AIPMT - 2011

Q.1 The dimension of $(\mu_0 \in_0)^{-1/2}$ are :
(1) $[L^{-1/2}T^{1/2}]$ (2) $[L^{1/2} T^{-1/2}]$
(3) $[L^{-1}T]$ (4) $[LT^{-1}]$

Q.2 The moment of inertia of a thin uniform rod of mass M and length L about an axis passing through its midpoint and perpendicular to its length is I_0. Its moment of inertia about an axis passing through one of its ends and perpendicular to its length is :
(1) $I_0 + ML^2$ (2) $I_0 + ML^2/2$
(3) $I_0 + ML^2/4$ (4) $I_0 + 2ML$

Q.3 A boy standing at the top of a tower of 20 m height drops a stone. Assuming g = 10 ms^{-2}, the velocity with which it hits the ground is :
(1) 5.0 m/s   (2) 10.0 m/s
(3) 20.0 m/s   (4) 40.0 m/s

Q.4 A person of mass 60 kg is inside a lift of mass 940 kg and presses the button on control panel. The lift starts moving upwards with an acceleration 1.0 m/s^2. If g = 10 ms^{-2}, the tension in the supporting cable is :
(1) 1200 N   (2) 8600 N
(3) 9680 N   (4) 11000 N

Q.5 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 :
(1) at the instant just after the body is projected.
(2) at the highest position of the body
(3) at the instant just before the body hits the earth.
(4) it remains constant all through.

Q.6 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 :
(1) t = 2 s   (2) t = 1 s
(3) t = 0.5 s   (4) t = 0.25 s

Q.7 A particle moves in a circle of radius 5 cm with constant speed and time period 0.2 π s. The acceleration of the particle is :
(1) 5 m/s^2 (2) 15 m/s^2
(3) 25 m/s^2 (4) 36 m/s^2

Q.8 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 -
(1) Zero   (2) MV   (3) 1.5 MV (4) 2 MV

Q.9 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 $\dfrac{v_1}{v_2}$ is :
(1) r_1/r_2 (2) $(r_1/r_2)^2$ (3) r_2/r_1 (4) $(r_2/r_1)^2$

Q.10 A radioactive nucleus of mass M emits a photon of frequency ν and the nucleus recoils. The recoil energy will be -
(1) $h\nu$ (2) $Mc^2 - h\nu$
(3) $h^2\nu^2/2Mc^2$ (4) Zero

Q.11 The potential energy of a system increases if work is done :
(1) Upon the system by a conservative force.
(2) Upon the system by a nonconservative force.
(3) by the system against a conservative force.
(4) by the system against a nonconservative force

Q.12 A body is moving with velocity 30 m/s towards east. After 10 seconds its velocity becomes 40 m/s towards north. The average acceleration of the body is :
(1) 5 m/s^2 (2) 1 m/s^2
(3) 7 m/s^2 (4) $\sqrt{7}$ m/s^2

Q.13 A missile is fired for maximum range with an initial velocity of 20 m/s. If g = 10 m/s^2, the range of the missile is :
(1) 20 m   (2) 40 m
(3) 50 m   (4) 60 m

Q.14 Force F on a particle moving in a straight line varies with distance d as shown in the figure. The work done on the particle during its displacement of 12 m is :

(1) 13 J   (2) 18 J

(3) 21 J   (4) 26 J

Q.15 A charge Q is enclosed by a Gaussian spherical surface of radius R. If the radius is doubled, then the outward electric flux will :

(1) be doubled   (2) increase four time

(3) be reduced to half   (4) remain the same

Q.16 Four electric charge + 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 charge + q and + q, is :

(1) Zero

(2) $\dfrac{1}{4\pi \in_0} \dfrac{2q}{L} (1 + \sqrt{5})$

(3) $\dfrac{1}{4\pi \in_0} \dfrac{2q}{L} \left(1 + \dfrac{1}{\sqrt{5}}\right)$

(4) $\dfrac{1}{4\pi \in_0} \dfrac{2q}{L} \left(1 - \dfrac{1}{\sqrt{5}}\right)$

Q.17 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 (m^2) the energy (joules) stored in the condenser is :

(1) $\dfrac{1}{2} \in_0 E^2 Ad$ (2) $E^2 Ad/\in_0$

(3) $\dfrac{1}{2} \in_0 E^2$ (4) $\in_0 EAd$

Q.18 If power dissipated in the 9Ω resistor in the circuit shown is 36 Watt, the potential difference across the 2 Ω resistor is :

(1) 2 Volt   (2) 4 Volt

(3) 8 Volt   (4) 10 Volt

Q.19 A current of 2 A flows through a 2 Ω resistor when connected across a battery. The same battery supplies a current of 0.5 A when connected across a 9 Ω resistor. The internal resistance of the battery is :

(1) 1 Ω   (2) 0.5 Ω

(3) 1/3 Ω   (4) 1/4 Ω

Q.20 The rate of increase of thermo-e.m.f. with temperature at the neutral temperature of a thermocouple :

(1) is negative

(2) is positive

(3) is zero

(4) depends upon the choice of the two materials of the thermocouple.

Q.21 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 :

(1) $\sqrt{2}\ \vec{F}$ (2) $-\sqrt{2}\ \vec{F}$

(3) $-\vec{F}$ (4) $\vec{F}$

Q.22 The power obtained in a reactor using U^{235} disintegration is 1000 kW. The mass decay of U^{235} per hour is :

(1) 1 microgram   (2) 10 microgram

(3) 20 microgram   (4) 40 microgram

Q.23 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 :

(a) A is feebly repelled

(b) B is feebly attracted

(c) C is strongly attracted

(d) D remains unaffected

Which one of the following is true ?

(1) A is of a non-magnetic material

(2) B is of a paramagnetic material

(3) C is of a diamagnetic material

(4) D is of a ferromagnetic material

Q.24 The electric and the magnetic field, associated with an e.m. wave, propagating along the +z-axis, can be represented by :

(1) $[\vec{E} = E_0 \hat{j}, \quad \vec{B} = B_0 \hat{k}]$

(2) $[\vec{E} = E_0 \hat{i}, \quad \vec{B} = B_0 \hat{j}]$

(3) $[\vec{E} = E_0 \hat{k}, \quad \vec{B} = B_0 \hat{i}]$

(4) $[\vec{E} = E_0 \hat{j}, \quad \vec{B} = B_0 \hat{i}]$

Q.25 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 :

(1) will turn towards left of direction of motion

(2) will turn towards right of direction of motion

(3) speed will decrease

(4) speed will increase

Q.26 The current i in a coil varies with time as shown in the figure. The variation of induced emf with time would be :
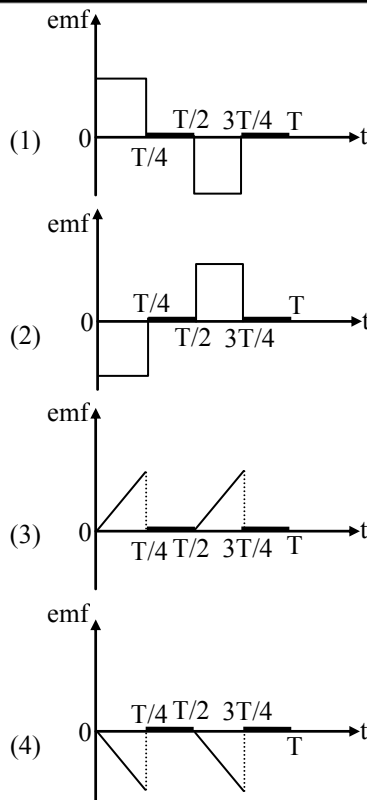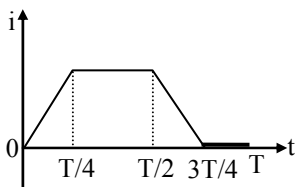
Q.27 In an ac circuit an alternating voltage e = $200\sqrt{2}$ sin 100 t volts is connected to a capacitor of capacity 1 μF. The r.m.s. value of the current in the circuit is :

(1) 20 mA   (2) 10 mA

(3) 100 mA   (4) 200 mA

Q.28 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 3Ω, the phase difference between the applied voltage and the current in the circuit is :

(1) zero   (2) $\pi/6$ (3) $\pi/4$ (4) $\pi/2$

Q.29 When 1 kg of ice at 0ºC melts to water at 0ºC, the resulting change in its entropy, taking latent heat of ice to be 80 Cal/gm, is :

(1) 293 Cal /K   (2) 273 Cal/K

(3) 8×10^4 Cal/K   (4) 80 Cal/K

Q.30 During an isothermal expansion, a confined ideal gas does – 150 J of work against its surroundings. This implies that :

(1) 150 J of heat has been added to the gas

(2) 150 J of heat has been removed from the gas

(3) 300 J of heat has been added to the gas

(4) no heat is transferred because the process is isothermal.

