

ASPIRE SUPER - 50 2024-25

FREE COACHING &
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SCHOLARSHIP WORTH
60 LAKHS



SUPER
50

ASPIRE SUPER - 50 EXAM 2023-2024

for

CLASS - 12TH

Time: 120 Minutes

Maximum Marks: 360

INSTRUCTIONS

PLEASE FILL DETAILS CAREFULLY

NAME _____

FATHER NAME _____

SCHOOL NAME _____

CONTACT NUMBER _____

Read the instructions carefully. 5 minutes are allowed specifically for this purpose.

1. Answer all questions
2. This booklet is your question paper containing **90** questions
3. The question paper consist of **2 sections**.
4. Section-I **Physics** (Questions -1 to 45), Section-II **Chemistry** (46-90)
5. Each question has **only one correct** answer. Once you have marked an option you can't mark a fresh option
6. For each **correct** answer **+4** marks will be awarded. For **wrong** answer **-1** mark will be deducted.
7. Fill your **OMR** sheet carefully.
8. All the Notations used in this paper are standard.
9. No use of electronic gadgets, calculators, mobile phones etc are allowed.
10. In case of any discrepancy do not ask anyone one including your invigilator. Try to attempt question and mark the best possible answer.

Roll No.										
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SECTION -I

PHYSICS

SUPER-50 CLASS 12TH 2023

1. The dimensions of $(\mu_0 \epsilon_0)^{-1/2}$ are
(a) $[L^{1/2} T^{-1/2}]$ (b) $[L^{-1} T]$
(c) $[L T^{-1}]$ (d) $[L^{1/2} T^{1/2}]$
2. A particle moves in a circle of radius 5cm with constant speed and time period 0.2π s. The acceleration of the particle is
(a) 15 m/s^2 (b) 25 m/s^2
(c) 36 m/s^2 (d) 5 m/s^2
3. A missile is fired for maximum range with an initial velocity of 20 m/s. If $g = 10 \text{ m/s}^2$, the range of the missile is
(a) 40 m (b) 50 m
(c) 60 m (d) 20 m
4. A boy standing at the top of a tower of 20m of height drops a stone. Assuming $g=10 \text{ m/s}^2$, the velocity with which it hits the ground is :-
(a) 10.0 m/s (b) 20.0m/s
(c) 40.0m/s (d) 5.0m/s
5. A body is moving with velocity 30m/s towards east After 10 s its velocity becomes 40m/s towards north. The average acceleration of the body is
(a) 1 m/s^2 (b) 7 m/s^2
(c) $\sqrt{7} \text{ m/s}^2$ (d) 5 m/s^2
6. A person of mass 60 kg is inside a lift of mass 940 kg and press the button on control panel. The lift starts moving upwards with an acceleration 1.0 m/s^2 . If $g=10 \text{ m/s}^2$, the tension in the supporting cable is
(a) 8600 N (b) 9680 N
(c) 11000 N (d) 1200 N

Rough work

7. A body of mass m hits normally a rigid wall with velocity V and bounces back with the same velocity. The impulse experienced by the body is

- (a) MV (b) $1.5 MV$
(c) $2 MV$ (d) Zero

8. The potential energy of a system increases if work is done

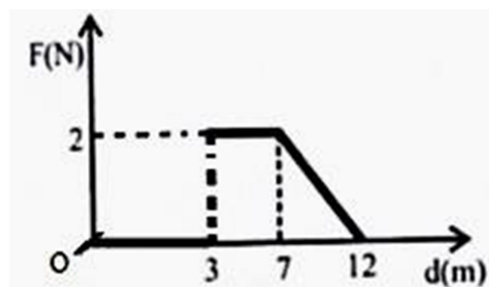
- (a) Upon the system by a non-conservative force
(b) By the system against a conservative force
(c) By the system against a non-conservative force
(d) Upon the system by a conservative force

9. A body projected vertically from the earth reaches a height equal to earth's radius before returning to the earth. The power exerted by the gravitational force is greatest.

- (a) At the highest position of the body
(b) At the instant just before the body hits the earth
(c) It remains constant all through
(d) At the instant just after the body is projected

10. Force F on a particle moving in a straight line varies with displacement d as shown in the figure. The work done on the particle during its displacement of 12 m is:

- (a) 18J (b) 21J
(c) 26J (d) 13J



Rough work

11. The instantaneous angular position of a point on a rotating wheel is given by the equation $\theta(t) = 2t^3 - 6t^2$. The torque on the wheel becomes zero at
- (a) $t = 1$ s (b) $t = 0.5$ s
(c) $t = 0.25$ s (d) $t = 2$ s
12. The moment of inertia of a thin uniform rod of mass M and length L about an axis passing through its center of mass and perpendicular to length is I_0 . Its moment of inertia about an axis passing through one of its ends and perpendicular to its length is
- (a) $I_0 + ML^2/2$ (b) $I_0 + ML^2/4$
(c) $I_0 + 2ML^2$ (d) $I_0 + ML^2$
13. A planet moving along an elliptical orbit is closest to the sun at a distance r_1 and farthest away at a distance of r_2 . If v_1 and v_2 are the linear velocities at these points respectively, then the ratio v_1/v_2 is
- (a) $(r_1/r_2)^2$ (b) (r_1/r_2)
(c) $(r_2/r_1)^2$ (d) r_1/r_2
14. When 1 kg of ice at 0°C melts to water at 0°C , the resulting change in its entropy. Taking latent heat of ice to be $80 \text{ cal}/^\circ\text{C}$, is
- (a) 273 cal/K (b) $8 \times 10^4 \text{ cal/K}$
(c) 80 cal/K (d) 293 cal/K
15. During an isothermal expansion, a confined ideal gas does -150 J of work against its surroundings. This implies that
- (a) 150 J heat has been removed from the gas
(b) 300 J of heat has been added to the gas
(c) no heat is transferred because the process is isothermal
(d) 150 J of heat has been added to the gas

