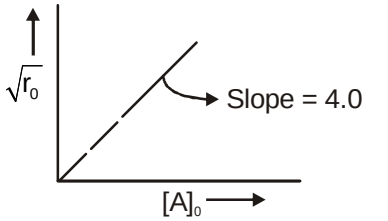
Ans : (D)

Hint :



Therefore number of possible dipeptides = 4

72. The kinetic study of a reaction like $vA \rightarrow P$ at 300 K provides the following curve, where concentration is taken in mol dm^{-3} and time in min.



r_o: Initial rate
$[A_o]$: Initial concentration of A

Identify the correct order(n) and rate constant(k) :

(A) n = 0, k = 4.0 mol dm^{-3} min^{-1} (B) n = 1/2, k = 2.0 $mol^{1/2} dm^{-3/2} min^{-1}$

(C) n = 1, k = 8.0 min^{-1} (D) n = 2, k = 16.0 $dm^3 mol^{-1} min^{-1}$

Ans : (D)

Hint : $\sqrt{r_0} = 4[A_0]$, $r_0 = 16\,[A_0]^2$, Rate = $k[A_0]^n$ $\therefore$ k = 16 and n = 2

73. At constant pressure, the heat of formation of a compound is not dependent on temperature, when

(A) $\Delta C_P = 0$ (B) $\Delta C_V = 0$ (C) $\Delta C_P > 0$ (D) $\Delta C_P < 0$

Ans : (A)

Hint : Fact

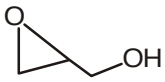
74. A copper coin was electroplated with Zn and then heated at high temperature until there is a change in colour. What will be the resulting colour ?

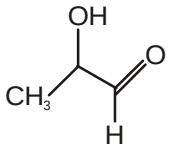
(A) White (B) Black (C) Silver (D) Golden

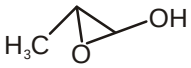
Ans : (D)

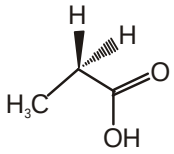
Hint : Zn + Cu $\xrightarrow{\Delta}$ Brass

75. Oxidation of allyl alcohol with a peracid gives a compound of molecular formula $C_3H_6O_2$, which contains an asymmetric carbon atom. The structure of the compound is

(A) 

(B) 

(C) 

(D) 

Ans : (A)

Hint : $CH_2 = CH - CH_2 - OH \xrightarrow[RCO_3H]{[O]} CH_2 - \overset{*}{C}H - CH_2 - OH$

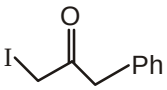
(allyl alcohol)

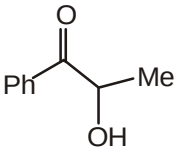
$(C_3H_6O_2)$

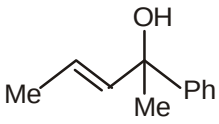
CATEGORY - III (Q.76 to Q.80)

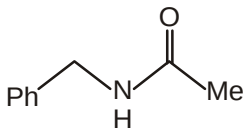
Carry 2 marks each and one or more option(s) is/are correct. If all correct answers are not marked and also no incorrect answer is marked then score = 2 × number of correct answers marked ÷ actual number of correct answers. If any wrong option is marked or if any combination including a wrong option is marked, the answer will considered wrong, but there is no negative marking for the same and zero mark will be awarded.

76. Haloform reaction with I_2 and KOH will be responded by

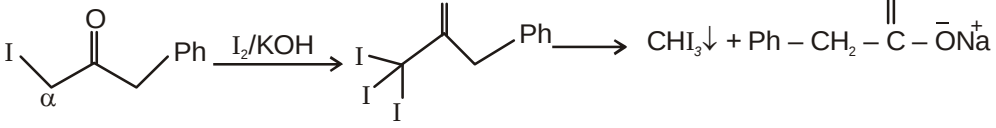
(A) 