Q.31 A particle of mass m is released from rest and follows a parabolic path as shown. Assuming that the displacement of the mass from the origin is small which graph correctly depicts the position of the particles as a function of time ?
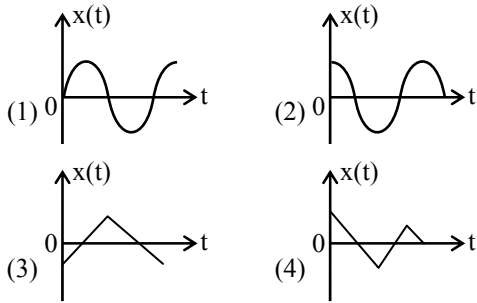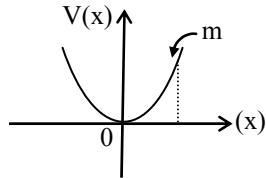
Q.32 Two waves are represented by the equations $y_1 = a \sin(\omega t + kx + 0.57)$ m and $y_2 = a \cos(\omega t + kx)$m, where x is in meter and t in sec. The phase difference between them is :
(1) 0.57 radian   (2) 1 radian
(3) 1.25 radian   (4) 1.57 radian

Q.33 Out of the following functions representing motion of a particle which represents SHM :
(A) $y = \sin \omega t - \cos \omega t$ (B) $y = \sin^3 \omega t$
(C) $y = 5 \cos\left(\dfrac{3\pi}{4} - 3\omega t\right)$
(D) $y = 1 + \omega t + \omega^2 t^2$
(1) Only (A) and (B)
(2) Only (A)
(3) Only (D) does not represent SHM
(4) Only (A) and (C)

Q.34 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 :
(1) decreases by a factor 20
(2) decreases by a factor 10
(3) increases by a factor 20
(4) increases by a factor 10

Q.35 The decreasing order of wavelength of infrared, microwave, ultraviolet and gamma rays is :
(1) infrared, microwave, ultraviolet, gamma rays
(2) microwave, infrared, ultraviolet, gamma rays
(3) gamma rays, ultraviolet, infrared, microwaves
(4) microwaves, gamma rays, infrared, ultraviolet

Q.36 The wavelength of the first line of Lyman series for hydrogen atom is equal to that of the second line of Balmer series for a hydrogen like ion. The atomic number Z of hydrogen like ion is :
(1) 2   (2) 3   (3) 4   (4) 1

Q.37 Which of the following is not due to total internal reflection ?
(1) brilliance of diamond
(2) working of optical fibre
(3) difference between apparent and real depth of a pond
(4) mirage on hot summer days

Q.38 A biconvex lens has a radius of curvature of magnitude 20 cm. Which one of the following options describe best the image formed of an object of height 2 cm placed 30 cm from the lens ?
(1) Real, inverted, height = 1 cm
(2) Virtual, upright, height = 1 cm
(3) Virtual, upright, height = 0.5 cm
(4) Real, inverted, height = 4 cm

Q.39 In photoelectric emission process from a metal of work function 1.8 eV, the kinetic energy of most energetic electrons is 0.5 eV. The corresponding stopping potential is :
(1) 2.3 V   (2) 1.8 V   (3) 1.3 V   (4) 0.5 V

Q.40 Electrons used in an electron microscope are accelerated by a voltage of 25 kV. If the voltage is increased to 100 kV then the de-Broglie wavelength associated with the electrons would
(1) increase by 4 times   (2) increase by 2 times
(3) decrease by 2 times   (4) decrease by 4 times

Q.41 Light of two different frequencies whose photons have energies 1 eV and 2.5 eV respectively illuminate a metallic surface whose work function is 0.5 eV successively. Ratio of maximum speeds of emitted electrons will be :
(1) 1 : 5   (2) 1 : 4   (3) 1 : 2   (4) 1 : 1

Q.42 In the Davisson and Germer experiment, the velocity of electrons emitted from the electron gun can be increased by :
(1) decreasing the potential difference between the anode and filament
(2) increasing the potential difference between the anode and filament
(3) increasing the filament current
(4) decreasing the filament current

Q.43 The half life of radioactive isotope 'X' is 50 years. It decays to another element 'Y' which is stable. The two elements 'X' and 'Y' were found to be in the ratio of 1 : 15 in a sample of a given rock. The age of the rock was estimated to be :
(1) 100 years   (2) 150 years
(3) 200 years   (4) 250 years

Q.44 Photoelectric emission occurs only when the incident light has more than a certain minimum:
(1) frequency   (2) power
(3) wavelength   (4) intensity

Q.45 Fusion reaction takes place at high temperature because :
(1) molecules break up at high temperature
(2) nuclei break up at high temperature
(3) atomic get ionised at high temperature
(4) kinetic energy is high enough to overcome the coulomb repulsion between nuclei

Q.46 A nucleus $_n^m X$ emits one α particle and two β^- particles. The resulting nucleus is :
(1) $_{n-2}^{m-4}Y$ (2) $_{n-4}^{m-6}Z$ (3) $_n^{m-6}Z$ (4) $_n^{m-4}X$

Q.47 A transistor is operated in common emitter configuration at $V_C = 2V$ such that a change in the base current from 100 μA to 300 μA produces a change in the collector current from 10 mA to 20 mA. The current gain is :
(1) 25   (2) 50   (3) 75   (4) 100

Q.48 If a small amount of antimony is added to germanium crystal :
(1) its resistance is increased
(2) it becomes a p-type semiconductor
(3) the antimony becomes an acceptor atom
(4) there will be more free electrons than holes in the semiconductor

Q.49 In forward biasing of the p-n junction :
(1) the positive terminal of the battery is connected to p-side and the depletion region becomes thin
(2) the positive terminal of the battery is connected to p-side and the depletion region becomes thick
(3) the positive terminal of the battery is connected to n-side and the depletion region becomes thin
(4) the positive terminal of the battery is connected to n-side and the depletion region becomes thick.

Q.50 Symbolic representation of four logic gates are shown as :
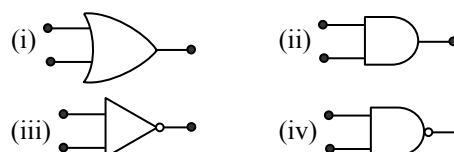
Pick out which ones are for AND, NAND and NOT gates, respectively :
(1) (ii), (iv) and (iii)   (2) (ii), (iii) and (iv)
(3) (iii), (ii) and (i)   (4) (iii), (ii) and (iv)

Q.51 The total number of atomic orbitals in fourth energy level of an atom is :
(1) 4   (2) 8   (3) 16   (4) 32

Q.52 The electrode potentials for
$$Cu^{2+}_{(aq)} + e^- \rightarrow Cu^+_{(aq)}$$
and $Cu^+_{(aq)} + e^- \rightarrow Cu_{(s)}$
are + 0.15 V and + 0.50 V respectively. The value of $E^o_{Cu^{2+}/Cu}$ will be :
(1) 0.150 V   (2) 0.500 V
(3) 0.325 V   (4) 0.650 V
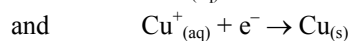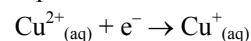
Q.53 Mole fraction of the solute in a 1.00 molal aqueous solution is :
(1) 1.7700   (2) 0.1770
(3) 0.0177   (4) 0.0344

Q.54 By what factor does the average velocity of a gaseous molecule increase when the temperature (in Kelvin) is doubled ?
(1) 1.4   (2) 2.0   (3) 2.8   (4) 4.0

Q.55 A buffer solution is prepared in which the concentration of NH_3 is 0.30 M and the concentration of NH_4^+ is 0.20 M. 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)
(1) 8.73　　(2) 9.08　　(3) 9.43　　(4) 11.72

Q.56 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 :
(1) 25.00 u　　　　　(2) 50.00 u
(3) 12.25 u　　　　　(4) 6.50 u

Q.57 Which of the following is correct option for free expansion of an ideal gas under adiabatic condition ?
(1) $q = 0, \Delta T < 0, w \neq 0$
(2) $q = 0, \Delta T \neq 0, w = 0$
(3) $q \neq 0, \Delta T = 0, w = 0$
(4) $q = 0, \Delta T = 0, w = 0$

Q.58 For the reaction $N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$, the equilibrium constant is K_1. The equilibrium constant is K_2 for the reaction $2NO(g) + O_2(g) \rightleftharpoons 2NO_2(g)$. What is K for the reaction $NO_2(g) \rightleftharpoons 1/2 N_2(g) + O_2(g)$?
(1) $1/(K_1 K_2)$　　　　(2) $1/(2 K_1 K_2)$
(3) $1/(4 K_1 K_2)$　　　　(4) $[1/K_1 K_2]^{1/2}$

Q.59 If x is amount of adsorbate and m is amount of adsorbent, which of the following relations is not related to adsorption process ?