Rough work

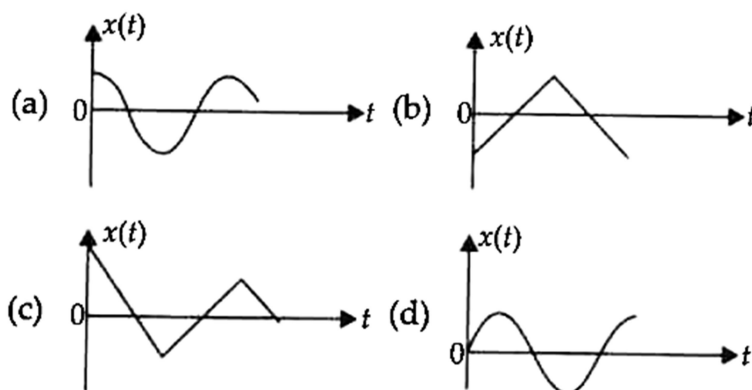
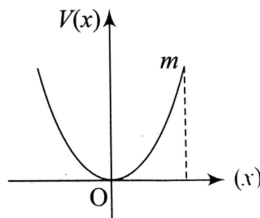
16. Two waves are represented by the equations

$$y_1 = a \sin(\omega t + kx + 0.57) \text{ m and}$$

$$y_2 = a \cos(\omega t + kx) \text{ m,}$$

Where x is in meter and t in second. The phase difference between them is

- (a) 1.0 radian (b) 1.25 radian
(c) 1.57 radian (d) 0.57 radian
17. A particle of mass m is released from rest and follow a particle part as shown Assuming that the displacement of the mass from the origin is small which graph correctly depicts the position of the particle as a function of time?



18. Sound waves travel at 350 m/s through a warm air and at 3500 m/s through brass. The wavelength of a 700 Hz acoustic wave as it enters brass from warm air
- (a) decrease by a factor 10
(b) increase by a factor 20
(c) increase by a factor 10
(d) decrease by a factor 20

Rough work

19. Out of the following functions representing motion of a particle which represents SHM

(1) $y = \sin\omega t - \cos\omega t$

(2) $y = \sin^3\omega t$

(3) $y = 5\cos\left(\frac{3\pi}{4} - 3\omega t\right)$

(4) $y = 1 + \omega t + \omega^2 t^2$

(a) Only (1)

(b) Only (4) does not represent SHM

(c) Only (1) and (3)

(d) Only (1) and (2)

20. A charge Q is enclosed by a Gaussian spherical surface of radius R. If the radius is doubled, then the outward electric flux will

(a) Increase four times

(b) be reduced to half

(c) remain the same

(d) be doubled

21. A parallel plate condenser has a uniform electric field E (V/m) in the space between the plates. If the distance between the plates is d (m) and area of each plate is A (m²) the energy (joules) stored in the condenser is

(a) $E^2 Ad/\epsilon_0$

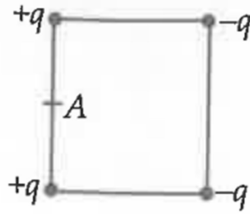
(b) $\frac{1}{2} \epsilon_0 E^2$

(c) $\epsilon_0 E A d$

(d) $\frac{1}{2} \epsilon_0 E^2 A d$

Rough work

22. Four electric charges $+q$, $+q$, $-q$ and $-q$ are placed at the corners of a square of side $2L$ (see figure). The electric potential at point A, midway between the two charges $+q$ and $+q$, is

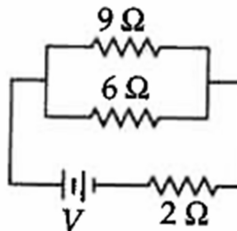


- (a) $\frac{1}{4\pi\epsilon_0} \frac{2q}{L} (1 + \sqrt{5})$ (b) $\frac{1}{4\pi\epsilon_0} \frac{2q}{L} \left(1 + \frac{1}{\sqrt{5}}\right)$
 (c) $\frac{1}{4\pi\epsilon_0} \frac{2q}{L} \left(1 - \frac{1}{\sqrt{5}}\right)$ (d) zero

23. A current of 2 A flows through a 2Ω resistor when connected across a battery. The same battery supplies a current of 0.5 A when connected across a 9Ω resistor. The internal resistance of the battery is

- (a) 0.5Ω (b) $1/4\Omega$ (c) $1/3\Omega$ (d) 1Ω

24. If power dissipated in the 9Ω resistor in the circuit shown is 36 watt, the potential difference across the 2Ω resistor is

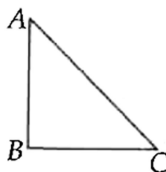


- (a) 4 volt (b) 8 volt (c) 10 volt (d) 2 volt

Rough work

25. The rate of increase of thermo-e.m.f. with temperature at the neutral temperature of a thermocouple
- (a) is positive (b) is zero
- (c) depends upon the choice of the two materials of the thermocouple
- (d) is negative
26. A current carrying closed loop in the form of a right angle isosceles triangle ABC is placed in a uniform magnetic field acting along AB. If the magnetic force on the arm BC is $\vec{F}$, the force on the arm AC is

- (a) $-\sqrt{2} \vec{F}$
- (b) $-\vec{F}$
- (c) $\vec{F}$
- (d) $\sqrt{2} \vec{F}$



27. There are four light-weight-rod samples A, B, C, D separately suspended by threads. A bar magnet is slowly brought near each sample and the following observations are noted

- (i) A is feebly repelled
- (ii) B is feebly attracted
- (iii) C is strongly attracted
- (iv) D remains unaffected

Which one of the following is true?

