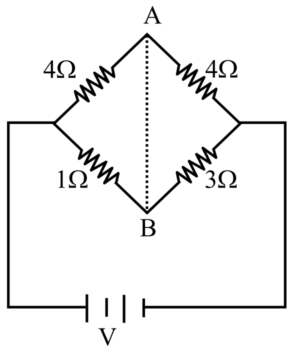
AIPMT - 2006

Q.1 In producing chlorine through electrolysis 100 watt power at 125V is being consumed. How much chlorine per minute is liberated ? E.C.E. of chlorine is 0.367×10^{-6} kg/coulomb:-

(1) 17.6 mg (2) 21.3 mg

(3) 24.3 mg (4) 13.6 mg

Q.2 In the circuit shown, if a conducting wire is connected between points A and B, the current in this wire will-



(1) Flow from A to B

(2) Flow in the direction which will be decided by the value of V

(3) Be zero

(4) Flow from B to A

Q.3 A rectangular block of mass m and area of cross-section A floats in a liquid of density ρ. If it is given a small vertical displacement from equilibrium it undergoes oscillation with a time period T. Then:-

(1) $T \propto \sqrt{\rho}$ (2) $T \propto \frac{1}{\sqrt{A}}$

(3) $T \propto \frac{1}{\rho}$ (4) $T \propto \frac{1}{\sqrt{m}}$

Q.4 A Carnot engine whose sink is at 300 K has an efficiency of 40%. By how much should the temperature of source be increased so as to increase its efficiency by 50% of original efficiency:-

(1) 275 K (2) 325 K

(3) 250 K (4) 380 K

Q.5 When a charged particle moving with velocity $\vec{V}$ is subjected to a magnetic field of induction $\vec{B}$, the force on it is non-zero. This implies the:-

(1) Angle between $\vec{V}$ and $\vec{B}$ is necessary 90º

(2) Angle between $\vec{V}$ and $\vec{B}$ can have at value other than 90º

(3) Angle between $\vec{V}$ and $\vec{B}$ can have at value other than zero and 180º

(4) Angle between $\vec{V}$ and $\vec{B}$ is either zero or 180º

Q.6 Two cells, having the same e.m.f., are connected in series through an external resistance R. Cell have internal resistances r_1 and r_2 ($r_1 > r_2$) respectively. When the circuit is closed, the potential difference across the first cell is zero. The value of R is:-

(1) $r_1 - r_2$ (2) $\frac{r_1 + r_2}{2}$

(3) $\frac{r_1 - r_2}{2}$ (4) $r_1 + r_2$

Q.7 A black body at 1227ºC emits radiations with maximum intensity at a wavelength of 5000Å. The temperature of the body is increased by 1000ºC, the maximum intensity will be observe at:-

(1) 4000Å (2) 5000Å

(3) 6000Å (4) 3000Å

Q.8 Two circular coil 1 and 2 are made from the same wire but the radius of the 1st coil is twice that of the 2nd coil. What potential difference in volts should be applied across them so that the magnetic field at their centres is the same-

(1) 3 (2) 4 (3) 6 (4) 2

Q.9 A transistor-oscillator using a resonant circuit with an inductor L (of negligible resistance) and a capacitor C in series produce oscillations of frequency f. If L is doubled and C is changed to 4C, the frequency will be:-

(1) $\frac{f}{4}$ (2) 8f (3) $\frac{f}{2\sqrt{2}}$ (4) $\frac{f}{2}$

Q.10 The binding energy of deuteron is 2.2 MeV and that of ${}_{2}^{4}He$ is 28MeV. If two deuterons are fused to form one ${}_{2}^{4}He$ then the energy released is:-

(1) 25.8 MeV (2) 23.6 MeV

(3) 19.2 MeV (4) 30.2 MeV

Q.11 In a radioactive material the activity at time t_1 is R_1 and at a later time t_2, it is R_2. If the decay constant of the material is λ, then

(1) $R_1 = R_2\ e^{-\lambda(t_1-t_2)}$ (2) $R_1 = R_2\ e^{\lambda(t_1-t_2)}$

(3) $R_1 = R_2\ (t_2/t_1)$ (4) $R_1 = R_2$

Q.12 Ionization potential of hydrogen atom is 13.6eV. Hydrogen atoms in the ground state are excited by monochromatic radiation of photon energy 12.1 eV. According to Bohr's theory, the spectral lines emitted by hydrogen will be:-

(1) Two (2) Three

(3) Four (4) One

Q.13 The potential energy of a long spring when stretched by 2 cm is U. If the spring is stretched by 8 cm the potential energy stored in it is:-

(1) 4U (2) 8U (3) 16U (4) $\frac{U}{4}$

Q.14 For angles of projection of a projectile at angles $(45^\circ - \theta)$ and $(45^\circ + \theta)$, the horizontal ranges described by the projectile are in the ratio of:

(1) 1 : 1 (2) 2 : 3

(3) 1 : 2 (4) 2 : 1

Q.15 A body of mass 3 kg is under a constant force which causes a displacement s in metres in it, given by the relation $s = \frac{1}{3}t^2$, where t is in seconds. Work done by the force in 2 seconds is:-

(1) $\frac{5}{19}$J (2) $\frac{3}{8}$J (3) $\frac{8}{3}$J (4) $\frac{19}{5}$J

Q.16 A particle moves along a straight line OX. At a time t (in seconds) the distance x (in metres) of the particle from O is given by $x = 40 + 12t - t^3$. How long would the particle travel before coming to rest: -

(1) 24 m (2) 40 m (3) 56 m (4) 16 m

Q.17 The velocity v of a particle at time t is given by $v = at + \frac{b}{t+c}$, where a, b and c are constants. The dimensions of a, b and c are respectively:-

(1) LT^{-2}, L and T (2) L^2, T and LT^2

(3) LT^2, LT and L (4) L, LT and T^2

Q.18 A microscope is focused on a mark on a piece of paper and then a slab of glass of thickness 3 cm and refractive index 1.5 is placed over the mark. How should the microscope be moved to get the mark in focus again:-

(1) 1 cm upward (2) 4.5 cm downward

(3) 1 cm downward (4) 2 cm upward

Q.19 300 J of work is done in sliding a 2 kg block up an inclined plane of height 10m. Taking $g = 10\ m/s^2$, work done against friction is

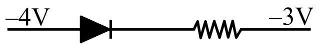
(1) 200 J (2) 100 J

(3) Zero (4) 1000 J

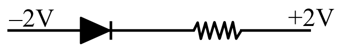
Q.20 A transistor is operated in common emitter configuration at constant collector voltage $V_c = 1.5$ V such that a change in the base current from 100 μA to 150 μA produces a change in the collector current from 5 mA to 10 mA. The current gain (β) is:-

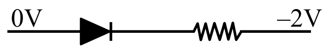
(1) 67 (2) 75 (3) 100 (4) 50

Q.21 A forward biased diode is:-

(1) 

(2) 

(3) 

(4) 