(1) $\dfrac{x}{m} = p \times T$

(2) $\dfrac{x}{m} = f(p)$ at constant T

(3) $\dfrac{x}{m} = f(T)$ at constant p

(4) $p = f(T)$ at constant $\left(\dfrac{x}{m}\right)$

Q.60 If the enthalpy change for the transition of liquid water to steam is 30 kJ mol^{-1} at 27ºC, the entropy change for the process would be :
(1) 100 J mol^{-1} K^{-1}　　(2) 10 J mol^{-1} K^{-1}
(3) 1.0 J mol^{-1} K^{-1}　　(4) 0.1 J mol^{-1} K^{-1}

Q.61 The Van't Hoff factor i for a compound which undergoes dissociation in one solvent and association in other solvent is respectively :
(1) greater than one and greater than one
(2) less than one and greater than one
(3) less than one and less than one
(4) greater than one and less than one

Q.62 Standard electrode potential for Sn^{4+}/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 :
(1) + 1.83 V　　　　(2) + 1.19 V
(3) + 0.89 V　　　　(4) + 0.18 V

Q.63 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 :
(1) 1 atm　　　　(2) 0.5 atm
(3) 0.8 atm　　　　(4) 0.9 atm

Q.64 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 $\Delta G^°$ and K_{eq} ?
(1) $\Delta G^° > 0; K_{eq} < 1$　　(2) $\Delta G^° > 0; K_{eq} > 1$
(3) $\Delta G^° < 0; K_{eq} > 1$　　(4) $\Delta G^° < 0; K_{eq} < 1$

Q.65 The freezing point depression constant for water is $-1.86º Cm^{-1}$. If 5.00 g Na_2SO_4 is dissolved in 45.0g H_2O, the freezing point is changed by –3.82ºC. Calculate the Van't Hoff factor for Na_2SO_4.
(1) 0.381　　　　(2) 2.05
(3) 2.63　　　　(4) 3.11

Q.66 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:

(1) $\lambda_1 = \dfrac{1}{2} \lambda_2$　　　　(2) $\lambda_1 = \lambda_2$

(3) $\lambda_1 = 2\lambda_2$　　　　(4) $\lambda_1 = 4\lambda_2$

Q.67 Standard electrode potential of three metals X, Y and Z are –1.2 V, + 0.5 V and –3.0 V respectively. The reducing power of these metals will be :
(1) X > Y > Z　　　　(2) Y > Z > X
(3) Y > X > Z　　　　(4) Z > X > Y

Q.68 Which one of the following statements for the order of a reaction is incorrect ?
(1) Order of reaction is always whole number
(2) Order can be determined only experimentally
(3) Order is not influenced by stoichiometric coefficient of the reactants.
(4) Order of reaction is sum of power to the concentration terms of reactants to express the rate of reaction

Q.69 Enthalpy change for the reaction,
$4H_{(g)} \rightarrow 2H_{2(g)}$ is $-869.6 kJ$
The dissociation energy of H – H bond is
(1) +217.4 kJ   (2) –434.8 kJ
(3) –869.6 kJ   (4) +434.8 kJ

Q.70 If n = 6, the correct sequence for filling of electrons will be :
(1) $ns \rightarrow np(n-1)d \rightarrow (n-2)f$
(2) $ns \rightarrow (n-2)f \rightarrow (n-1)d \rightarrow np$
(3) $ns \rightarrow (n-1)d \rightarrow (n-2)f \rightarrow np$
(4) $ns \rightarrow (n-2)f \rightarrow np \rightarrow (n-1)d$

Q.71 Which of the following compounds has the lowest melting point ?
(1) CaF_2 (2) $CaCl_2$ (3) $CaBr_2$ (4) CaI_2

Q.72 Which of the following pairs of metals is purified by van Arkel method ?
(1) Ni and Fe   (2) Ga and In
(3) Zr and Ti   (4) Ag and Au

Q.73 The correct order of increasing bond length of C – H, C – O, C – C and C = C is :
(1) $C – H < C – O < C – C < C = C$
(2) $C – H < C = C < C – O < C – C$
(3) $C – C < C = C < C – O < C – H$
(4) $C – O < C – H < C – C < C = C$

Q.74 Acidified $K_2Cr_2O_7$ solution turns green when Na_2SO_3 is added to it. This is due to the formation of :
(1) $CrSO_4$ (2) $Cr_2(SO_4)_3$
(3) CrO_4^{2-} (4) $Cr_2(SO_3)_3$

Q.75 For the four successive transition elements (Cr, Mn, Fe and Co), the stability of +2 oxidation state will be there in which of the following order?

(1) Cr > Mn > Co > Fe
(2) Mn > Fe > Cr > Co
(3) Fe > Mn > Co > Cr
(4) Co > Mn > Fe > Cr
(At nos. Cr = 24, Mn = 25, Fe = 26, Co = 27)

Q.76 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^- ?
(1) NO_2^- and NH_2^- (2) NO_2^- and NO_3^-
(3) NO_4^+ and NO_3^- (4) SCN^- and NH_2^-

Q.77 Which of the following elements is present as the impurity to the maximum extent in the pig iron ?
(1) Phosphorus   (2) Manganese
(3) Carbon   (4) Silicon

Q.78 Which of the following is least likely to behave as Lewis base ?
(1) OH^- (2) H_2O
(3) NH_3 (4) BF_3

Q.79 Which one of the following is present as an active ingredient in bleaching powder for bleaching action ?
(1) $CaCl_2$ (2) $CaOCl_2$
(3) $Ca(OCl)_2$ (4) CaO_2Cl

Q.80 The complex [Pt (Py) (NH$_3$) Br Cl] will have how many geometrical isomers ?
(1) 2   (2) 3
(3) 4   (4) 0

Q.81 Name the type of the structure of silicate in which one oxygen atom of $[SiO_4]^{4-}$ is shared ?
(1) Three dimensional   (2) Linear chain silicate
(3) Sheet silicate   (4) Pyrosilicate

Q.82 The complexes $[Co(NH_3)_6]$ $[Cr(CN)_6]$ and $[Cr(NH_3)_6]$ $[Co(CN)_6]$ are the examples of which type of isomerism ?
(1) Geometrical isomerism
(2) Linkage isomerism
(3) Ionization isomerism
(4) Coordination isomerism

Q.83 The d-electron configurations of Cr^{2+}, Mn^{2+}, Fe^{2+} and Co^{2+} are d^4, d^5, d^6 and d^7 respectively. Which one of the following will exhibit minimum paramagnetic behaviour ?

(1) $[Cr(H_2O)_6]^{2+}$ (2) $[Mn(H_2O)_6]^{2+}$

(3) $[Fe(H_2O)_6]^{2+}$ (4) $[Co(H_2O)_6]^{2+}$

(At. Nos. Cr= 24, Mn= 25, Fe= 26, Co = 27)

Q.84 Of the following complex ions, which is diamagnetic in nature ?

(1) $[CoF_6]^{3}$ (2) $[NiCl_4]^{2-}$

(3) $[Ni(CN)_4]^{2-}$ (4) $[CuCl_4]^{2-}$

Q.85 Which of the following has the minimum bond length ?

(1) O_2 (2) O_2^+ (3) O_2^- (4) O_2^{2-}

Q.86 The value of ΔH for the reaction
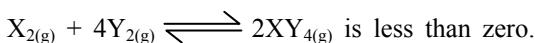
$X_{2(g)} + 4Y_{2(g)} \rightleftharpoons 2XY_{4(g)}$ is less than zero. Formation of $XY_{4(g)}$ will be favoured at :

(1) High pressure and low temperature

(2) High temperature and high pressure

(3) Low pressure and low temperature

(4) High temperature and low pressure

Q.87 Of the following which one is classified as polyester polymer ?

(1) Nylon - 66   (2) Terylene

(3) Backelite   (4) Melamine

Q.88 What is the product obtained in the following reaction :
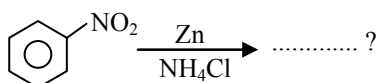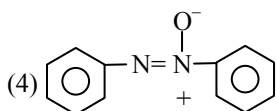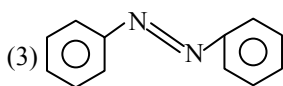
**Q.89** In a set of reactions m-bromobenzoic acid gave a product D. Identify the product D.
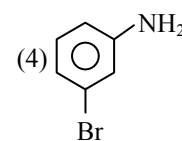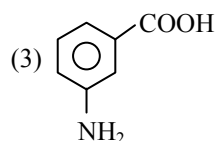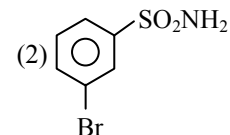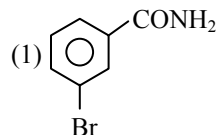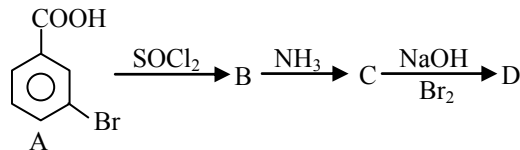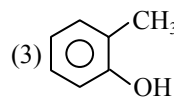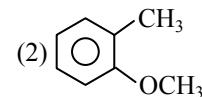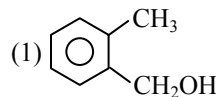

Q.90 In Dumas' method of estimation of nitrogen 0.35 g of an organic compound gave 55 mL of nitrogen collected at 300 K temperature and 715 mm pressure. The percentage composition of nitrogen in the compound would be :
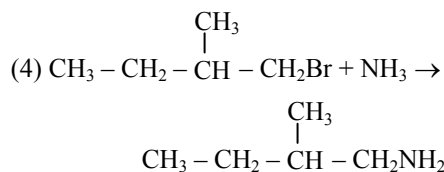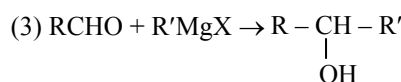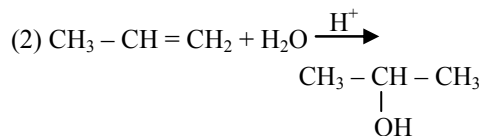(Aqueous tension at 300 K = 15 mm)

(1) 14.45   (2) 15.45   (3) 16.45   (4) 17.45

Q.91 Which one of the following is most reactive towards electrophilic reagent ?
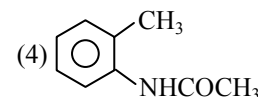
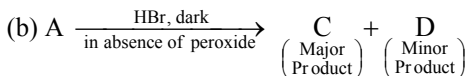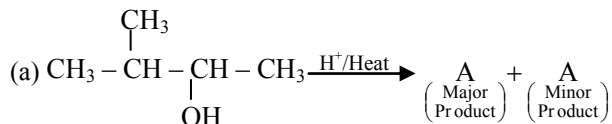**Q.92** Which one is a nucleophilic substitution reaction among the following ?