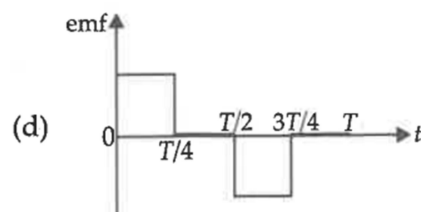
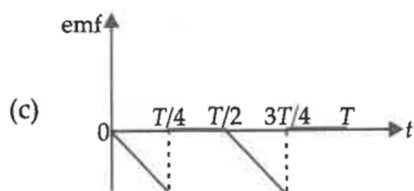
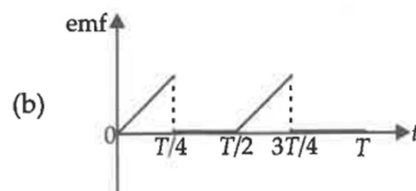
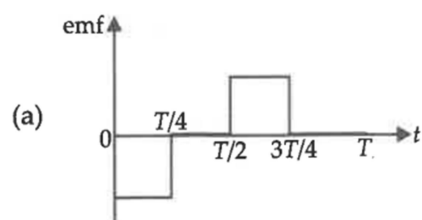
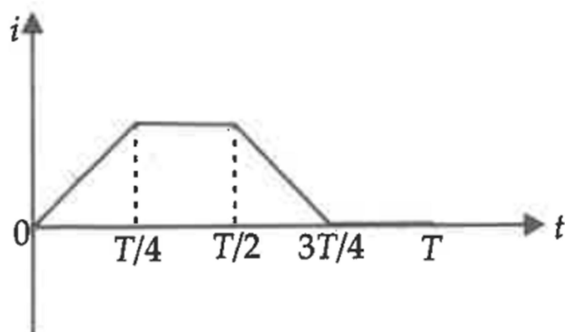
- (a) B is of a paramagnetic material
- (b) C is of a diamagnetic material
- (c) D is of a ferromagnetic material
- (d) A is of a non-magnetic material

Rough work

28. A uniform electric field and a uniform magnetic field are acting along the same direction in a certain region. If an electron is projected in the region such that its velocity is pointed along the direction of fields, then the electron
- (a) will turn towards right of direction of motion
 - (b) speed will decrease
 - (c) speed will increase
 - (d) will turn towards left of direction of motion
29. An ac voltage is applied to a resistance R and an inductor L in series. If R and the inductive reactance are both equal to $3\ \Omega$, the phase difference between the applied voltage and the current in the circuit is
- (a) $\pi/6$
 - (b) $\pi/4$
 - (c) $\pi/2$
 - (d) zero
30. In an ac circuit an alternating voltage $e = 200\sqrt{2} \sin 100t$ volts is connected to a capacitor of capacity $1\ \mu F$. The r. m. s. value of the current in the circuit is
- (a) 10mA
 - (b) 200mA
 - (c) 100mA
 - (d) 20mA

Rough work

31. The current i in a coil varies with time as shown in the figure. The variation of induced emf with time would be



32. A particle covers half of its total distance with speed v_1 , and the rest half distance with speed v_2 . Its average speed during the complete journey is

(a) $\frac{v_1 + v_2}{2}$

(b) $\frac{v_1 v_2}{v_1 + v_2}$

(c) $\frac{2v_1 v_2}{v_1 + v_2}$

(d) $\frac{v_1^2 v_2^2}{v_1^2 + v_2^2}$

Rough work

33. A projectile is fired at an angle of 45° with the horizontal. Elevation angle of the projectile at its highest point as seen from the point of projection, is

(a) 45°

(b) 60°

(c) $\tan^{-1} \frac{1}{2}$

(d) $\tan^{-1} \left(\frac{\sqrt{3}}{2} \right)$

34. A mass m moving horizontally (along the x -axis) with velocity v collides and sticks to a mass of $3m$ moving vertically upward (along the y -axis) with velocity $2v$. The final velocity of the combination is

(a) $\frac{3}{2}v\hat{i} + \frac{1}{4}v\hat{j}$

(b) $\frac{1}{4}v\hat{i} + \frac{3}{2}v\hat{j}$

(c) $\frac{1}{3}v\hat{i} + \frac{2}{3}v\hat{j}$

(d) $v\frac{2}{3}v\hat{i} + \frac{1}{3}v\hat{j}$

35. A particle of mass m is thrown upwards from the surface of the earth, with a velocity u . The mass and the radius of the earth are, respectively, M and R . G is gravitational constant and g is acceleration due to gravity on the surface of the earth. The minimum value of u so that the particle does not return back to earth, is

(a) $\sqrt{\frac{2GM}{R^2}}$

(b) $\sqrt{\frac{2GM}{R}}$

(c) $\sqrt{\frac{2gM}{R^2}}$

(d) $\sqrt{2gR^2}$

Rough work

36. A particle of mass M is situated at the centre of a spherical shell of same mass and radius a . The magnitude of the gravitational potential at a point situated at $a/2$ distance from the centre, will be