Q.22 A photo-cell employs photoelectric effect to convert:-

(1) Change in the frequency of light into a change in electric voltage

(2) Change in the intensity of illumination into a change in photoelectric current

(3) Change in the intensity of illumination into a change in the work function of the photocathode

(4) Change in the frequency of light into a change in the electric current

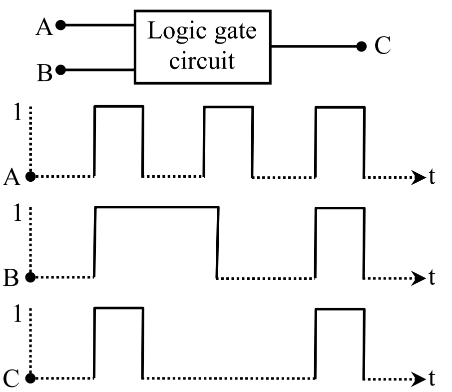
Q.23 The core of a transformer is laminated because:-
(1) Energy losses due to eddy currents may be minimised
(2) The weight of the transformer may be reduced
(3) Rusting of the core may be prevented
(4) Ratio of voltage in primary and secondary may be increased

Q.24 Two coils of self inductances 2 mH and 8 mH are placed so close together that the effective flux in one coil is completely linked with the other. The mutual inductance between these coils is:
(1) 10 mH (2) 6mH
(3) 4 mH (4) 16 mH

Q.25 In a discharge tube ionization of enclosed gas produced due to collisions between:
(1) Positive ions and neutral atoms/molecules
(2) Negative electrons and netural atoms/molecules
(3) Photons and neutral atoms/molecules
(4) Neutral gas atoms/molecules

Q.26 When photons of energy $h\nu$ fall on an aluminium plate (of work function E_0), photoelectrons of maximum kinetic energy K are ejected. If the frequency of the radiation is doubled, the maximum kinetic energy of the ejected photoelectrons will be
(1) $K + E_0$ (2) 2K
(3) K (4) $K + h\nu$

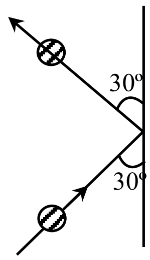
Q.27 The following figure shows a logic gate circuit with two inputs A and B and the output C. The voltage waveforms of A, B and C are as shown below-



The logic circuit gate is:
(1) AND gate (2) NAND gate
(3) NOR gate (4) OR gate

Q.28 A coil of inductive reactance 31Ω has a resistance of 8Ω. It is placed in series with a condenser of capacity reactance 25Ω. The combination is connected to an a.c. source of 110 volt. The power factor of the circuit is:-
(1) 0.56 (2) 0.64
(3) 0.80 (4) 0.33

Q.29 A 0.5 kg ball moving with a speed of 12 m/s strikes a hard wall at an angle of 30º with the wall. It is reflected with the same speed and at the same angle. If the ball is in contact with the wall for 0.25 seconds, the average force acting on the wall is:-



(1) 48 N (2) 24 N
(3) 12 N (4) 96 N

Q.30 The moment of inertia of a uniform circular disc of radius 'R' and mass 'M' about an axis touching the disc at its diameter and normal to the disc is:-
(1) MR^2 (2) $\frac{2}{5}MR^2$
(3) $\frac{3}{2}MR^2$ (4) $\frac{1}{2}MR^2$

Q.31 The momentum of a photon of energy 1MeV in kg m/s, will be-
(1) 0.33×10^{6} (2) 7×10^{-24}
(3) 10^{-22} (4) 5×10^{-22}

Q.32 The radius of Germanium (Ge) nuclide is measured to be twice the radius of ${}^{9}_{4}Be$. The number of nucleons in Ge are:-
(1) 73 (2) 74 (3) 75 (4) 72

Q.33 The molar specific heat at constant pressure of an ideal gas is $\left(\frac{7}{2}\right)R$. The ratio of specific heat at constant pressure to that at constant volume is:-
(1) $\frac{7}{5}$ (2) $\frac{8}{7}$ (3) $\frac{5}{7}$ (4) $\frac{9}{7}$

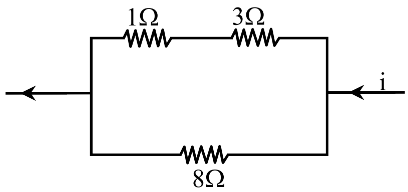
Q.34 The Earth is assumed to be a sphere of radius R. A platform is arranged at a height R from the surface of the Earth. The escape velocity of a body from this platform is fv, where v is its escape velocity from the surface of the Earth. The value of f is:-

(1) $\sqrt{2}$ (2) $\frac{1}{\sqrt{2}}$ (3) $\frac{1}{3}$ (4) $\frac{1}{2}$

Q.35 Two sound waves with wavelength 5.0 m and 5.5 m respectively, each propagate in a gas with velocity 330 m/s. We expect the following number of beats per second:-

(1) 12 (2) 0 (3) 1 (4) 6

Q.36 Power dissipated across the 8Ω resistor in the circuit shown here is 2 watt. The power dissipated in watt units across the 3Ω resistor is:-



(1) 2.0 (2) 1.0 (3) 0.5 (4) 3.0

Q.37 Kirchhoff's first and second laws for electrical circuits are consequences of:-

(1) Conservation of energy

(2) Conservation of electric charge and energy respectively

(3) Conservation of electric charge

(4) Conservation of energy and electric charge respectively

Q.38 A transverse wave propagating along x-axis is represented by

$y(x, t) = 8.0 \sin (0.5\pi x - 4\pi t - \frac{\pi}{4})$

where x is in metres and t is in seconds. The speed of the wave is:-

(1) 4π m/s (2) 0.5 π m/s

(3) $\frac{\pi}{4}$ m/s (4) 8 m/s

Q.39 The time of reverberation of a room A is one second. What will be the time (in seconds) of reverberation of a room, having all the dimensions double of those of room A-

(1) 2 (2) 4 (3) $\frac{1}{2}$ (4) 1

Q.40 Which one of the following statements is true:

(1) Both light and sound waves in air are transverse

(2) The sound waves in air are longitudinal while the light waves are transverse

(3) Both light and sound waves in air are longitudinal

(4) Both light and sound waves can travel in vacuum

Q.41 Above Curie temperature:-

(1)A ferromagnetic substance becomes paramagnetic

(2) A paramagnetic substance becomes diamagnetic

(3) A diamagnetic substance becomes paramagnetic

(4) A paramagnetic substance becomes ferromagnetic

Q.42 A convex lens and a concave lens, each having same focal length of 25 cm, are put in contact to form a combination of lenses. The power in dipoters of the combination is:-

(1) 25 (2) 50

(3) Infinite (4) Zero

Q.43 An electric dipole of moment $\vec{p}$ is lying along a uniform electric field $\vec{E}$. The work done in rotating the dipole by 90º is:-

(1) $\sqrt{2}$ pE (2) $\frac{pE}{2}$

(3) 2pE (4) p E

Q.44 A parallel plate air capacitor is charged to a potential difference of V volts. After disconnecting the charging battery the distance between the plates of the capacitor is increased using an insulating handle. As a result the potential difference between the plates:-