(1) $CH_3CHO + HCN \rightarrow CH_3CH(OH)CN$

(2) $CH_3 - CH = CH_2 + H_2O \xrightarrow{H^+}$

$$CH_3 - \underset{\underset{OH}{|}}{CH} - CH_3$$

(3) $RCHO + R'MgX \rightarrow R - \underset{\underset{OH}{|}}{CH} - R'$

(4) $CH_3 - CH_2 - \underset{\underset{CH_3}{|}}{CH} - CH_2Br + NH_3 \rightarrow$

$$CH_3 - CH_2 - \underset{\underset{CH_3}{|}}{CH} - CH_2NH_2$$

Q.93 Considering the state of hybridization of carbon atoms, find out the molecule among the following which is linear?
(1) $CH_3 - CH_2 - CH_2 - CH_3$
(2) $CH_3 - CH = CH - CH_3$
(3) $CH_3 - C \equiv C - CH_3$
(4) $CH_2 = CH - CH_2 - C \equiv CH$

Q.94 In the following reactions,

(a) $CH_3 - \underset{\underset{OH}{|}}{CH} - \underset{\underset{|}{CH_3}}{CH} - CH_3 \xrightarrow{H^+/Heat}$ $\underset{\binom{Major}{Product}}{A} + \underset{\binom{Minor}{Product}}{A}$

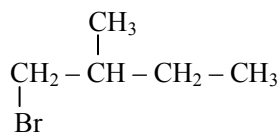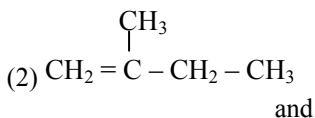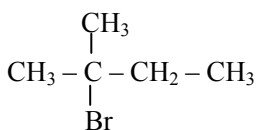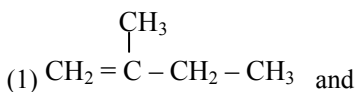(b) $A \xrightarrow[\text{in absence of peroxide}]{HBr, dark}$ $\underset{\binom{Major}{Product}}{C} + \underset{\binom{Minor}{Product}}{D}$

the major products (A) & (C) are respectively:

(1) $CH_2 = \underset{\underset{|}{CH_3}}{C} - CH_2 - CH_3$ and

$CH_3 - \underset{\underset{Br}{|}}{\overset{\overset{CH_3}{|}}{C}} - CH_2 - CH_3$

(2) $CH_2 = \underset{\underset{|}{CH_3}}{C} - CH_2 - CH_3$

and

$\underset{\underset{Br}{|}}{CH_2} - \overset{\overset{CH_3}{|}}{CH} - CH_2 - CH_3$

(3) $CH_3 - \overset{\overset{CH_3}{|}}{C} = CH - CH_3$ and

$CH_3 - \underset{\underset{Br}{|}}{\overset{\overset{CH_3}{|}}{C}} - CH_2 - CH_3$

(4) $CH_3 - \overset{\overset{CH_3}{|}}{C} = CH - CH_3$ and

$CH_3 - \underset{\underset{Br}{|}}{\overset{\overset{CH_3}{|}}{CH}} - CH - CH_3$
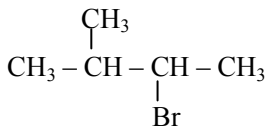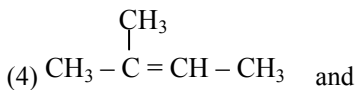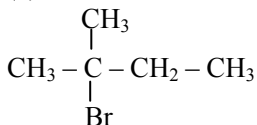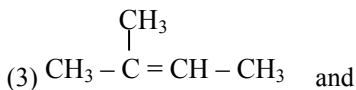
Q.95 The Lassaigne's extract is boiled with conc. HNO_3 while testing for halogens. By doing so it:
(1) increases the concentration of NO_3^- ions
(2) decomposes Na_2S and NaCN, if formed
(3) helps in the precipitation of AgCl
(4) increases the solubility product of AgCl

Q.96 The correct IUPAC name of the compound

is
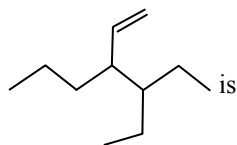
(1) 3-(1-ethyl propyl) hex-1 ene
(2) 4-Ethyl-3-propyl hex-1-ene
(3) 3-Ethyl-4-ethenyl heptane
(4) 3-Ethyl-4-propyl hex-5-ene

Q.97 Clemmensen reduction of a ketone is carried out in the presence of which of the following ?
(1) H_2 and Pt as catalyst
(2) Glycol with KOH
(3) Zn-Hg with HCl
(4) Li Al H_4

Q.98 Which one of the following is employed as Antihistamine ?
(1) Omeprazole   (2) Chloramphenicol
(3) Diphenyl hydramine(4) Norothindrone

Q.99 Which one of the following statements is not true regarding (+) Lactose ?
(1) (+) Lactose, $C_{12}H_{22}O_{11}$ contains 8-OH groups
(2) On hydrolysis (+) Lactose gives equal amount of D(+) glucose and D(+) galactose
(3) (+) Lactose is a β-glycoside formed by the union of a molecule of D(+) glucose and a molecule of D(+) galactose
(4) (+) Lactose is a reducing sugar and does not exhibit mutarotation

Q.100 Which one of the following statement is not true ?
(1) Oxide of sulphur, nitrogen and carbon are the most widespread air pollutant
(2) pH of drinking water should be between 5.5 – 9.5
(3) Concentration of DO below 6 ppm is good for the growth of fish
(4) Clean water would have a BOD value of less than 5ppm

Q.101 The "Eyes" of the potato tuber are :
(1) axillary buds   (2) root buds
(3) flower buds   (4) shoot buds

Q.102 Organisms called Methanogens are most abundant in a :
(1) Hot spring (2) Sulphur rock
(3) Cattle yard (4) Polluted stream

Q.103 Which one of the following have the highest number of species in nature ?
(1) Angiosperms (2) Fungi
(3) Insects (4) Birds

Q.104 Archegoniphore is present in :
(1) *Funaria* (2) *Marchantia*
(3) *Chara* (4) *Adiantum*

Q.105 Compared with the gametophytes of the bryophytes, the gametophytes of vascular plants tend to be
(1) smaller and to have smaller sex organs
(2) smaller but to have larger sex organs
(3) larger but to have smaller sex organs
(4) larger and to have larger sex organs

Q.106 The gametophyte is **not** an independent, free living generation in :
(1) *Pinus* (2) *Polytrichum*
(3) *Adiantum* (4) *Marchantia*

Q.107 Important site for formation of glycoproteins and glycolipids is :
(1) Lysosome (2) Vacuole
(3) Golgi apparatus (4) Plastid

Q.108 Peptide synthesis inside a cell takes place in :
(1) Ribosomes (2) Chloroplast
(3) Mitochondria (4) Chromoplast

Q.109 In eubacteria, a cellular component that resembles eukaryotic cell is :
(1) Cell wall (2) Plasma membrane
(3) Nucleus (4) Ribosomes

Q.110 Mutations can be induced with :
(1) Gamma radiation (2) Infra Red radiations
(3) IAA (4) Ethylene

Q.111 A collection of plants and seeds having diverse alleles of all the genes of a crop is called :
(1) Genome (2) Herbarium
(3) Germplasm (4) Gene library

Q.112 Which one of the following also acts as a catalyst in a bacterial cell ?
(1) 23 s RNA (2) 5 s RNA
(3) sn RNA (4) hn RNA

Q.113 Which one of the following statements is correct ?
(1) Flower of tulip is a modified shoot
(2) In tomato, fruit is a capsule
(3) Seeds of orchids have oil-rich endosperm
(4) Placentation in primose is basal

Q.114 The correct floral formula of chilli is :
(1) $\oplus \phi K_5 \widehat{C_5} A_{(5)} \underline{G}_2$ (2)

$\oplus \phi K_{(5)} C_5 A_5 \underline{G}_{(2)}$

(3) $\oplus \phi K_{(5)} \widehat{C_{(5)}} A_5 \underline{G}_{(2)}$ (4) $\oplus \phi K_5 C_{(5)} A_{(5)} \underline{G}_2$

Q.115 Nitrifying bacteria :
(1) reduce nitrates to free nitrogen
(2) oxidize ammonia to nitrates
(3) convert free nitrogen to nitrogen to compounds
(4) convert proteins into ammonia

Q.116 The function of leghaemoglobin in the root nodules of legumes is :
(1) expression of ni*f* gene
(2) inhibition of nitrogenase activity
(3) oxygen removal
(4) nodule differentiation

Q.117 Which one of the following elements is plants is not remobillised ?
(1) Sulphur (2) Phosphorus
(3) Calcium (4) Potassium

Q.118 A drupe develops in :
(1) Tomato (2) Mango
(3) Wheat (4) Pea

Q.119 Ground tissue includes :
(1) All tissues internal to endodermis
(2) All tissues external to endodermis
(3) All tissues except epidermis and vascular bundles
(4) Epidermis and cortex

Q.120 In land plants, the guard cells differ from other epidermal cells in having :
(1) Chloroplasts
(2) Cytoskeleton
(3) Mitochondria
(4) Endoplasmic reticulum

Q.121 The ovary is half inferior in flower of :
(1) Guava   (2) Peach
(3) Cucumber   (4) Cotton

Q.122 The cork cambium, cork and secondary cortex are collectively called :
(1) Phellem (2) Phelloderm
(3) Phellogen   (4) Periderm

Q.123 Which one of the following is wrongly matched?
(1) Cassia – lmbricate aestivation
(2) Root pressure-Guttation
(3) Puccinia – Smut
(4) Root –Exarch protoxylem