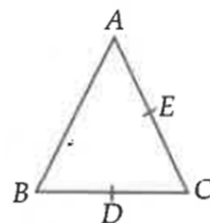
(a) $\frac{GM}{a}$ (b) $\frac{2GM}{a}$
 (c) $\frac{3GM}{a}$ (d) $\frac{4GM}{a}$

37. A mass of diatomic gas ($\gamma = 1.4$) at a pressure of 2 atmospheres is compressed adiabatically so that its temperature rises from 27°C to 927°C . The pressure of the gas in the final state is

(a) 8 atm (b) 28 atm (c) 68.7 atm (d) 256 atm

38. Three charges, each $+q$, are placed at the corners of an isosceles triangle ABC of sides BC and AC , $2a$. D and E are the mid points of BC and CA . The work done in taking a charge Q from D to E is

(a) $\frac{3qQ}{4\pi\epsilon_0 a}$ (b) $\frac{3qQ}{8\pi\epsilon_0 a}$
 (c) $\frac{qQ}{4\pi\epsilon_0 a}$ (d) zero

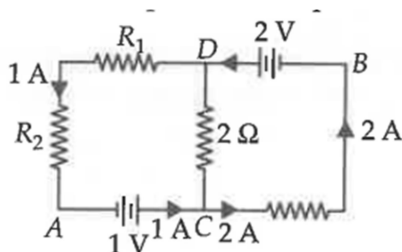


39. The electric potential V at any point (x, y, z) , all in metres in space is given by $V = 4x^2$ volt. The electric field at the point $(1, 0, 2)$ in volt/meter, is

(a) 8 along negative X-axis (b) 8 along positive X-axis
 (c) 16 along negative X-axis (d) 16 along positive X-axis

Rough work

40. In the circuit shown in the figure, if the potential at point A is taken to be zero, the potential at point B is

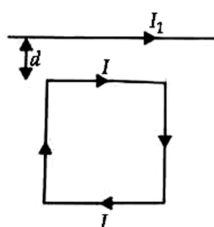


- (a) +1 V (b) -1V (c) +2 V (d) -2 V
41. A thermocouple of negligible resistance produces an e.m.f. of $40 \mu\text{V}/^\circ\text{C}$ in the linear range of temperature. A galvanometer of resistance 10 ohm whose sensitivity is $1 \mu\text{A}/\text{div}$, is employed with the thermocouple. The smallest value of temperature difference that can be detected by the system will be
- (a) 0.25°C (b) 0.5°C (c) 1°C (d) 0.1°C
42. A galvanometer of resistance, G , is shunted by a resistance S ohm. To keep the main current in the circuit unchanged, the resistance to be put in series with the galvanometer is

- (a) $\frac{G}{(S+G)}$ (b) $\frac{S^2}{(S+G)}$
- (c) $\frac{SG}{(S+G)}$ (d) $\frac{G^2}{(S+G)}$

Rough work

43. Charge q is uniformly spread on a thin ring of radius R . The ring rotates about its axis with a uniform frequency f Hz. The magnitude of magnetic induction at the center of the ring is
- (a) $\frac{\mu_0 q f}{2\pi R}$ (b) $\frac{\mu_0 q f}{2R}$
 (c) $\frac{\mu_0 q}{2fR}$ (d) $\frac{\mu_0 q}{2\pi f R}$
44. A short bar magnet of magnetic moment 0.4 J T^{-1} is placed in a uniform magnetic field of 0.16 T . The magnet is in stable equilibrium when the potential energy is
- (a) 0.064 J (b) -0.064 J (c) zero (d) -0.082 J
45. A square loop, carrying a steady current I , is placed in a horizontal plane near a long straight conductor carrying a steady current I_1 at a distance d from the conductor as shown in figure. The loop will experience



- (a) A net attractive force towards the conductor
 (b) A net repulsive force away from the conductor
 (c) A net torque acting upward perpendicular to the horizontal plane
 (d) A net torque acting downward normal to the horizontal plane