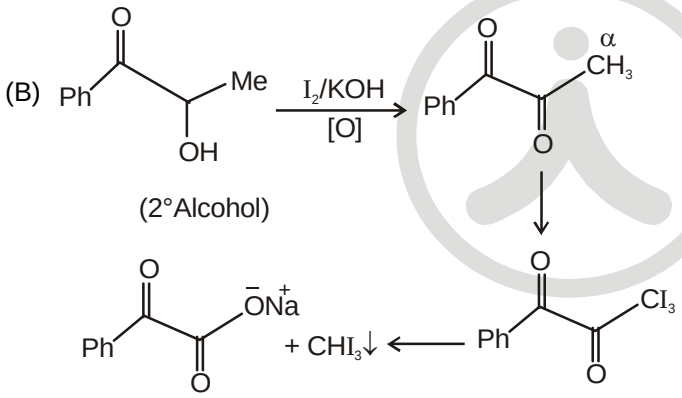
(B) 

(C) 

(D) 

Ans : (A, B)

Hint : (A) 

(B) 

77. Identify the correct statement(s):

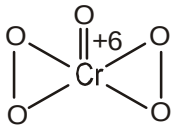
(A) The oxidation number of Cr in CrO_5 is + 6.

(B) $\Delta H > \Delta U$ for the reaction $N_2O_4(g) \rightarrow 2NO_2(g)$, provided both gases behave ideally.

(C) pH of 0.1N H_2SO_4 is less than that of 0.1N HCl at 25°C.

(D) $\left(\frac{RT}{F}\right) = 0.0591$ volt at 25°C.

Ans : (A,B)

Hint : (A) 

(B) $N_2O_4(g) \rightarrow 2NO_2(g)$, $\Delta H = \Delta U + \Delta n_g RT = \Delta U + (2-1)RT = \Delta U + RT$

$\therefore \Delta H > \Delta U \because$ Reaction is endothermic.

(C) For 0.1N H_2SO_4 solution, $[H^+] = 0.1N \therefore pH = 1$
For 0.1N HCl solution, $[H^+] = 0.1N \therefore pH = 1$] same

(D) is incorrect as $\frac{RT}{F} = \frac{8.314 \times 298}{96500} = 0.0256\,V$

78. Compounds with spin-only magnetic moment equivalent to five unpaired electrons are

(A) $K_4[Mn(CN)_6]$ (B) $[Fe(H_2O)_6]Cl_3$ (C) $K_3[FeF_6]$ (D) $K_4[MnF_6]$

Ans : (B,C,D)

Hint : (A) In $K_4[Mn(CN)_6]$, Mn has +2 O.S. and $Mn^{+2} = [Ar]3d^5 4s^0$, and CN^- is strong field ligand. Pairing takes place and the complex has only one unpaired electron.

(B) In $[Fe(H_2O)_6]Cl_3$, Fe has +3 O.S. and $Fe^{+3} = [Ar]3d^5 4s^0$, the number of unpaired $e^- = 5$
(H_2O is a weak field ligand thus no pairing)

(C) In $K_3[FeF_6]$, Fe has +3 O.S. and $Fe^{+3} = [Ar]3d^5 4s^0$, thus number of unpaired $e^- = 5$
(F^- is a weak field ligand thus no pairing)

(D) In $K_4[MnF_6]$, Mn has O.S. of +2 thus $Mn^{+2} = [Ar]3d^5 4s^0$ is number of unpaired $e^- = 5$
(F^- is a weak field ligand thus no pairing)

79. Which of the following chemicals may be used to identify three unlabelled beakers containing conc.NaOH, conc.H_2SO_4 and water ?

(A) NH_4NO_3 (B) NaCl (C) $(NH_4)_2CO_3$ (D) HCOONa

Ans : (A,C)

Hint : (A) NH_4NO_3 will evolve NH_3 pungent smelling gas with NaOH, NO_2 brown gas with conc. H_2SO_4 and no reaction in water, thus NH_4NO_3 can label all three beakers.

(C) $(NH_4)_2CO_3$ will evolve NH_3 pungent smelling gas with NaOH, effervescence of CO_2 with conc. H_2SO_4 and no reaction with water, thus $(NH_4)_2CO_3$ can label all three beakers.