Q.124 Flowers are Zygomorphic in :
(1) Datura   (2) Mustard
(3) Gulmohur   (4) tomato

Q.125 CAM helps the plants in :
(1) Reproduction   (2) Conserving water
(3) Secondary growth (4) Disease resistance

Q.126 Of the total incident solar radiation the proportion of PAR is
(1) More than 80%   (2) About 70%
(3) About 60%   (4) Less than 50%

Q.127 A prokaryotic autotrophic nitrogen fixing symbiont is found in
(1) Pisum   (2) Alnus
(3) Cycas   (4) Cicer

Q.128 Nucellar polyembryony is reported in species of :
(1) Brassica (2) Citrus
(3) Gossypium   (4) Triticum

Q.129 Filiform apparatus is a characteristic feature of
(1) Zygote   (2) Suspensor
(3) Egg   (4) Synergid

Q.130 What would be the number of chromosomes of the aleurone cells of a plant with 42 chromosomes in its root tip cells ?
(1) 21   (2) 42   (3) 63   (4) 84

Q.131 Wind pollination is common in :
(1) Orchids   (2) Legumes
(3) Lilies   (4) Grasses

Q.132 In which one of the following pollination is autogamous ?
(1) Cleistogamy   (2) Geitonogamy
(3) Xenogamy   (4) Chasmogamy

Q.133 Mass of living matter at a trophic level in an area at any time is called :
(1) Standing state   (2) Standing crop
(3) Detritus   (4) Humus

Q.134 Which one of the following statements is wrong in case of Bhopal tragedy ?
(1) It took place in the night of December 2/3, 1984
(2) Methyl Isocyanate gas leakage took place
(3) Thousands of human beings died
(4) Radioactive fall out engulfed Bhopal

Q.135 Secondary sewage treatment is mainly a :
(1) Biological process   (2) Physical process
(3) Mechanical process   (4) Chemical process

Q.136 Eutrophication is often seen in :
(1) Mountains   (2) Deserts
(3) Fresh water lakes (4) Ocean

Q.137 Large Woody Vines are more commonly found in :
(1) Alpine forests   (2) Temperate forests
(3) Mangroves   (4) Tropical rainforests

Q.138 Which one of the following expanded forms of the following acronyms is correct ?
(1) IUCN = International Union for Conservation of Nature and Natural Resources
(2) IPCC = International Panel for Climate Change
(3) UNEP = United Nations Environmental policy
(4) EPA = Environmental Pollution Agency

Q.139 Which one of the following statements is correct for secondary succession?
(1) It is similar to primary succession except that it has a relatively fast pace.
(2) It begins on a bare rock.
(3) It occurs on deforested site
(4) It follows primary succession

Q.140 Which one of the following shows maximum genetic diversity in India ?
(1) Mango (2) Groundnut
(3) Rice (4) Maize

Q.141 Which one of the following is not a biofertilizer ?
(1) Mycorrhiza (2) Agrobacterium
(3) Rhizobium (4) Nostoc

Q.142 Which one of the following acts as a physiological barrier to the entry of microorganisms in human body ?
(1) Skin
(2) Epithelium of Urogenital tract
(3) Tears
(4) Monocytes

Q.143 Which one of the following helps in absorption of phosphorus from soil by plants ?
(1) Anabaena (2) Glomus
(3) Rhizobium (4) Frankia

Q.144 'Himgiri' developed by hybridisation and selection for disease resistance against rust pathogens is a variety of :
(1) Wheat (2) Chilli
(3) Maize (4) Sugarcane

Q.145 Which of the following is **mainly** produced by the activity of anaerobic bacteria on sewage ?
(1) Marsh gas (2) Laughing gas
(3) Propane (4) Mustard gas

Q.146 Agarose extracted from sea weeds finds use in :
(1) Gel electrophoresis (2) Spectrophotometry
(3) Tissue Culture (4) PCR

Q.147 Maximum number of existing transgenic animals is of :
(1) Pig (2) Fish
(3) Mice (4) Cow

Q.148 Continuous addition of sugars in 'fed batch' fermentation is done to :
(1) degrade sewage (2) produce methane
(3) obtain antibiotics (4) purify enzymes

Q.149 The process of RNA interference has been used in the development of plants resistant to :
(1) Insects (2) Nematodes
(3) Fungi (4) Viruses

Q.150 "Jaya" and "Ratna" developed for green revolution in India are the varieties of :
(1) Bajra (2) Maize
(3) Rice (4) Wheat

Q.151 Which one of the following organisms is **not** an example of eukaryotic cells ?
(1) *Amoeba proteus*
(2) *Paramccium caudatum*
(3) *Escheria coli*
(4) *Euglena viridis*

Q.152 Which one of the following animals is **correctly** matched with its particular named taxonomic category ?
(1) Housefly – Musca, an order
(2) Tiger –tigris, the species
(3) Cuttlefish- Mollusca, a class
(4) Humans – Primata, the family

Q.153 In which one of the following the genus name, its two characters and its class/phylum are correctly matched ?

|	Genus name	Two characters		Class / Phylum
(1)	Aurelia	(a)	Cnidoblasts	Coelenterata
		(b)	Organ level of organization	
(2)	Ascaris	(a)	Body segmented	Annelida
		(b)	Males and females distinct	
(3)	Salamandra	(a)	A tympanum represents ear	Amphibia
		(b)	Fertilization is external	
(4)	Pteropus	(a)	skin possesses hair	Mammalia
		(b)	Oviparous	

Q.154 Which one of the following groups of animals is correctly matched with its one characteristic feature without even a single exception ?
(1) Mammalia : give birth to young ones.
(2) Reptilia : possess 3-chambered heart with one incompletely divided ventricle
(3) Chordata : possess a mouth provided with an upper and a lower jaw
(4) Chondrichthyes : possess cartilaginous endoskeleton

Q.155 What will you look for to identify the sex of the following ?
- (1) Male shark – Claspers borne on pelvic fins
- (2) Female Ascaris – Sharply curved posterior end
- (3) Male frog- A copulatory pad on the first digit of the hind limb
- (4) Female cockroach – Anal cerci

Q.156 The curve given below shows enzymatic activity with relation to three conditions (pH, temperature and substrate concentration)
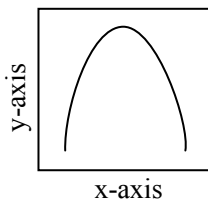
What do the two axises (x and y) represent ?

|	x-axis	y-axis
(1)	enzymatic activity,	temperature
(2)	enzymatic activity,	pH
(3)	temperature	enzyme activity
(4)	substrate concentration	enzymatic activity

Q.157 The ciliated columnar epithelial cells in humans are known to occur in :
- (1) Fallopian tubes and urethra
- (2) Eustachian tube and stomach lining
- (3) Bronchioles and Fallopian tubes
- (4) Bile duct and oesophagus

Q.158 Select the correct option with respect to mitosis.
- (1) Chromosomes move to the spindle equator and get aligned along equatorial plate in metaphase
- (2) Chromatids separate but remain in the centre of the cell in anaphase
- (3) Chromatids start moving towards opposite poles in telophase
- (4) Golgi complex and endoplasmic reticulum are still visible at the end of prophase

Q.159 Which one of the following structural formulae of two organic compounds is correctly identified along with its related function ?

A   **B**
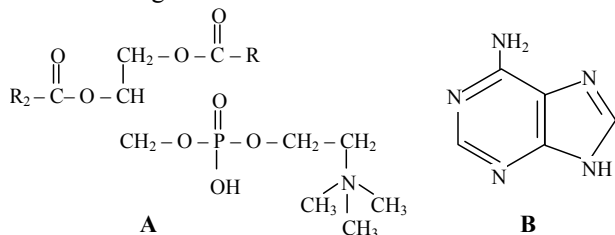
- (1) **A** : Lecithin-a component of cell membrane
- (2) **B** : Adenine-a nucleotide that makes up nucleic acids
- (3) **A** : Triglyceride-major source of energy
- (4) **B** : Uracil-a component of DNA

Q.160 What was the most significant trend in the evolution of modern man (Homo sapiens) from his ancestors ?
- (1) Increasing brain capacity
- (2) Upright posture
- (3) Shortening of jaws
- (4) Binocular vision

Q.161 Which one of the following conditions correctly describes the manner of determining the sex in the given examples ?
- (1) Homozygous sex chromosomes (XX) produce male in Drosophila
- (2) Homozygous sex chromosomes (ZZ) determine female sex in Birds
- (3) XO type of sex chromosomes determine male sex in grasshopper
- (4) XO condition in humans as found in Turner Syndrome, determines female sex

Q.162 A person with unknown blood group under ABO system, has suffered much blood loss in an accident and needs immediate blood transfusion. His one friend who has a valid certificate of his own blood type, offers for blood donation without delay. What would have been the type of blood group of the donor friend
- (1) Type A   (2) Type B
- (3) Type AB   (4) Type O

Q.163 What are those structures that appear as 'beads-on-string' in the chromosomes when viewed under electron microscope ?
- (1) Base pairs   (2) Genes
- (3) Nucleotides   (4) Nucleosomes

Q.164 Match the source gland with its respective hormone as well as the function.