Rough work

SECTION -II

CHEMISTRY

SUPER-50 CLASS 12TH 2023

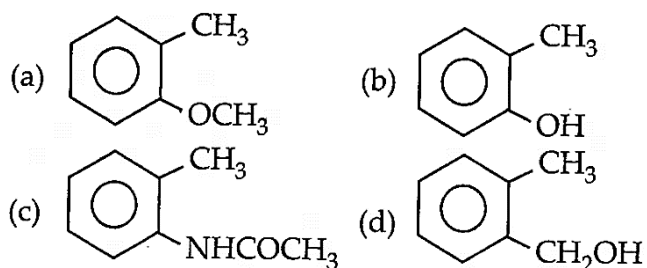
46. The total number of atomic orbitals in fourth energy level of an atom is
(a) 8 (b) 16 (c) 32 (d) 4
47. The energies E_1 and E_2 of two radiations are 25 eV and 50 eV respectively. The relation between their wavelengths i.e., λ_1 and λ_2 will be
(a) $\lambda_1 = \lambda_2$ (b) $\lambda_1 = 2\lambda_2$ (c) $\lambda_1 = 4\lambda_2$ (d) $\lambda_1 = \frac{1}{2}\lambda_2$
48. If $n = 6$, the correct sequence for filling of electrons will be
(a) $ns \rightarrow (n-2)f \rightarrow (n-1)d \rightarrow np$ (b) $ns \rightarrow (n-1)d \rightarrow (n-2)f \rightarrow np$
(c) $ns \rightarrow (n-2)f \rightarrow np \rightarrow (n-1)d$ (d) $ns \rightarrow np \rightarrow (n-1)d \rightarrow (n-2)f$
49. Which of the following has the minimum bond length?
(a) O_2^+ (b) O_2^- (c) O_2^{2-} (d) O_2
50. Which of the two ions from the list given below that have the geometry that is explained by the same hybridization of orbitals, NO_2^- , NO_3^- , NH_2^- , NH_4^+ , SCN^- ?
(a) NO_2^- and NO_3^- (b) NH_4^+ and NO_3^- (c) SCN^- and NH_2^- (d) NO_2^- and NH_2^-
51. The correct order of increasing bond length of C – H, C – O, C – C and C = C is
(a) C – H < C = C < C – O < C – C (b) C – C < C = C < C – O < C – H
(c) C – O < C – H < C – C < C = C (d) C – H < C – O < C – C < C = C
52. By what factor does the average velocity of a gaseous molecule increase when the temperature (in Kelvin) is doubled?
(a) 2.0 (b) 2.8 (c) 4.0 (d) 1.4
53. Two gases A and B having the same volume diffuse through a porous partition in 20 and 10 seconds respectively. The molecular mass of A is 49 u. Molecular mass of B will be
(a) 50.00 u (b) 12.25 u (c) 6.50 u (d) 25.00 u
54. A gaseous mixture was prepared by taking equal mole of CO and N_2 . If the total pressure of the mixture was found 1 atmosphere, the partial pressure of the nitrogen (N_2) in the mixture is
(a) 0.5 atm (b) 0.8 atm (c) 0.9 atm (d) 1 atm
55. If the enthalpy change for the transition of liquid water to steam is 30 kJ mol^{-1} at 27°C , the entropy change for the process would be
(a) $10 \text{ J mol}^{-1} \text{ K}^{-1}$ (b) $1.0 \text{ J mol}^{-1} \text{ K}^{-1}$ (c) $0.1 \text{ J mol}^{-1} \text{ K}^{-1}$ (d) $100 \text{ J mol}^{-1} \text{ K}^{-1}$
56. Enthalpy change for the reaction, $4H_{(g)} \rightarrow 2H_{2(g)}$ is -869.6 kJ . The dissociation energy of H – H bond is
(a) -434.8 kJ (b) -869.6 kJ (c) $+434.8 \text{ kJ}$ (d) $+217.4 \text{ kJ}$

ROUGH WORK

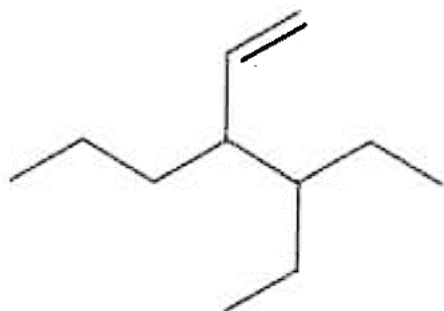
57. Which of the following is correct option for free expansion of an ideal gas under adiabatic condition?
 (a) $q = 0, \Delta T \neq 0, w = 0$ (b) $q \neq 0, \Delta T = 0, w = 0$
 (c) $q = 0, \Delta T = 0, w = 0$ (d) $q = 0, \Delta T < 0, w \neq 0$
58. A buffer solution is prepared in which the concentration of NH_3 is 0.30M and the concentration of NH_4^+ is 0.20M. If the equilibrium constant, K_b for NH_3 equals 1.8×10^{-5} , what is the pH of this solution? ($\log 2.7 = 0.43$)
 (a) 9.08 (b) 9.43 (c) 11.72 (d) 8.73
59. Which of the following is least likely to behave as Lewis base?
 (a) H_2O (b) NH_3 (c) BF_3 (d) OH^-
60. The value of ΔH for the reaction $\text{X}_{2(g)} + 4\text{Y}_{2(g)} \rightleftharpoons 2\text{XY}_{4(g)}$ is less than zero. Formation of $\text{XY}_{4(g)}$ will be favoured at
 (a) high temperature and high pressure (b) low pressure and low temperature
 (c) high temperature and low pressure (d) high pressure and low temperature
61. For the reaction, $\text{N}_{2(g)} + \text{O}_{2(g)} \rightleftharpoons 2\text{NO}_{(g)}$, the equilibrium constant is K_1 . The equilibrium constant is K_2 for the reaction, $2\text{NO}_{(g)} + \text{O}_{2(g)} \rightleftharpoons 2\text{NO}_{2(g)}$. What is K for the reaction, $\text{NO}_{2(g)} \rightleftharpoons \frac{1}{2} \text{N}_{2(g)} + \text{O}_{2(g)}$?
 (a) $\frac{1}{2K_1K_2}$ (b) $\frac{1}{4K_1K_2}$ (c) $\left[\frac{1}{K_1K_2}\right]^{1/2}$ (d) $\frac{1}{K_1K_2}$
62. Standard electrode potential of three metals X, Y and Z are -1.2 V , $+0.5\text{ V}$ and -3.0 V respectively. The reducing power of these metals will be
 (a) $Y > Z > X$ (b) $Y > X > Z$ (c) $Z > X > Y$ (d) $X > Y > Z$
63. Which of the following compounds has the lowest melting point?
 (a) CaCl_2 (b) CaBr_2 (c) CaI_2 (d) CaF_2
64. Which one of the following is present as an active ingredient in bleaching powder for bleaching action?
 (a) CaOCl_2 (b) $\text{Ca}(\text{OCl})_2$ (c) CaO_2Cl (d) CaCl_2
65. Name the two type of the structure of silicate in which one oxygen atom of $[\text{SiO}_4]^{4-}$ is shared?
 (a) Linear chain silicate (b) Sheet silicate
 (c) Pyrosilicate (d) Three dimensional
66. Considering the state of hybridization of carbon atoms, find out the molecule among the following which is linear?
 (a) $\text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_3$ (b) $\text{CH}_3 - \text{C} \equiv \text{C} - \text{CH}_3$
 (c) $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{C} \equiv \text{CH}$ (d) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$