(1) Decreases (2) Does not change

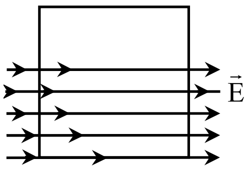
(3) Becomes zero (4) Increases

Q.45 A car runs at a constant speed on a circular track of radius 100 m, taking 62.8 seconds for every circular lap. The average velocity and average speed for each circular lap respectively is:

(1) 0, 0 (2) 0, 10 m/s

(3) 10 m/s, 10 m/s (4) 10 m/s, 0

Q.46 A square surface of side L metres is in the plane of the paper. A uniform electric field $\vec{E}$ (volt/m), also in the plane of the paper, is limited only to the lower half of the square surface, (see figure). The electric flux in SI units associated with the surface is:-



(1) $EL^2/(2\varepsilon_0)$ (2) $EL^2/2$
(3) Zero (4) $E L^2$

Q.47 A tube of length L is filled completely with an incompressible liquid of mass M and closed at both the ends. The tube is then rotated in a horizontal plane about one of its ends with a uniform angular velocity ω. The force exerted by the liquid at the other ends is:-

(1) $\frac{ML\omega^2}{2}$ (2) $\frac{ML^2\omega}{2}$
(3) $M L\omega^2$ (4) $\frac{ML^2\omega^2}{2}$

Q.48 A uniform rod of length ℓ and mass m is free to rotate in a vertical plane about A. The rod initially in horizontal position is released. The initial angular acceleration of the rod is (Moment of inertia of rod about A is $\frac{m\ell^2}{3}$):

(1) $\frac{3g}{2\ell}$ (2) $\frac{2\ell}{3g}$ (3) $\frac{3g}{2\ell^2}$ (4) mg $\frac{\ell}{2}$

Q.49 The vectors $\vec{A}$ and $\vec{B}$ are such that $|\vec{A}+\vec{B}| = |\vec{A}-\vec{B}|$ .The angle between the two vectors is:-

(1) 90º (2) 60º (3) 75º (4) 45º

Q.50 Two bodies, A(of mass 1kg) and B(of mass 3kg), are dropped from heights of 16 m and 25 m respectively. The ratio of the time taken by them to reach the ground is:-

(1) $\frac{5}{4}$ (2) $\frac{12}{5}$ (3) $\frac{5}{12}$ (4) $\frac{4}{5}$

Q.51 Identify the correct statement for change of Gibbs energy for a system (ΔG_{system}) at constant temperature and pressure:-

(1) If $\Delta G_{system} > 0$, the process is spontaneous
(2) If $\Delta G_{system} = 0$, the system has attained equilibrium
(3) If $\Delta G_{system} = 0$, the system is still moving in a particular direction
(4) If $\Delta G_{system} < 0$, the process is not spontaneous

Q.52 A solution containing 10 g per dm^3 of urea (molecular mass = 60 g mol^{-1}) is isotonic with a 5% solution of a nonvolatile solute. The molecular mass of this nonvolatile solution is:

(1) 250 g mol^{-1} (2) 300 g mol^{-1}
(3) 350 g mol^{-1} (4) 200 g mol^{-1}

Q.53 A plot of log x/m versus log p for the adsorption of a gas on a solid gives a straight line with slope equal to:

(1) – log K (2) n
(3) $\frac{1}{n}$ (4) log K

Q.54 Assume each reaction is carried out in an open container. For which reaction will ΔH = ΔE ?

(1) $H_2(g) + Br_2(g) \rightarrow 2HBr(g)$
(2) $C(s) + 2H_2O(g) \rightarrow 2H_2(g) + CO_2(g)$
(3) $PCl_5(g) \rightarrow PCl_3(g) + Cl_2(g)$
(4) $2CO(g) + O_2(g) \rightarrow 2CO_2(g)$

Q.55 In a set off reactions propionic acid yielded a compound D.

$$CH_3CH_2COOH \xrightarrow{SOCl_2} B \xrightarrow{NH_3} C \xrightarrow[Br_2]{KOH} D$$

The structure of D would be:-

(1) $CH_3CH_2CH_2NH_2$ (2) $CH_3CH_2CONH_2$
(3) $CH_2CH_2NHCH_3$ (4) $CH_3CH_2NH_2$

Q.56 During the process of digestion, the proteins present in food materials are hydrolysed to amino acids. The two enzymes involved in the process:

$$\text{Proteins} \xrightarrow{\text{Enzyme(A)}} \text{Polypeptides} \xrightarrow{\text{Enzyme(B)}} \text{Amino acids,}$$

are respectively-

(1) Amylase and Maltase
(2) Diastase and Lipase
(3) Pepsin and Trypsin
(4) Invertase and Zymase

Q.57 The human body does not produce:-
(1) DNA (2) Vitamin
(3) Hormones (4) Enzymes

Q.58 CsBr crystallizes in a body centred cubic lattice. The unit cell length is 436.6 pm. Given that the atomic mass of Cs = 133 and that of Br = 80 amu and Avogadro number being 6.02×10^{23} mol^{-1}, the density of CsBr is:-
(1) 42.5 g/cm^3 (2) 0.425 g/cm^3
(3) 8.25 g/cm^3 (4) 4.25 g/cm^3

Q.59 More number of oxidation states are exhibited by the actinoids than by the lanthonoids. The main reason for this is:-
(1) More energy difference between 5f and 6d orbitals than that between 4f and 5d orbitals
(2) Lesser energy difference between 5f and 6d orbitals than between 4f and 5d orbitals
(3) Greater metallic character of the lanthanoids than that of the corresponding actinoids
(4) More active nature of the actinoids

Q.60 Given: The mass of electron is 9.11×10^{-31}Kg Planck constant is 6.626×10^{-34}Js, the uncertainty involved in the measurement of velocity within a distance of 0.1Å is:-
(1) 5.79×10^6 ms^{-1} (2) 5.79×10^7 ms^{-1}
(3) 5.79×10^8 ms^{-1} (4) $5.79 \times 10^5$$ms^{-1}$

Q.61 Copper sulphate dissolved in excess of KCN to give:-
(1) CuCN (2) $[Cu(CN)_4]^{3-}$
(3) $[Cu(CN)_4]^{2-}$ (4) $Cu(CN)_2$

Q.62 In which of the following pairs are both the ions coloured in aqueous solution-
(1) Ni^{2+}, Ti^{3+} (2) Sc^{3+}, Ti^{3+}
(3) Sc^{3+}, Co^{2+} (4) Ni^{2+}, Cu^+
[At. No. : Sc = 21, Ti = 22, Ni = 28, Cu = 29, Co = 27]

Q.63 Al_2O_3 can be converted to anhydrous $AlCl_3$ by heating:-
(1) Al_2O_3 with HCl gas
(2) Al_2O_3 with NaCl in solid state
(3) A mixture of Al_2O_3 and carbon in dry Cl_2 gas
(4) Al_2O_3 with Cl_2 gas