	Source gland	Hormone	Function
(1)	Thyroid	Thyroxine	Regulates blood calcium level
(2)	Anterior pituitary	Oxytocin	Contraction of uterus muscles during child birth
(3)	Posterior pituitary	Vasopressin	Stimulates resorption of water in the distal tubules in the nephron
(4)	Corpus luteum	Estrogen	Supports pregnancy

Q.165 Which of the following is correctly stated as it happens in the common cockroach ?
(1) The food is ground by mandibles and gizzard

(2) Malpighian tubules are excretory organs projecting out from the colon
(3) Oxygen is transported by haemoglobin in blood
(4) Nitrogenous excretory product is urea

Q.166 A large proportion of oxygen is left unused in the human blood even after its uptakes by the body tissues. This O_2 :
(1) helps in releasing more O_2 to the epithelial tissues
(2) acts as a reserve during muscular exercise
(3) raises the pCO_2 of blood to 75 mm of Hg
(4) is enough to keep oxyhaemoglobin saturation at 96%

Q.167 Which one of the following enzymes carries out the initial step in the digestion of milk in humans
(1) Trypsin   (2) Pepsin
(3) Rennin   (4) Lipase

Q.168 Which one of the following is **not** a part of a renal pyramid ?
(1) Loops of Henle
(2) Peritubular capillaries
(3) Convoluted tubules
(4) Collecting ducts

Q.169 One very special feature in the earthworm pheretima is that :
(1) It has a long dorsal tubular heart
(2) Fertilisation of eggs occurs inside the body
(3) The typhlosole greatly increases the effective absorption area of the digested food in the intestine
(4) The S-shaped state embedded in the integument are the defensive weapons used against the enemies

Q.170 Two friends are eating together on a dining table. One of them suddenly starts coughing while swallowing some food. This coughing would have been due to improper movement of:
(1) Tongue   (2) Epiglottis
(3) Diaphragm   (4) Neck

Q.171 Arteries are best defined as the vessel which :
(1) carry blood from one visceral organ to another visceral organ]
(2) supply oxygenated blood to the different organs
(3) carry blood away from the heart to different organs
(4) break up into capillaries which reunite to form a vein

Q.172 'Bundle of Hiss' is a part of which one of the following organs in humans ?
(1) Pancreas   (2) Brain
(3) Heart   (4) Kidney

Q.173 The purplish red pigment rhodopsin contained in the rods type of photo receptor cells of the human eye, is a derivative of :
(1) Vitamin A   (2) Vitamin B_1
(3) Vitamin C   (4) Vitamin D

Q.174 Which one of the following plasma proteins is involved in the coagulation of blood ?
(1) Fibrinogen   (2) an albumin
(3) serum amylase   (4) a globulin

Q.175 When a neuron is in resting state i.e. not conducting any impulse, the axonal membrane is :
(1) Comparatively more permeable of K^+ ions and nearly impermeable to Na^+ ions
(2) Comparatively more permeable to Na^+ ions and nearly impermeable to K^+ ions
(3) Equally permeable to both Na^+ and K^+ ions
(4) Impermeable to both Na^+ and K^+ ions

Q.176 Which one of the following correctly explains the function of a specific part of a human nephron ?

(1) Afferent arteriole : carries the blood away from the glomerulus towards renal vein

(2) Podocytes : Create minute spaces (slit pores) for the filtration of blood into the Bowman's capsule

(3) Henle's loop : most reabsorption of the major substances from the glomerular filtrate

(4) Distal convoluted tubule : re-absorption of K^+ ions into the surrounding blood capillaries

Q.177 Given below is an incomplete table certain hormones, their source glands and one major effect of each on the body in humans. Identify the correct option for the three blanks A, B and C.

Glands	Secretion	Effect on Body
A	Oestrogen	Maintenance of secondary sexual characters
Alpha cells of Islets of Langerhans	B	Raises blood sugar level
Anterior pituitary	C	Over section leads to gigantism

Options :

	A	B	C
(1)	Placenta	Glucagon	Calcitionin
(2)	Ovary	Glucagon	Growth hormone
(3)	Placenta	Insulin	Vasopressin
(4)	Ovary	Insulin	Calcitonin

Q.178 Uricotelic mode of passing out nitrogenous wastes is found in :

(1) Insects and Amphibians

(2) Reptiles and Birds

(3) Birds and Annelids

(4) Amphibians and Reptiles

Q.179 The figure given below shows a small part of human lung where exchange of gases takes place. In which one of the options given below, the one part A, B, C or D is correctly identified along with its function,
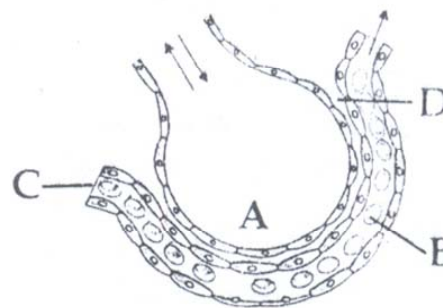
Options :

(1) **B** : red blood cell – transport of CO_2 mainly

(2) **C :** arterial capillary – passes oxygen to tissues

(3) **A** : alveolar cavity – main site of exchange of respiratory gases

(4) **D :** Capillary wall – exchange of O_2 and CO_2 takes place here

**Q.180** Which one of the following statements is correct regarding blood pressure :

(1) 190/110 mm Hg may harm vital organs like brain and kidney

(2) 130/90 mm Hg is considered high and requires treatment

(3) 100/55 mm Hg is considered an ideal blood pressure

(4) 105/50 mm Hg makes one very active

Q.181 Which one of the following statements is correct with respect to kidney function regulation ?

(1) During summer when body loses of lot of water by evaporation, the release of ADH is suppressed

(2) When someone drinks lot of water, ADH release is suppressed

(3) Exposure to cold temperature stimulates ADH release

(4) An increase in glomerular blood flow stimulates formation of Angiotensin II.

Q.182 The figure given below depicts a diagrammatic sectional view of the female reproductive system of humans. Which one set of three parts out of I-VI have been correctly identified ?
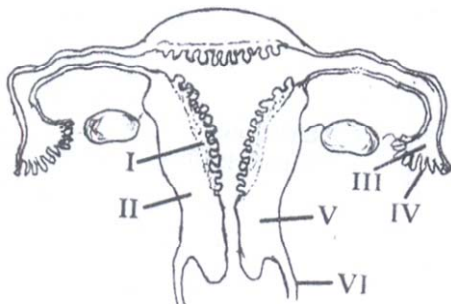
(1) (I) Perimetrium, (II) Myometrium, (III) Fallopian tube

(2) (II) Endometrium, (III) Infundibulum, (IV) Fimbriage

(3) (III) Infundibulum, (IV) Fimbriae, (V) Cervix

(4) (IV) Oviducal funnel, (V) Uterus (VI) Cervix

Q.183 The testes in humans are situated outside the abdominal cavity inside a pouch called scrotum. The purpose served is for :

(1) providing a secondary sexual feature for exhibiting the male sex

(2) maintaining the scrotal temperature lower than the internal body temperature

(3) escaping any possible compression by the visceral organs

(4) providing more space for the growth of epididymis

Q.184 Which one of the following is the most wide accepted method of contraception in India, as at present ?

(1) IUDs' (Intra uterine devices)

(2) Cervical caps

(3) Tubectomy

(4) Diaphragms

Q.185 If for some reason, the vasa efferentia in the human reproductive system get blocked, the gametes will not be transported from :

(1) Vagina to uterus

(2) Testes to epididymis

(3) Epididymis to vas deferens

(4) Ovary to uterus

Q.186 Medical Termination of Pregnancy (MTP) is considered safe up to how many weeks of pregnancy ?

(1) Six weeks   (2) Eight weeks

(3) Twelve weeks   (4) Eighteen weeks

Q.187 Which one of the following is categorised as a parasite in **true sense** ?

(1) The cuckoo (koel) lays its eggs in crow's nest

(2) The female anopheles bites and sucks blood from humans

(3) Human foetus developing inside the uterus draws nourishment from the mother

(4) Head louse living on the human scalp as well as laying eggs on human hair

Q.188 What type of human population is represented by the following age pyramid ?
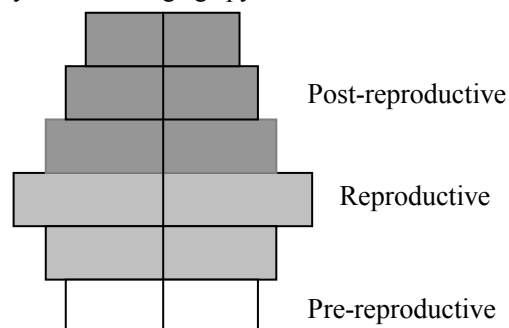
(1) Expanding population

(2) Vanishing population

(3) Stable population

(4) Declining population

Q.189 Which one of the following statements for pyramid of energy is incorrect, whereas the remaining three are correct ?

(1) It is upright in shape

(2) Its base is broad

(3) It shows energy content of different trophic level organisms

(4) It is inverted in shape

Q.190 Ethanol is commercially produced through a particular special of :

(1) Aspergillus   (2) Sanccharomyces

(3) Clostridium   (4) Trichoderma

Q.191 Consider the following four conditions (a – d) and select the correct pair of them as adaptation to environment in desert lizards.

The conditions :

(a) burrowing in soil to escape high temperature

(b) losing heat rapidly from the body during high temperature

(c) bask in sun when temperature is low

(d) insulating body due to thick fatty dermis

Options :

(1) (a), (b)   (2) (c), (d)

(3) (a), (c)   (4) (b), (d)

Q.192 Which one of the following pairs of gases are the major cause of "Green house effect"?

(1) CO_2 and N_2O (2) CO_2 and O_3

(3) CO_2 and CO (4) CFCs and SO_2

Q.193 Where will you look for the sporozoites of the malarial parasite ?