ROUGH WORK

67. Which one of the following is most reactive towards electrophilic reagent?



68. The correct IUPAC name for the compound



is

- (a) 4-ethyl-3-propylhex-1-ene (b) 3-ethyl-4-ethenylheptane
(c) 3-ethyl-4-propylhex-5-ene (d) 3-(1-ethylpropyl)hex-1-ene
69. In Dumas' method of estimation of nitrogen 0.35 g of an organic compound gave 55 mL of nitrogen collected at 300 K temperature and 715 mm pressure. The percentage composition of nitrogen in the compound would be (aqueous tension at 300 K = 15 mm).
(a) 15.45 (b) 16.45 (c) 17.45 (d) 14.45
70. The Lassaigne's extract is boiled with conc. HNO_3 while testing for halogens. By doing so it
(a) decomposes Na_2S and NaCN , it formed
(b) helps in the precipitation of AgCl
(c) increases the solubility product of AgCl
(d) increases the concentration of NO_3^- ions

ROUGH WORK

71. Which one is a nucleophilic substitution reaction among the following?
- (a) $\text{CH}_3 - \text{CH} = \text{CH}_2 + \text{H}_2\text{O} \xrightarrow{\text{H}^+}$

$$\begin{array}{c} \text{CH}_3 - \text{CH} - \text{CH}_3 \\ | \\ \text{OH} \end{array}$$
- (b) $\text{RCHO} + \text{R}'\text{MgX} \longrightarrow \text{R} - \text{CH} - \text{R}'$

$$\begin{array}{c} | \\ \text{OH} \end{array}$$
- (c) $\text{CH}_3 - \text{CH}_2 - \overset{\text{CH}_3}{\underset{|}{\text{CH}}} - \text{CH}_2\text{Br} + \text{NH}_3 \longrightarrow$

$$\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{CH}_2 - \text{CH} - \text{CH}_2\text{NH}_2 \end{array}$$
- (d) $\text{CH}_3\text{CHO} + \text{HCN} \longrightarrow \text{CH}_3\text{CH}(\text{OH})\text{CN}$
72. The freezing point depression constant for water is $-1.86^\circ\text{Cm}^{-1}$. If 5.00 g Na_2SO_4 is dissolved in 45.0 g H_2O , the freezing point is changed by -3.82°C . Calculate the van't Hoff factor for Na_2SO_4 .
 (a) 2.05 (b) 2.63 (c) 3.11 (d) 0.381
73. The van't Hoff factor i for a compound which undergoes dissociation in one solvent and association in other solvent is respectively
 (a) less than one and greater than one (b) less than one and less than one
 (c) greater than one and less than one (d) greater than one and greater than one
74. Mole fraction of the solute in a 1.00 molal aqueous solution is
 (a) 0.1770 (b) 0.0177 (c) 0.0344 (d) 1.7700
75. The electrode potentials for $\text{Cu}_{(aq)}^{2+} + e^- \rightarrow \text{Cu}_{(aq)}^+$ and $\text{Cu}_{(aq)}^+ + e^- \rightarrow \text{Cu}_{(s)}$ are +0.15 V and +0.50 V respectively. The value of $E^\circ_{\text{Cu}^{2+}/\text{Cu}}$ will be.
 (a) 0.500 V (b) 0.325 V (c) 0.650 V (d) 0.150 V
76. Standard electrode potential for $\text{Sn}^{4+}/\text{Sn}^{2+}$ couple is +0.15 V and that for the Cr^{3+}/Cr couple is -0.74 V. These two couples in their standard state are connected to make a cell. The cell potential will be
 (a) +1.19 V (b) +0.89 V (c) +0.18 V (d) +1.83 V

ROUGH WORK

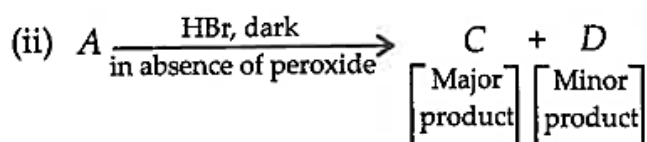
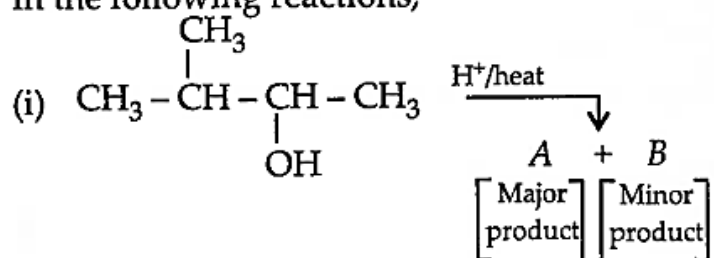
77. If the E_{cell}° for a given reaction has a negative value, then which of the following gives the correct relationships for the values of ΔG° and K_{eq} ?