Q.64 The enthalpy and entropy change for the reaction:
$Br_2(\ell) + Cl_2(g) \rightarrow 2BrCl(g)$
are 30 kJ mol^{-1} and 105 JK^{-1} mol^{-1} respectively. The temperature at which the reaction will be in equilibrium is:-
(1) 285.7K (2) 273 K
(3) 450 K (4) 300 K

Q.65 The appearance of colour in solid alkali metal halides is generally due to :
(1) F-centres (2) Schottky defect
(3) Frenkel defect (4) Interstitial positions

Q.66 The general molecular formula, which represents the homologus series of alkanols is:-
(1) $C_nH_{2n}O_2$ (2) $C_nH_{2n}O$
(3) $C_nH_{2n+1}O$ (4) $C_nH_{2n+2}O$

Q.67 If $E^\circ_{Fe^{2+}/Fe} = -0.441$ V and
$E^\circ_{Fe^{3+}/Fe^{2+}} = 0.771$ V, the standard EMF
of the reaction : $Fe + 2Fe^{3+} \rightarrow 3Fe^{2+}$ will be:
(1) 0.330 V (2) 1.653 V
(3) 1.212 V (4) 0.111 V

Q.68 For the reaction :
$$2A + B \rightarrow 3C + D$$
Which of the following does not express the reaction rate:-
(1) $-\frac{d[C]}{3dt}$ (2) $-\frac{d[B]}{dt}$
(3) $\frac{d[D]}{dt}$ (4) $-\frac{d[A]}{2dt}$

Q.69 For the reaction :
$CH_4(g) + 2O_2(g) \rightleftharpoons CO_2(g) + 2H_2O(\ell)$
$\Delta H_r = -170.8$ kJ mol^{-1}
Which of the following statements is not true:-
(1) At equilibrium, the concentrations of $CO_2(g)$ and $H_2O(\ell)$ are not equal
(2) The equilibrium constant for the reaction is given by $K_P = \frac{[CO_2]}{[CH_4][O_2]}$
(3) Addition of $CH_4(g)$ or $O_2(g)$ at equilibrium will cause a shift to the right
(4) The reaction is exothermic

Q.70 $[NH(CH_2)NHCO(CH_2)_4CO]_n$ is a:-
(1) copolymer
(2) Addition polymer
(3) Thermosetting polymer
(4) Homopolymer

Q.71 A carbonyl compound reacts with hydrogen cyanide to form cyanohydrin which on hydrolysis forms a racemic mixture of α-hydroxy acid. The carbonyl compound is:
(1) Acetaldehyde (2) Acetone
(3) diethyl ketone (4) Formaldehyde

Q.72 Which one of the following is a peptide hormone:-

(1) Glucagon (2) Testosterone

(3) Thyroxin (4) Adrenaline

Q.73 The major organic product in the reaction,

$CH_3–O–CH(CH_3)_2 + HI \rightarrow$ Product is:

(1) $CH_3OH + (CH_3)_2CHI$

(2) $ICH_2OCH(CH_3)_2$

(3) $CH_3OC(CH_3)_2$
$\quad\quad\quad|$
$\quad\quad\quad I$

(4) $CH_3I + (CH_3)_2CHOH$

Q.74 Nucleophilic addition reaction will be most favoured in:-

(1) $CH_3–CH_2–CH_2\overset{\overset{O}{\|}}{C}–CH_3$

(2) $(CH_3)_2C = O$

(3) CH_3CH_2CHO

(4) CH_3CHO

Q.75 The enthalpy of hydrogenation of cyclohexene is $–119.5$ kJ $mol^{–1}$. If resonance energy of benzene is $–150.4$ kJ $mol^{–1}$, its enthalpy of hydrogenation would be:-

(1) $–508.9$ kJ $mol^{–1}$ (2) $–208.1$ kJ $mol^{–1}$

(3) $–269.9$ kJ $mol^{–1}$ (4) $–358.5$ kJ $mol^{–1}$

Q.76 Self condensation of two moles of ethyl acetate in presence of sodium ethoxide yields:-

(1) Ethyl butyrate

(2) Acetoacetic ester

(3) Methyl acetoacetate

(4) Ethyl propionate

Q.77 Consider the reaction

$N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$

The equality relationship between $\frac{d[NH_3]}{dt}$ and $-\frac{d[H_2]}{dt}$ is :-

(1) $\frac{d[NH_3]}{dt} = -\frac{1}{3}\frac{d[H_2]}{dt}$

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

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

(4) $\frac{d[NH_3]}{dt} = -\frac{d[H_2]}{dt}$

Q.78 Which of the following is not chiral:-

(1) 2-Butanol

(2) 2,3-Dibromopentane

(3) 3-Bromopentane

(4) 2-Hydroxypropanoic acid

Q.79 $[Co(NH_3)_4(NO_2)_2]Cl$ exhibits:-

(1) Linkage isomerism, ionization isomerism and optical isomerism

(2) Linkage isomerism, ionization isomerism and geometrical isomerism

(3) Ionization isomerism, geometrical isomerism and optical isomerism

(4) Linkage isomerism, geometrical isomerism and optical isomerism

Q.80 $[Cr(H_2O)_6]Cl_3$ (at. No. of Cr = 24) has a magnetic moment of 3.83 B.M. The correct distribution of 3d electrons in the Chromium of the complex is:-

(1) $(3d\ x^2 – y^2)^1$, $3d\ z^{2^1}$, $3d\ xz^1$

(2) $3d\ xy^1$, $(3d\ x^2 – y^2)^1$, $3d\ yz^1$

(3) $3dxy^1$, $3d\ yz^1$, $3d\ xz^1$

(4) $3d\ xy^1$, $3d\ yz^1$, $3dz^{2^1}$

Q.81 1.00 g of a non-electrolyte solute (molar mass 250g $mol^{–1}$) was dissolved in 51.2 g of benzene. If the freezing point depression constant K_f of benzene is 5.12 K kg $mol^{–1}$, the freezing point of benzene will be lowered by:-

(1) 0.4 K (2) 0.3 K

(3) 0.5 K (4) 0.2 K

Q.82 Which of the following pairs constitutes a buffer:-

(1) HNO_2 & $NaNO_2$ (2) NaOH & NaCl

(3) HNO_3 & NH_4NO_3 (4) HCl & KCl

Q.83 The hydrogen ion concentration of a $10^{–8}$M HCl aqueous solution at 298 K ($K_W = 10^{–14}$) is:-

(1) $1.0 \times 10^{–6}$ M (2) $1.0525 \times 10^{–7}$ M

(3) $9.525 \times 10^{–8}$ M (4) $1.0 \times 10^{–8}$ M

Q.84 A solution of acetone is ethanol:-

(1) Shows a negative deviation from Raoult's law

(2) Shows a positive deviation from Raoult's law

(3) Behaves like a near ideal solution

(4) Obeys Raoult's law

Q.85 A hypothetical electrochemical cell is shown below:

$\overset{\ominus}{A} \mid A^+(xM) \parallel B^+(yM) \mid \overset{\oplus}{B}$

The emf measured is +0.20V. The cell reaction is:

(1) $A^+ + B \rightarrow A + B^+$

(2) $A^+ + e^- \rightarrow A; B^+ + e^- \rightarrow B$

(3) The cell reaction cannot be predicted

(4) $A + B^+ \rightarrow A^+ + B$

Q.86 Ethylene oxide when treated with Grignard reagent yields:-

(1) Secondary alcohol

(2) Tertiary alcohol

(3) Cyclopropyl alcohol

(4) Primary alcohol

Q.87 During osmosis, flow of water through a semipermeable membrane is:-

(1) From solution having higher concentration only

(2) Form both sides of semipermeable membrane with equal flow rates

(3) From both sides of semipermeable membrane with unequal flow rates

(4) From solution having lower concentration only

Q.88 Which of the following is more basic than aniline:-

(1) Diphenlamine (2) Triphenylamine

(3) p-Nitroaniline (4) Benzylamine

Q.89 In which of the following molecules all the bonds are not equal:-

(1) CIF_3 (2) BF_3

(3) AlF_3 (4) NF_3

Q.90 The electronegativity difference between N and F is greater than that between N and H yet the dipole moment of NH_3(1.5 D) is larger than that of NF_3 (0.2 D). This is because:-

(1) In NH_3 as well as in NF_3 the atomic dipole and bond dipole are in the same direction

(2) In NH_3 the atomic dipole and bond dipole are in the same direction whereas in NF_3 these are in opposite directions

(3) In NH_3 as well as NF_3 the atomic dipole and bond dipole are in opposite directions

(4) In NH_3 the atomic dipole and bond dipole are in the opposite directions whereas in NF_3 these are in the same direction

Q.91 The correct order of the mobility of the alkali metal ions in aqueous solution is:

(1) $Li^+ > Na^+ > K^+ > Rb^+$

(2) $Na^+ > K^+ > Rb^+ > Li^+$

(3) $K^+ > Rb^+ > Na^+ > Li^+$

(4) $Rb^+ > K^+ > Na^+ > Li^+$

Q.92 The correct order regarding the electronegativity of hybrid orbitals of carbon is:-

(1) $sp > sp^2 < sp^3$ (2) $sp > sp^2 > sp^3$

(3) $sp < sp^2 > sp^3$ (4) $sp < sp^2 < sp^3$

Q.93 Which of the following species has a linear shape:-

(1) NO_2^- (2)SO_2 (3) NO_2^+ (4)O_3

Q.94 Which of the following is the most basic oxide:-

(1) Al_2O_3 (2) Sb_2O_3

(3) Bi_2O_3 (4) SeO_2

Q.95 The orientation of an atomic orbital is governed by:-

(1) Azimuthal quantum number

(2) Spin quantum number

(3) Magnetic quantum number

(4) Principal quantum number

Q.96 Which of the following is not a correct statement:-

(1) The electron-deficient molecules can act as Lewis acids

(2) The canonical structures have no real existence

(3) Every AB_5 molecule does infact have square pyramid structure

(4) Multiple bonds are always shorter than corresponding single bonds

Q.97 The number of unpaired electrons in a paramagnetic diatomic molecule of an element with atomic number 16 is:-

(1) 2 (2) 3 (3) 4 (4) 1

Q.98 Which one of the following orders is not in according with the property stated against it ?

(1) $F_2 > Cl_2 > Br_2 > I_2$; Oxidising power

(2) HI > HBr > HCl > HF ; Acidic property in water

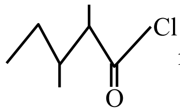
(3) $F_2 > Cl_2 > Br_2 > I_2$; Electronegativity

(4) $F_2 > Cl_2 > Br_2 > I_2$; Bond dissociation energy

Q.99 Which of the following is not isostructural with $SiCl_4$:-

(1) SCl_4 (2) SO_4^{2-}

(3) PO_4^{3-} (4) NH_4^+

Q.100 The IUPAC name of 

is:-

(1) 3,4-dimethylpentanoyl chloride

(2) 1-chloro-1-oxo-2,3-dimethylpentane

(3) 2-ethyl-3-methylbutanoyl chloride

(4) 2,3-dimethylpentanoyl chloride

Q.101 What would be the number of chromosomes in the cells of the aleurone layer in a plant species with 8 chromosomes in its synergids ?

(1) 16 (2) 24 (3) 32 (4) 8

Q.102 Pineapple (ananas) fruit develops from-

(1) a unilocular polycarpellary flower

(2) a multipistillate syncarpous flower

(3) a cluster of compactly borne flowers on a common axis

(4) a multilocular monocarpellary flower

Q.103 Golden rice is a promising transgenic crop. When released for cultivation, it will help in

(1) Alleviation of vitamin A deficiency

(2) Pest resistance

(3) Herbicide tolerance

(4) Producing a petrol-like fuel from rice

Q.104 Parthenocarpic tomato fruits can be produced by-

(1) Removing androecium of flowers before pollen grains are released

(2) Treating the plants with low concentrations of gibberellic acid and auxins

(3) Raising the plants from vernalized seeds

(4) Treating the plants with phenylmercuric acetate

Q.105 How does pruning help in making the hedge dense ?

(1) It induces the differentiation of new shoots from the rootstock

(2) It frees axillary buds from apical dominance

(3) The apical shoot grows faster after pruning

(4) It released wound hormones

Q.106 The 'blue baby' syndrome results from-

(1) Excess of chloride

(2) Methemoglobin

(3) Excess of dissolved oxygen

(4) Excess of TDS (total dissolved solids)

Q.107 Praying mantis is a good example of-

(1) Mullerian mimicry

(2) Warning colouration

(3) Social insects

(4) Camouflage

Q.108 Which one of the following statements is correct ?

(1) Neurons regulate endocrine activity, but not vice verse

(2) Endocrine glands regulate neural activity, and nervous system regulates endocrine glands

(3) Neither hormones control neural activity nor the neurons control endocrine activity

(4) Endocrine glands regulate neural activity, but not vice versa

Q.109 Examination of blood of a person suspected of having anemia, shows large, immature, nucleated erythrocytes without haemoglobin. Supplementing his diet with which of the following is likely to alleviate his symptoms ?

(1) Thiamine

(2) Folic acid and cobalamine

(3) Riboflavin

(4) Iron compounds

Q.110 Farmers in a particular region were concerned that pre-mature yellowing of leaves of a pulse crop might cause decrease in the yield. Which treatment could be most beneficial to obtain maximum seed yield ?

(1) Frequent irrigation of the crop

(2) Treatment of the plants with cytokinins alongwith a small dose of nitrogenous fertilizer

(3) Removal of all yellow leaves and spraying the remaining green leaves with 2,4,5-trichlorophenoxy acetic acid

(4) Application of iron and magnesium to promote synthesis of chlorophyll

Q.111 In which of the following fruits is the edible part the aril ?