(1) Salivary glands of freshly moulted female Anopheles mosquito

(2) Saliva of infected female Anopheles mosquito

(3) red blood corpuscles of humans suffering from malaria

(4) spleen of infected humans

Q.194 When two unrelated individuals or lines are crossed, the per romance of F_1 hybrid is often superior to both parents. This phenomenon is called :

(1) Metamorphosis   (2) Heterosis

(3) Transformation   (4) Sphcing

Q.195 A certain patient is suspected to be suffering from Acquired Immuno Deficiency Syndrome. Which diagnostic technique will you recommend for its detection ?

(1) WIDAL (2) ELISA

(3) MRI   (4) Ultra Sound

Q.196 At which stage of HIV infection does one usually shown symptoms of AIDS ?

(1) Within 15 days of sexual contact with an infected person

(2) When the infecting retrovirus enters host cells

(3) When viral DNA is produced by reverse transcriptase

(4) When HIV replicates rapidly in helper T-lymphocytes damages larger number of these

Q.197 Given below is a sample of a portion of DNA strand giving the base sequence on the opposite strands. What is so special shown in it ?

5' .... GAATTC .... 3'

3' .... CTTAAG .... 5'

(1) Palindromic sequence of base pairs

(2) Replication completed

(3) Deletion mutation

(4) Start codon at the 5' end

Q.198 The most common substrate used in distilleries for the production of ethanol is :

(1) Molasses   (2) Corn meal

(3) Soyabean   (4) Ground gram

Q.199 An organism used as a Biofertilizer for raising soyabean crop is :

(1) Nostoc   (2) Azotobacter

(3) Azospirillum   (4) Rhizobium

Q.200 There is a restriction endonuclease called EcoRl. What does "co" part in it stand for ?

(1) coli   (2) colon

(3) coelom   (4) coenzyme

ANSWER KEY (AIPMT-2011)

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

HINTS & SOLUTIONS

PHYSICS

1. Velocity of light $c = \dfrac{1}{\sqrt{\mu_0 \in_0}}$

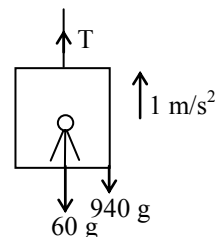So dimension of given expression is equal to velocity $\Rightarrow [LT^{-1}]$

2.
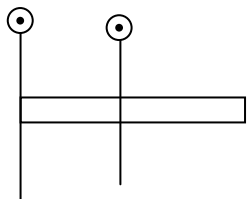
Moment of inertia about an axis passing through one end $= I_{cm} + md^2$

$$= I_0 + M \left(\frac{L}{2}\right)^2 = I_0 + \frac{ML^2}{4}$$

3. $v = \sqrt{2gh} = \sqrt{2 \times 10 \times 20} = 20$ m/sec

4.

For (man + lift)
T – (60 + 940) g = (60 + 940) × 1
T = (60 + 940)(10 + 1) = 11000 N

5. $P = \vec{F}.\vec{V} = FV\cos\theta$

Power will be maximum when velocity and cosθ will be maximum.

6. $\theta = 2t^3 - 6t^2$

$\omega = \dfrac{d\theta}{dt} = 6t^2 - 12t$

$\alpha = \dfrac{d\omega}{dt} = 12t - 12$

$\tau = I\alpha$

Torque will be zero when α is zero

so $\alpha = 12t - 12 = 0$

$t = 1$ sec

7. If particle move in a circular path with constant speed, the acceleration of the particle is centripetal acceleration

$$a_c = \omega^2 R = \left(\frac{2\pi}{T}\right)^2 R$$

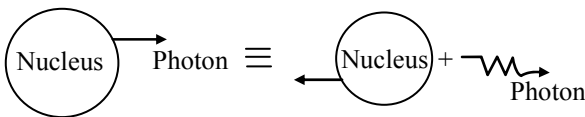$$a_c = \frac{4\pi^2 R}{T^2} = \frac{4\pi^2}{(0.2\pi)^2} \times 5 \times 10^{-2}$$

$$a_c = 5 \text{ m/sec}^2$$

8. Impulse $= mv_2 - mv_1$
$$= -mv - mv = -2mv$$

9. $v_1 r_1 = v_2 r_2$

$$\frac{v_1}{v_2} = \frac{r_2}{r_1}$$

10.

$$F_{ex} = \frac{dP}{dt} = 0 \Rightarrow dP = 0 \Rightarrow P = \text{constant}$$

$$\boxed{\vec{P}_i = \vec{P}_f}$$

$$0 = \vec{P}_{Nu} + \vec{P}_{Ph}$$

$$|\vec{P}_{Nu}| = |\vec{P}_{Ph}| = \frac{h}{\lambda} = \frac{h\nu}{c}$$

Recoil K.E. of nucleus $K.E_{Nu} = \dfrac{P_{Nu}^2}{2M_{Nu}}$

$$K.E._{Nu} = \frac{(h\nu/c)^2}{2M} = \frac{h^2\nu^2}{2Mc^2}$$

11. Potential energy will increase when work is done by the system against a conservative force.

12. Average acceleration

$$\vec{A}_{avg} = \frac{\vec{v}_f - \vec{v}_i}{t} = \frac{40\hat{j} - 30\hat{i}}{10}$$

$$\vec{A}_{avg} = \frac{\sqrt{40^2 + 30^2}}{10} = 5 \text{ m/sec}^2$$

13. Maximum Range
$$R_{max} = \frac{u^2}{g} = \frac{(20)^2}{10} = 40 \text{ m}$$

14. Work done = area between force v/s displacement curve and displacement axis

$$= (2 \times 4) + \frac{2 \times 5}{2} = 13 \text{ J}$$

15. $\phi_{net} = \dfrac{\Sigma q}{\in_0}$

$\because$ Net flux does not depend on size of Gaussian surface

$\Rightarrow$ Flux remains unchanged.

16. $V_A = \dfrac{kq}{L} + \dfrac{kq}{L} - \dfrac{kq}{\sqrt{5}L} - \dfrac{kq}{\sqrt{5}L}$

$$= \frac{2kq}{L}\left(1 - \frac{1}{\sqrt{5}}\right)$$

17. $U = \dfrac{1}{2}CV^2$

$$= \frac{1}{2}\left(\frac{\in_0 A}{d}\right)V^2$$

$$= \frac{1}{2}(\in_0 Ad)\left(\frac{V}{d}\right)^2 = \frac{1}{2}\in_0 E^2 Ad$$

18. $\because \rho = I_g^2 R$

$$36 = I^2(9)$$
$$\Rightarrow I_9 = 2A$$

$\because$ In parallel $I \propto \dfrac{1}{R}$

$$\frac{I_9}{I_6} = \frac{6}{9} \qquad \frac{2}{I_6} = \frac{6}{9}$$

$I_6 = 3A$

$\Rightarrow I_{ckt} = 2 + 3 = 5A$

$\Rightarrow V_{2\Omega} = IR = (5)(2) = 10$ volt

19. $I = \dfrac{E}{R + r}$

$$2 = \frac{E}{2 + r} \qquad\qquad ....(1)$$

$$0.5 = \frac{E}{9 + r} \qquad\qquad ...(2)$$

(1) divided by (2)

$$4 = \frac{9 + r}{2 + r}$$

$8 + 4r = 9 + r$ or $3r = 1$

$$\therefore r = \frac{1}{3}\Omega$$

20. At neutral temperature

$$\frac{dE}{dT} = 0$$

21. From $\vec{F} = I(\vec{\ell} \times \vec{B})$

$$\vec{F}_{BC} = -\vec{F}_{AC}$$

$$\vec{F}_{AC} = -\vec{F}$$

22. $E = Pt = mc^2$

$$m = \frac{Pt}{c^2} = \frac{10^6 \times 3600}{(3 \times 10^8)^2}$$

$m = 40 \ \mu gm$

23. Diamagnetic will be feebly repelled Paramagnetic will be feebly attracted Ferromagnetic will be strongly attracted.

24. $\hat{v} = \hat{E} \times \hat{B}$ or (direction of propagation of waves is $\hat{E} \times \hat{B}$)

25. B will not apply force E field will apply a force opposite to velocity of the electron hence speed will decrease.

26. $e = -\dfrac{d\phi}{dt}$

27. $I_{rms} = \dfrac{E_0 / \sqrt{2}}{1/\omega C}$

28. $\tan\phi = \dfrac{X_L}{R} = 1, \ \phi = 45°$

29. $dS = \dfrac{\Delta Q}{T} = \dfrac{80 \times 1000}{273} \approx 293 \ cal/K$

30. In isothermal expansion work done against surrounding is negative but work done by gas is positive.

$\Delta W = +150 \ J$

$dU = 0$

From F.L.O.T.

$\Delta Q = \Delta W + dU$

$\Delta Q = +150 \ J$

heat is +ve it means heat absorb by gas

31. Motion start from extreme position and for small displacement it is SHM $y = A\cos(\omega t + \phi)$

32. $Y_1 = a\sin(\omega t + kx + 0.57)$

$Y_2 = a\sin(\omega t + kx + \pi/2)$

Phase difference $= \dfrac{\pi}{2} - 0.57 = 1$ radian

33. Any function which is converted into single $y = A\sin(\omega t + \phi)$ or $y = A\cos(\omega t + \phi)$ is considered SHM.