- (a) $\Delta G^{\circ} > 0; K_{eq} > 1$ (b) $\Delta G^{\circ} < 0; K_{eq} > 1$
 (c) $\Delta G^{\circ} < 0; K_{eq} < 1$ (d) $\Delta G^{\circ} > 0; K_{eq} < 1$

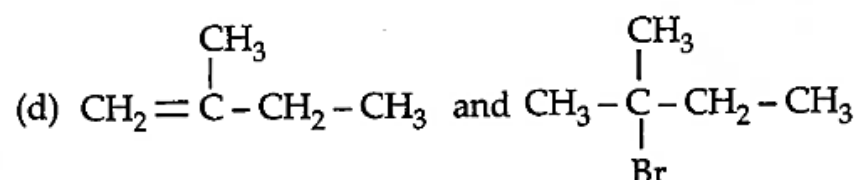
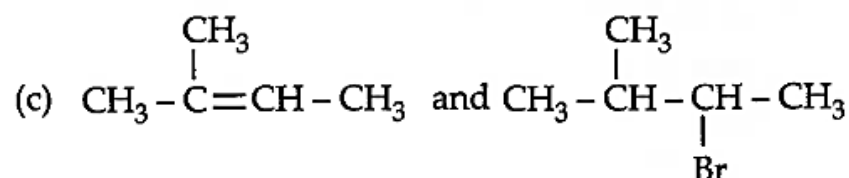
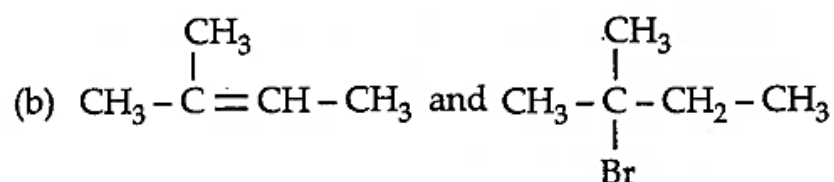
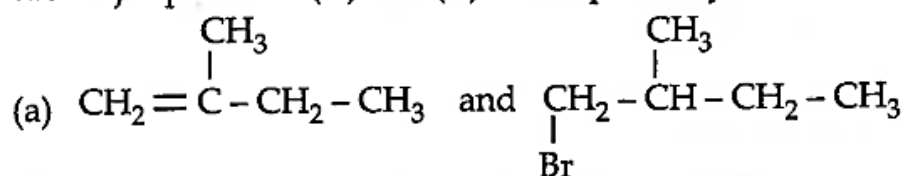
78. Which one of the following statements for the order of a reaction is incorrect?

- (a) Order can be determined only experimentally.
 (b) Order is not influenced by stoichiometric coefficient of the reactants.
 (c) Order of a reaction is sum of power to the concentration terms of reactants to express the rate of reaction.
 (d) Order of reaction is always whole number.

79. In the following reactions,



the major products (A) and (C) are respectively



ROUGH WORK

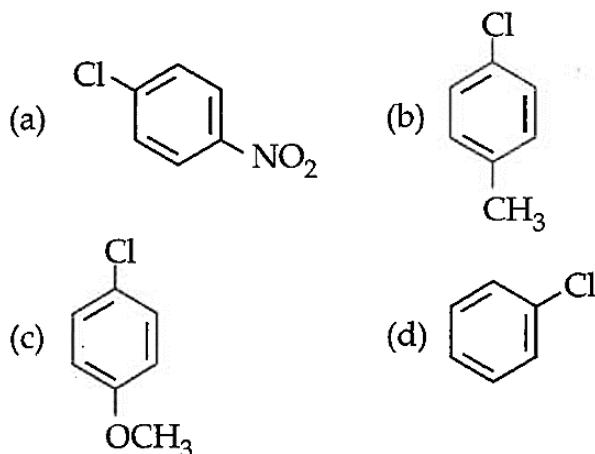
80. Which has the maximum number of molecules among the following?
 (a) 44 gCO₂ (b) 48 gO₃ (c) 8 gH₂ (d) 64 g SO₂
81. What is the value of electron gain enthalpy of Na⁺ if IE_1 of Na = 5, 1eV ?
 (a) -5.1Ev (b) -10.2eV (c) +2.55eV (d) +10.2eV
82. Match List-I with List-II for the compositions of substances and select the correct answer using the code given below.

List-I (Substances)		List-II (Composition)	
(A)	Plaster of Paris	(i)	CaSO ₄ · 2H ₂ O
(B)	Epsomite	(ii)	CaSO ₄ · $\frac{1}{2}$ H ₂ O
(C)	Kieserite	(iii)	MgSO ₄ · 7H ₂ O
(D)	Gypsum	(iv)	MgSO ₄ · H ₂ O
		(v)	CaSO ₄

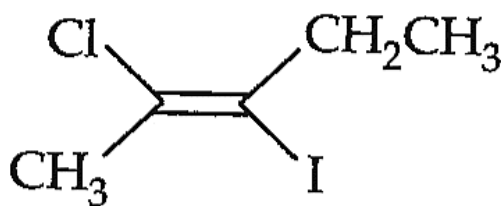
- (a) (A)-(iii), (B)-(iv), (C)-(i), (D)-(ii)
 (b) (A)-(ii), (B)-(iii), (C)-(iv), (D)-(i)
 (c) (A)-(i), (B)-(ii), (C)-(iii), (D)-(v)
 (d) (A)-(iv), (B)-(iii), (C)-(ii), (D)-(i)
83. Which of the following statements is incorrect?
 (a) Pure sodium metal dissolves in liquid ammonia to give blue solution.
 (b) NaOH reacts with glass to give sodium silicate.
 (c) Aluminium reacts with excess NaOH to give Al(OH)₃.
 (d) NaHCO₃ on heating gives Na₂CO₃.
84. Which of the following oxide is amphoteric?
 (a) SnO₂ (b) CaO (c) SiO₂ (d) CO₂