(1) Custard apple (2) Pomegranate

(3) Orange (4) Litchi

Q.112 Which one of the following amino-acids was not found to be synthesized in Miller's experiment ?
(1) Glycine (2) Aspartic acid
(3) Glutamic acid (4) Alanine

Q.113 Crop plants grown in monoculture are-
(1) Low in yield
(2) Free from intraspecific competition
(3) Characterised by poor root system
(4) Highly prone to pests

Q.114 Montreal Protocol which calls for appropriate action to protect the ozone layer from human activities was passed in the year-
(1) 1986 (2) 1987
(3) 1988 (4) 1985

Q.115 The formula for exponential population growth is-
(1) dt/dN = rN (2) dN/rN = dt
(3) rN/dN = dt (4) dN/dt = rN

Q.116 Which one of the following is not used for construction of ecological pyramids ?
(1) Dry weight
(2) Number of individuals
(3) Rate of energy flow
(4) Fresh weight

Q.117 Niche overlap indicates-
(1) Active cooperation between two species
(2) Two different parasites on the same host
(3) Sharing of one or more resources between the two species
(4) Mutualism between two species

Q.118 In photosystem-I, the first electron acceptor is-
(1) Ferredoxin
(2) Cytochrome
(3) Plastocyanin
(4) An iron sulphur protein

Q.119 Treatment of seed at low temperature under moist conditions to break its dormancy is called -
(1) Sclarification (2)Vernalization
(3) Chelation (4) Stratification

Q.120 Which one of the following is the most suitable medium for culture of *Drosophila melanogaster* ?
(1) Moist bread (2) Agar-agar
(3) Ripe banana (4) cow dung

Q.121 Which one of the following is not included under in-situ conservation ?
(1) Sanctuary (2) Botanical garden
(3) Biosphere reserve (4) National park

Q.122 Which antibiotic inhibits interaction between tRNA and mRNA during bacterial protein synthesis ?
(1) Erythromycin (2) Neomycin
(3) Streptomycin (4) Tetracycline

Q.123 Phenotype of an organism is the result of-
(1) Mutations and linkages
(2) Cytoplasmic effects and nutrition
(3) Environmental changes and sexual dimorphism
(4) Genotype and environment interactions

Q.124 Photochemical smog pollution does not contain-
(1) Ozone
(2) Nitrogen dioxide
(3) Carbon dioxide
(4) PAN (peroxy acyl nitrate)

Q.125 Moss peat is used as a packing material for sending flowers and live plants to distant places because-
(1) It is easily available
(2) It is hygroscopic
(3) It reduces transpiration
(4) It serves as a disinfectant

Q.126 A common structural feature of vessel elements and sieve tube elements is-
(1) Thick secondary walls
(2) Pores on lateral wall
(3) Presence of p-protein
(4) Enucleate condition

Q.127 The thalloid body of a slime mould (Myxomycetes) is known as-
(1) Protonema (2) Plasmodium
(3) Fruiting body (4) Mycelium

Q.128 In which mode of inheritance do you expect more maternal influence among the offspring ?
(1) Autosomal (2) Cytoplasmic
(3) Y-linked (4) X-linked

Q.129 What type of placentation is seen in sweet pea ?
(1) Basal (2)Axile
(3) Free central (4) Marginal

Q.130 Long filamentous threads protruding at the end of a young cob of maize are-
(1) Anthers (2) Styles
(3) Ovaries (4) Hairs

Q.131 Conifers differ from grasses in the-
(1) Production of seeds from ovules
(2) Lack of xylem tracheids
(3) Absence of pollen tubes
(4) Formation of endosperm before fertilization

Q.132 How many different kinds of gametes will be produced by a plant having the genotype AABbCC ?
(1) Three (2) Four
(3) Nine (4) Two

Q.133 In Maize, hybrid vigour is exploited by-
(1) Bombarding the protoplast with DNA
(2) Crossing of two inbred parental lines
(3) Harvesting seeds from the most productive plants
(4) Inducing mutations

Q.134 Which of the following statements regarding mitochondrial membrane is not correct ?
(1) The outer membrane is permeable to all kinds of molecules
(2) The enzymes of the electron transfer chain are embedded in the outer membrane
(3) The inner membrane is highly convoluted forming a series of infoldings
(4) The outer membrane resembles a sieve

Q.135 Amino acid sequence, in protein synthesis is decided by the sequence of-
(1) tRNA (2) mRNA
(3) cDNA (4) rRNA

Q.136 How many ATP molecules could maximally be generated from one molecule of glucose, if the complete oxidation of one mole of glucose to CO_2 and H_2O yields 686 kcal and the useful chemical energy available in the high energy phosphate bond of one mole of ATP is 12 kcal ?
(1) Two (2) Thirty
(3) Fifty-seven (4) One

Q.137 An organic substance bound to an enzyme and essential for its activity is called -
(1) Coenzyme (2) Holoenzyme
(3) Apoenzyme (4) isoenzyme

Q.138 Bowman's glands are found in-
(1) Olfactory epithelium
(2) External auditory canal
(3)Cortical nephrons only
(4) Juxtamedullary nephrons

Q.139 The bacterium (Clostridium botulinum) that causes botulism is-
(1) A facultative anaerobe
(2) An obligate anaerobe
(3) A facultative aerobe
(4) An obligate aerobe

Q.140 Which one of the following is the correctly matched pair of an endangered animal and a National Park ?
(1) Lion – Corbett National Park
(2) Rhinoceros – Kaziranga National Park
(3) Wild Ass – Dudhwa National Park
(4) Great Indian Bustard – Keoladeo National Park

Q.141 A person showing unpredictable moods, outbursts of emotion, quarrelsome behaviour and conflicts with others is suffering from-
(1) *Schizophrenia*
(2) Borderline Personality Disorder (BPD)
(3) Mood disorders
(4) Addictive disorders

Q.142 Sulphur is an important nutrient for optimum growth and productivity in-
(1) Pulse crops (2) Cereals
(3) Fibre crops (4) Oilseed crops

Q.143 Pentamerous, actinomorphic flowers, bicarpellary ovary with oblique septa, and fruit a capsule or berry, are characteristic features of-
(1) Asteraceae (2) Brassicaceae
(3) Solanaceae (4) Liliaceae

Q.144 In a moss the sporophyte-
(1) is partially parasitic on the gametophyte
(2) produces gametes that given rise to the gametophyte
(3) Arises from a spore produced from the gametophyte
(4) Manufactures food for itself, as well as for the gametophyte

Q.145 Curing of tea leaves is brought about by the activity of-
(1) Bacteria (2) Mycorrhiza
(3) Viruses (4) Fungi

Q.146 People living at sea level have around 5 million RBC per cubic millimeter of their blood whereas those living at an altitude of 5400 metres have around 8 million. This is because at high altitude-
(1) People get pollution-free air to breathe and more oxygen is available
(2) Atmospheric O_2 level is less and hence more RBCs are needed to absorb the required amount of O_2 to survive
(3) There is more UV radiation which enhances RBC production
(4) People eat more nutritive food, therefore more RBCs are formed