34. Frequency is same in both medium

$$n_1 = n_2$$

$$\frac{v_1}{\lambda_1} = \frac{v_2}{\lambda_2}$$

$$\frac{\lambda_2}{\lambda_1} = \frac{v_2}{v_1} = \frac{3500}{350} = 10$$

36. $\dfrac{1}{\lambda} = RZ^2 \left(\dfrac{1}{n_1^2} - \dfrac{1}{n_2^2} \right)$

$$R(1)^2 \left(\frac{1}{1^2} - \frac{1}{2^2} \right) = RZ^2 \left(\frac{1}{2^2} - \frac{1}{4^2} \right)$$

$Z = 2$

38. Focal length of the lens

$$\frac{1}{f} = (1.5 - 1) \left(\frac{1}{20} - \frac{1}{-20} \right) = \frac{1}{20}$$

$f = 20 \ cm$

From lens formula

$$\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$$

$$\frac{1}{v} - \frac{1}{-30} = \frac{1}{20}$$

$v = 60 \ cm$

$$\frac{I}{O} = m = \frac{v}{u} = \frac{60}{-30} = -I$$

$I = -2(0) = -2 \times 2 = -4 \ cm$

so image will be real inverted and of size 4 cm.

39. $K.E._{max} = eV_0$

$$V_0 = \frac{K.E_{max}}{e} = \frac{0.5 \ eV}{e}$$

$V_0 = 0.5 \ volt$

40. $\lambda = \dfrac{h}{\sqrt{2mq\Delta V}} \propto \dfrac{1}{\sqrt{\Delta V}}$

$$\frac{\lambda_2}{\lambda_1} = \sqrt{\frac{\Delta V_1}{\Delta V_2}} = \sqrt{\frac{25}{100}} = \frac{1}{2}$$

$$\lambda_2 = \frac{\lambda_1}{2}$$

41. $v_{max} = \sqrt{\dfrac{2}{m} K.E_{max}}$

$v_{max} = \sqrt{\dfrac{2}{m}(E_{Ph} - W)}$

$\dfrac{v_1}{v_2} = \sqrt{\dfrac{E_{Ph_1} - W}{E_{Ph_2} - W}} = \sqrt{\dfrac{1 - 0.5}{2.5 - 0.5}}$

$\dfrac{v_1}{v_2} = \dfrac{1}{2}$

42. Velocity of electron emitted from the electron gun can be increased by potential difference between the anode and filament.
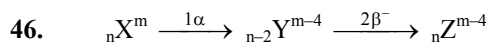
43. $X \rightarrow Y$
$X : Y = 1 : 15$
$A.P. = \dfrac{1}{16} = \dfrac{1}{2^n}$
No. of half life $n = 4$
$t = nT_{1/2} = 4 \times 50 = 200$ yr.

44. Photoelectron emission take place when certain minimum "frequency" light fall on metal surface.

45. Thermal K.E. $\geq$ Electrostatic P.E.

46. $_nX^m \xrightarrow{1\alpha} {}_{n-2}Y^{m-4} \xrightarrow{2\beta^-} {}_nZ^{m-4}$
α emission decreases mass no. by 4 and atomic no. by 2 and β^- emission increases atomic number by one but leaves mass no. unchanged.

47. $\beta = \dfrac{\Delta I_C}{\Delta I_B} = \dfrac{(20-10)\times 10^{-3}}{(300-100)\times 10^{-6}} = 50$

48. By addition of pentavalent impurity only n-type of semiconductor are constructed

49. In FB width of depletion layer is decreased.

50. From theory

CHEMISTRY

51. Number of atomic orbitals in an orbit
$= n^2 = 4^2 = 16$

52. $\Delta G_3 = \Delta G_1 + \Delta G_2$
$\Rightarrow -2\,FE^\circ = -1F \times 0.15 + (-1F \times 0.50)$
$\Rightarrow -2\,FE^\circ = -0.15F - 0.50\,F$
$\Rightarrow -2\,FE^\circ = -F\,(0.15 + 0.50)$
$\therefore E^\circ = \dfrac{0.65}{2} = 0.325$ volt

53. Mole fraction of solute $= \dfrac{1}{56.55} = 0.0177$

54. Average velocity $= \sqrt{\dfrac{8RT}{\pi M}}$

55. $pOH = pK_b + \log \dfrac{[Salt]}{[Base]}$

$= 4.74 + \log \dfrac{0.20}{0.30} = 4.74 + (0.301 - 0.477)$

$= 4.74 - 0.176 = 4.56$

$\therefore pH = 14 - 4.56 = 9.44$
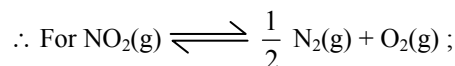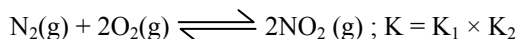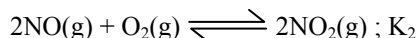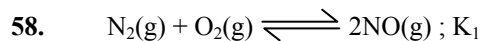
56. $\dfrac{r_A}{r_B} = \sqrt{\dfrac{M_B}{M_A}}$

$\Rightarrow \dfrac{v_A}{t_A} \times \dfrac{t_B}{v_B} = \sqrt{\dfrac{M_B}{M_A}} \qquad \Rightarrow \dfrac{10}{20} = \sqrt{\dfrac{M_B}{49}}$

$\Rightarrow \dfrac{1}{4} = \dfrac{M_B}{49} \qquad \therefore M_B = \dfrac{49}{4} = 12.25$

57. For an ideal gas, for free expansion
$q = 0 ; \Delta T = 0$ and $w = 0$

58. $N_2(g) + O_2(g) \rightleftharpoons 2NO(g) ; K_1$
$2NO(g) + O_2(g) \rightleftharpoons 2NO_2(g) ; K_2$
_____
$N_2(g) + 2O_2(g) \rightleftharpoons 2NO_2(g) ; K = K_1 \times K_2$

$\therefore$ For $NO_2(g) \rightleftharpoons \dfrac{1}{2} N_2(g) + O_2(g) ;$

$K' = \left[\dfrac{1}{K_1.K_2}\right]^{1/2}$

59. $x/m = P \times T$ is the incorrect relation.

60. $\Delta S_{vap} = \dfrac{\Delta H_{vap}}{T} = \dfrac{30\,KJmol^{-1}}{300K} = 100\,J\,mol^{-1}\,K^{-1}$

61. Fact

62. $E^\circ_{cell} = E^\circ_{cathode(RP)} - E^\circ_{anode(RP)}$
$= 0.15 - (-0.74)$
$= +0.89\,V$

63. Fact

64. $\because \Delta G^\circ = -nFE^\circ$
and $\Delta G^\circ = -RT\,\log_e K_{eq}$

65. Using, $\Delta T_f = i \times K_f \times m$

$$i = \frac{\Delta T_f \times W_A}{K_f \times n_B \times 1000}$$

$$= \frac{3.82 \times 45}{1.86 \times \left(\dfrac{5}{142}\right) \times 1000} = 2.63$$

66. $\lambda_1 = 2\lambda_2$

67. $Z > X > Y$; higher the reduction potential lesser the reducing power

68. Fact

71. Melting point $\propto$ lattice energy
Melting point $CaF_2 > CaCl_2 > CaBr_2 > CaI_2$

73. Bond length (C–H < C=C < C–O < C–C)

74. $K_2Cr_2O_7 + 3Na_2SO_3 + 4H_2SO_4 \longrightarrow 3Na_2SO_4 + K_2SO_4 + Cr_2(SO_4)_3$

75. On the basis electrode potential, the correct order is $\qquad Mn > Fe > Cr > Co$

76. NO_2^- $\qquad\qquad$ NO_3^-

$O = \ddot{N} - \overline{O}$ $\qquad$ $O = N - \overline{O}$
$\qquad\qquad\qquad\qquad\quad \downarrow$
$\qquad\qquad\qquad\qquad\quad O$

sp^2 $\qquad\qquad\qquad$ sp^2

78. BF_3 is electron deficient so act as lewis acid.

79. $Ca(OCl)_2$ is active ingredient which is responsible for bleaching action.
Bleaching powder formula
$Ca(OCl)_2.CaCl_2.Ca(OH)_2.2H_2O$

81. In pyrosilicate SiO_4^{-4} unit shared one oxygen atom.

82. Coordination isomerism

83. $Co^{2+} \longrightarrow 3d^7\ 4s^o$
⇅ ⇅ 1 1 1 ; having minimum no. of unpaired electrons.
$[Cr(H_2O)_6]^{+2} = Cr^{+2} = [Ar]\ 3d^4 \therefore n = 4$
$[Mn(H_2O)_6]^{+2} = Mn^{+2} = [Ar]\ 3d^5 \therefore n = 5$
$[Fe(H_2O)_6]^{+2} = Fe^{+2} = [Ar]\ 3d^6 \therefore n = 4$
$[Co(H_2O)_6]^{+2} = Co^{+2} = [Ar]\ 3d^7 \therefore n = 3$

84. $[Ni(CN)_4]^{-2}$
$Ni^{+2} = [Ar]\ 3d^8\ 4s^0$
CN^- is a strong ligand causes pairing.
$Ni^{+2} = $ ⇅ ⇅ ⇅ ⇅ ☐ ☐☐☐
$\qquad\qquad\qquad 3d \qquad\quad 4s \qquad 4p$
$\qquad\qquad\qquad\qquad\quad dsp^2$
$\qquad n = 0$

85. Bond length $\propto \dfrac{1}{Bond\ order}$

O–O Bond length $\quad O_2^{-2} > O_2^- > O_2 > O_2^+$
$\quad$ Bond order $\qquad 1 \quad 1.5 \quad 2 \quad 2.5$

86. $\Delta n_g = -ve$ and $\Delta H = -ve$