ROUGH WORK

85. Which of the following compounds undergoes nucleophilic substitution reaction most easily?



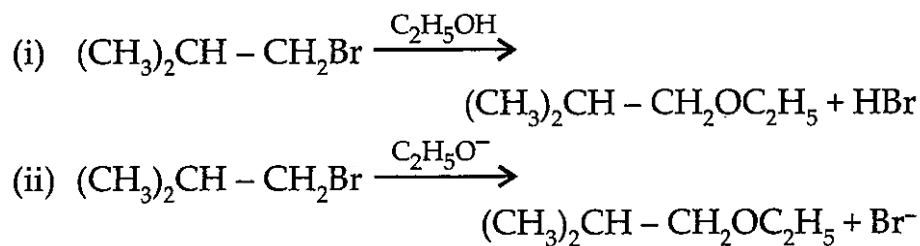
86. The IUPAC name of the following compound is



- (a) trans-2-chloro-3-iodo-2-pentene
(b) cis-3-iodo-4-chloro-3-pentane
(c) trans-3-iodo-4-chloro-3-pentene
(d) cis-2-chloro-3-iodo-2-pentene
87. A 0.1 molal aqueous solution of a weak acid is 30% ionized. If K_f for water is $1.86^\circ\text{C}/\text{m}$, the freezing point of the solution will be
(a) -0.18°C (b) -0.54°C (c) -0.36°C (d) -0.24°C
88. 200 mL of an aqueous solution of a protein contains its 1.26 g. The osmotic pressure of this solution at 300 K is found to be 2.57×10^{-3} bar. The molar mass of protein will be ($R = 0.083 \text{ L}^{\text{bar mol}^{-1} \text{K}^{-1}}$)
(a) 51022 g mol^{-1} (b) $122044 \text{ g mol}^{-1}$ (c) 31011 g mol^{-1} (d) 61038 g mol^{-1}

ROUGH WORK

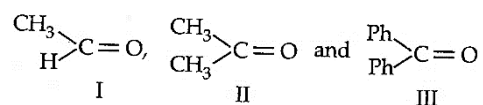
89. Consider the reactions.



The mechanisms of reactions (i) and (ii) are respectively

- (a) $\text{S}_{\text{N}}1$ and $\text{S}_{\text{N}}2$ (b) $\text{S}_{\text{N}}1$ and $\text{S}_{\text{N}}1$ (c) $\text{S}_{\text{N}}2$ and $\text{S}_{\text{N}}2$ (d) $\text{S}_{\text{N}}2$ and $\text{S}_{\text{N}}1$

90. The order of reactivity of phenyl magnesium bromide (PhMgBr) with the following compounds:



- (a) $\text{III} > \text{II} > \text{I}$ (b) $\text{II} > \text{I} > \text{III}$ (c) $\text{I} > \text{III} > \text{II}$ (d) $\text{I} > \text{II} > \text{III}$

ROUGH WORK

ROUGH WORK

एस्पायर *Bulletin*

हिमाचल के बच्चों के लिए एस्पायर शुरू करेगा “सुपर-50” बैच

आर्थिक रूप से पिछड़े 50 बच्चों को एस्पायर मुहैया कराएगा निःशुल्क रहन-सहन व शिक्षा

एस्पायर संस्थान अपने सामाजिक उत्तरदायित्व के निर्वहन हेतु हिमाचल के आर्थिक रूप से पिछड़े वर्ग के बच्चे, जो कि पढ़ाई में अच्छे हैं उनके लिए ‘एस्पायर सुपर-50’ बैच शुरू करने का फैसला लिया है। जो विद्यार्थी अभी बाहरवीं कक्षा में पढ़ रहे हैं व 2024 में बाहरवीं कक्षा उत्तीर्ण करेंगे वो बच्चे इस बैच के लिए योग्य होंगे। जिसके अन्तर्गत एस्पायर एकडेमी शैक्षणिक सत्र 2024-25 के लिए हिमाचल के 50 होनहार विद्यार्थी, जोकि आर्थिक रूप से पिछड़े हैं, उनके लिए एक वर्ष तक निःशुल्क कोचिंग के साथ-साथ हॉस्टल में निःशुल्क रहने व खाने-पीने की व्यवस्था करेगी। इस बैच में प्रवेश पाने के लिए पहले स्तर पर विद्यार्थी को “ब्रेन ऑफ हिमाचल” परीक्षा में



बैठना अनिवार्य होगा।

ब्रेन ऑफ हिमाचल परीक्षा में अच्छा प्रदर्शन करने वाले व आर्थिक रूप से पिछड़े बच्चों को दूसरे स्तर की परीक्षा के लिए आमंत्रित किया जाएगा। दूसरे स्तर की परीक्षा उत्तीर्ण करने वाले बच्चों को दस्तावेज सत्यापन व स्क्रीनिंग के लिए बुलाया जाएगा। सही दस्तावेज सत्यापन के पश्चात् सुपर-50 बैच के लिए उत्तीर्ण हुए बच्चों की सूची निकाली जाएगी व उन बच्चों को अगले एक वर्ष तक निःशुल्क कोचिंग प्रदान की जाएगी तथा निःशुल्क हॉस्टल व खान-पान की सुविधा भी उपलब्ध कराई जाएगी।

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