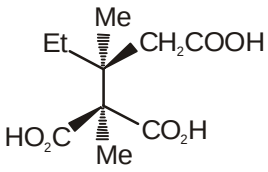
$$NH_4NO_3 + NaOH \longrightarrow NaNO_3 + NH_3 \uparrow + H_2O$$

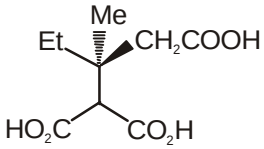
$$4NH_4NO_3 + 2H_2SO_4 \longrightarrow 4NO_2 \uparrow + O_2 \uparrow + 2(NH_4)_2 SO_4 + 2H_2O$$

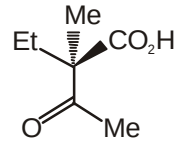
$$(NH_4)_2 CO_3 + 2NaOH \longrightarrow 2NH_3 \uparrow + Na_2CO_3 + 2H_2O$$

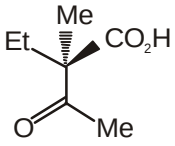
$$(NH_4)_2 CO_3 + H_2SO_4 \longrightarrow (NH_4)_2 SO_4 + CO_2 \uparrow + H_2O$$

80. The compound(s), capable of producing achiral compound on heating at 100°C is/are

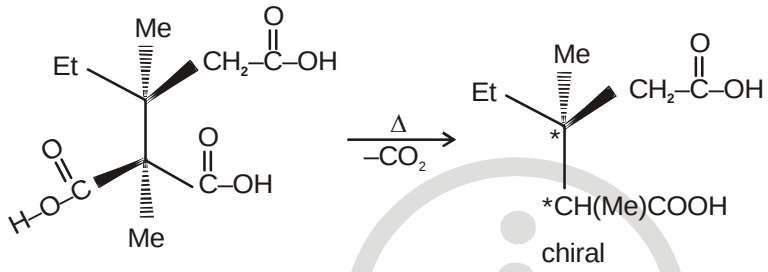
(A) 

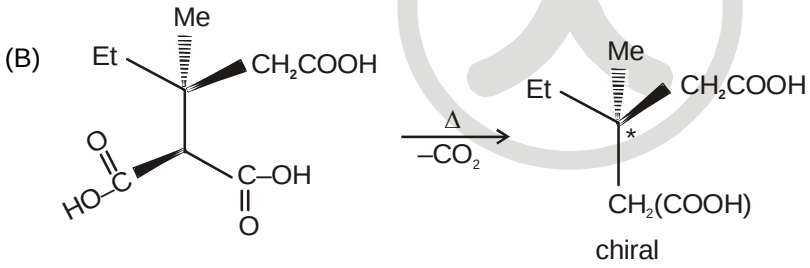
(B) 

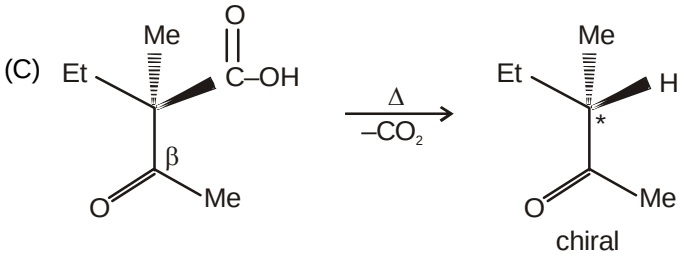
(C) 

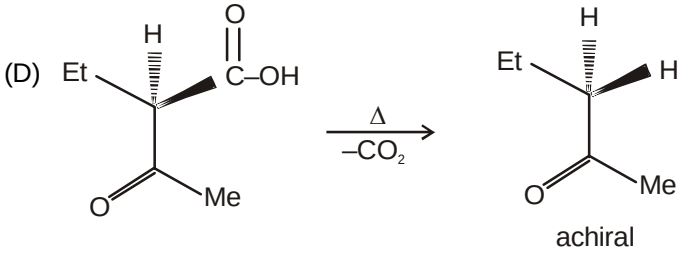
(D) 

Ans : (D)

Hint : (A) 

(B) 

(C) 

(D) 

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