Q.147 An important evidence in favour of organic evolution is the occurrence of-
(1) Homologous and vestigial organs
(2) Analogous and vestigial organs
(3) Homologous organs only
(4) Homologous and analogous organs

Q.148 Which one of the following is not a living fossil-
(1) King crab (2) Sphenodon
(3) Archaeopteryx (4) Peripatus

Q.150 A major breakthrough in the studies of cells came with the development of electron microscope. This is because-
(1) The resolution power of the electron microscope is much higher than that of the light microscope
(2) The resolving power of the electron microscope is 200-350 nm as compared to 0.1-0.2 nm for the light microscope
(3) Electron beam can pass through thick materials, whereas light microscopy requires thin sections
(4) The electron microscope is more powerful than the light microscope as it uses a beam of electrons which has wavelength much longer than that of photons

Q.151 Which one of the following is a matching set of phylum and its three examples ?
(1) Cnidaria – Bonellia, Physalia, Aurelia
(2) Platyhelminthes-Planaria, Schistosoma, Enterobius
(3) Mollusca-Loligo, Teredo, Octopus
(4) Porifera-Spongilla, Euplectella, Pennatula

Q.152 Metameric segmentation is the characteristic of-
(1) Platyhelminthes and Arthropoda
(2) Echinodermata and Annelida
(3) Annelida and Arthropoda
(4) Mollusca and Chordata

Q.153 Which of the following pairs of an animal and a plant represents endangered organisms in India-
(1) Bentinckia nicobarica and Red Panda
(2) Tamarind and Rhesus monkey
(3) Cinchona and Leopard
(4) Banyan and Black buck

Q.154 Jurassic period of the Mesozoic era characterized by-
(1) Gymnosperms are dominant plants and first birds appear
(2) Radiation of reptiles and origin of mammal like reptiles
(3) Dinosaurs become extinct and angiosperms appear
(4) Flowering plants and first dinosaurs appear

Q.155 What is common about Trypanosoma, Noctiluca, Monocystis and Giardia-
(1) These are all unicellular protists
(2) They have flagella
(3) They produce spores
(4) These are all parasites

Q.156 Which of the following statements regarding cilia is not correct -
(1) The organized beating of cilia is controlled by fluxes of Ca^{2+} across the membrane
(2) Cilia are hair-like cellular appendages
(3) Microtubules of cilia are composed of tubulin
(4) Cilin contain an outer ring of nine doublet microtubules surrounding two single microtubules

Q.157 Two microbes found to be very useful in genetic engineering are-
(1) Escherichia coli and Agrobacterium tumefaciens
(2) Vibrio cholerae and a tailed bacteriophage
(3) Diplococcus sp.and Pseudomonas sp.
(4) Crown gall bacterium and Caenorhabditis elegans

Q.158 Which of the following environmental conditions are essential for optimum growth of Mucor on a piece of bread ?

A. Temperature of about 25ºC

B. Temperature of about 5ºC

C. Relative humidity of about5%

D. Relative humidity of about 95%

E. A shady place

F. A brightly illuminated place

Choose the answer from the following options

(1) A, C and E only (2) A, D and E only

(3) B, D and E only (4) B, C and F only

Q.159 Evolutionary history of an organism is known as-

(1) Phylogeny (2) Ancestry

(3) Paleontology (4) Ontogeny

Q.160 Which of the following is considered a hot-spot of biodiversity in India ?

(1) Western Ghats

(2) Indo-Gangetic Plain

(3) Eastern Ghats

(4) Aravalli Hills

Q.161 During photorespiration the oxygen consuming reaction (s) occur in-

(1) Stroma of chloroplasts and mitochondria

(2) Stroma of chloroplasts and peroxisomes

(3) Grana of chloroplasts and peroxisomes

(4) Stroma of chloroplasts

Q.162 Which one of the following is an example of polygenic inheritance ?

(1) Flower colour in Mirabilis jalapa

(2) Production of male honey bee

(3) Pod shape in garden pea

(4) Skin colour in humans

Q.163 Which one of the following does not act as a neurotransmitter ?

(1) Acetylcholine (2) Epinephrine

(3) Norepinephrine (4) Cortisone

Q.164 Sertoli cells are regulated by the pituitary hormone known as-

(1) FSH (2) GH

(3) Prolactin (4) LH

Q.165 A steroid hormone which regulates glucose metabolism is-

(1) Cortisol

(2) Corticosterone

(3) 11-deoxycorticosterone

(4) Cortisone

Q.166 The contractile protein of skeletal muscle involving ATPase activity is-

(1) Tropomyosin (2) Myosin

(3) α-Actin (4) Troponin

Q.167 Which one of the following is not a second messenger in hormone action ?

(1) cGMP (2) Calcium

(3) Sodium (4) cAMP

Q.168 In Mendel's experiments with garden pea, round seed shape (RR) was dominant over wrinkled seeds (rr), yellow cotyledon (YY) was dominant over green cotyledon (yy). What are the expected phenotypes in the F_2 generation of the cross RRYY × rryy ?

(1) Only round seeds with green cotyledons

(2) Only wrinkled seeds with yellow cotyledons

(3) Only wrinkled seeds with green cotyledons

(4) Round seeds with yellow cotyledons, and wrinkled seeds with yellow cotyledons

Q.169 One gene-one enzyme hypothesis was postulated by-

(1) R. Franklin (2) Hershey and Chase

(3) A.Garrod (4) Beadle and Tatum

Q.170 One turn of the helix in a B-form DNA is approximately-

(1) 20 nm (2) 0.34 nm

(3) 3.4 nm (4) 2 nm

Q.171 Test cross involves-

(1) Crossing between two genotypes with recessive trait

(2) Crossing between two F_1 hybrids

(3) Crossing the F_1 hybrid with a double recessive genotype

(4) Crossing between two genotypes with dominant trait

Q.172 Antiparallel strands of a DNA molecule means that-

(1) One strand turns anti-clockwise

(2) The phosphate groups of two DNA stands, at their ends, share the same position

(3) The phosphate groups at the start of two DNA strands are in opposite position (pole)

(4) One strand turns clockwise

Q.173 Areolar connective tissue joins-
(1) Fat body with muscles
(2) Integument with muscles
(3) Bones with muscles
(4) Bones with bones

Q.174 Mast cells secrete-
(1) Hippurin (2) Myoglobin
(3) Histamine (4) Heamoglobin

Q.175 If a colourblind woman marries a normal visioned man, their sons will be -
(1) All normal visioned
(2) One-half colourblind and one-half normal
(3) Three-fourths colourblind and one-fourth normal
(4) All colourblind

Q.176 Cri-du-chat syndrome in humans is caused by the-
(1) Fertilization of an XX egg by a normal Y-bearing sperm
(2) Loss of half of the short arm of chromosome 5
(3) Loss of half of the long arm of chromosome 5
(4) Trisomy of 21^{st} chromosome

Q.177 Restriction endonuclease -
(1) Cuts the DNA molecule randomly
(2) Cuts the DNA molecule at specific sites
(3) Restricts the synthesis of DNA inside the nucleus
(4) Synthesizes DNA

Q.178 Antibodies in our body are complex-
(1) Lipoproteins (2) Steroids
(3) Prostaglandins (4) Glycoproteins

Q.179 Limit of BOD prescribed by Central Pollution Control Board for the discharge of industrial and municipal waste waters into natural surface waters, is -
(1) < 3.0 ppm (2) <10 ppm
(3) < 100 ppm (4) < 30 ppm

Q.180 Earthworms are -
(1) Ureotelic when plenty of water is available
(2) Uricotelic when plenty of water is available
(3) Uricotelic under conditions of water scarcity
(4) Ammonotelic when plenty of water is available.

Q.181 Which of the following is an accumulation and release centre of neurohormones ?
(1) Posterior pituitary lobe
(2) Intermediate lobe of the pituitary
(3) Hypothalamus
(4) Anterior pituitary lobe

Q.182 Withdrawal of which of the following hormones is the immediate cause of menstruation ?
(1) Estrogen (2) FSH
(3) FSH-RH (4) Progesterone

Q.183 Which one of the following statements is incorrect ?
(1) The residual air in lungs slightly decreases the efficiency of respiration in mammals
(2) The presence of non-respiratory air sacs, increases the efficiency of respiration in birds
(3) In insects, circulating body fluids serve to distribute oxygen to tissues
(4) The principle of countercurrent flow facilitates efficient respiration in gills of fishes

Q.184 Which one of the following has an open circulatory system ?
(1) Pheretima (2) Periplaneta
(3) Hirudinaria (4) Octopus

Q.185 Which hormone causes dilation of blood vessels, increased oxygen consumption an glucogenesis ?
(1) ACTH (2) Insulin
(3) Adrenalin (4) Glucagon

Q.186 The causative agent of mad-cow disease is a-
(1) Bacterium (2) Prion
(3) Worm (4) Virus

Q.187 The translocation of organic solutes in sieve tube members is supported by-
(1) Root pressure and transpiration pull
(2) P-proteins
(3) Mass flow involving a carrier and ATP
(4) Cytoplasmic streaming

Q.188 Biradial symmetry and lack of cnidoblasts are the characteristics of-
(1) Starfish and sea anemone
(2) Ctenoplana and Beroe
(3) Aurelia and Paramecium
(4) Hydra and starfish

Q.189 The arrangement of the nuclei in a normal embryo sac in the dicot plants is-

(1) 2 + 4 + 2 (2) 3 + 2 + 3
(3) 2 + 3 + 3 (4) 3 + 3 + 2

Q.190 An enzyme that can stimulate germination of barley seeds is-

(1) α- amylase (2) Lipase
(3) Protease (4) Invertase

Q.191 In a cereal grain the single cotyledon of embryo is represented by -

(1) Coleorhiza (2) Scutellum
(3) Prophyll (4) Coleoptile

Q.192 The majority of carbon dioxide produced by our body cells is transported to the lungs-

(1) Dissolved in the blood
(2) As bicarbonates
(3) As carbonates
(4) Attached to hemoglobin

Q.193 Triticale, the first man-made cereal crop, has been obtained by crossing wheat with

(1) Rye (2) Pearl millet
(3) Sugarcane (4) Barley

Q.194 In order to obtain virus-free plants through tissue culture the best method is-

(1) Protoplast culture
(2) Embryo rescue
(3) Anther culture
(4) Meristem culture

Q.195 HIV that causes AIDS, first starts destroying

(1) B-lymphocytes (2) Leucocytes
(3) Thrombocytes (4) Helper T-lymphocytes

Q.196 In which one of the following sets of animals do all the four give birth to young ones ?

(1) Lion, Bat, Whale, Ostrich
(2) Platypus, Penguin, Bat, Hippopotamus
(3) Shrew, Bat, Cat, Kiwi
(4) Kangaroo, Hedgehog, Dolphin, Loris

Q.197 Sickle cell anemia has not been eliminated from the African population because-

(1) It is controlled by recessive genes
(2) It is not a fatal disease
(3) It provides immunity against malaria
(4) It is controlled by dominant genes

Q.198 Two common characters found in centipede, cockroach, and crab are-

(1) Compound eyes and anal cerci
(2) Jointed legs and chitinous exoskeleton
(3) Green gland and tracheae
(4) Book lungs and antennae

Q.199 Both sickle cell anemia and Huntington's chorea are-

(1) Bacteria-related diseases
(2) Congenital disorders
(3) Pollutant-induced disorders
(4) Virus-related diseases

Q.200 Angiotensinogen is a protein produced and secreted by-

(1) Macula densa cells
(2) Endothelial cells (cells lining the blood vessels)
(3) Liver cells
(4) Juxtaglomerular (JG) cells

ANSWER KEY (AIPMT-2006)

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

HINTS & SOLUTIONS

1. $m = ZIt = (Z)\left(\frac{P}{V}\right)(t) = (0.367 \times 10^{-6})\left(\frac{100}{125}\right)(60)$

$= 1.76 \times 10^{-5}$ kg = 17.6 mg

2. $V_A - V_B = \left[V - \left(\frac{V}{8}\times 4\right)\right] - \left[V - \left(\frac{V}{4}\times 1\right)\right]$

$= -\frac{V}{2} + \frac{V}{4} = -\frac{V}{4} \Rightarrow V_B > V_A \Rightarrow$ **Ans (4)**

3. Restoring force = $Ax\rho g = kx \Rightarrow k = A\rho g$

$\Rightarrow T = 2\pi\sqrt{\frac{m}{A\rho g}} \Rightarrow$ **Ans(2)**

4. $\eta = 1 - \frac{T_2}{T_1} \Rightarrow 1 - \frac{300}{T_1} = 0.4 \Rightarrow T_1 = 500$ K

now $\eta\ni = 0.4 + 0.4 \times \frac{50}{100} = 0.6$

Therefore $0.6 = 1 - \frac{300}{500 + \Delta T}$

$\Rightarrow 500 + \Delta T = 750 \Rightarrow \Delta T = 250$ K

5. $\vec{F} = q(\vec{v} \times \vec{B}) = avB \sin\theta\, \hat{n}$

Therefore when $\theta = 0^o$ or $\theta = 180^o$, F = 0

6 According to question

$E - Ir_1 = 0$ & $I = \frac{E+E}{r_1 + r_2 + R}$ $\therefore \frac{E}{r_1} = \frac{2E}{r_1 + r_2 + R}$

$\Rightarrow r_1 + r_2 + R = 2r_1 \qquad \Rightarrow R = r_1 - r_2$

7. By Wiens displacement law $\lambda_m T = b$ we have $(5000)(1500) = (\lambda'_m)(1500 + 1000)$

$\Rightarrow \lambda'_m = \frac{(5000)(1500)}{(2500)} = 3000$ Å

8. Let r_1 and r_2 are the radius of coil 1 & 2. If B_1 and B_2 are magnetic induction at their centre, then

$B_1 = \frac{\mu_0 I_1}{2r_1}$; and $B_2 = \frac{\mu_0 I_2}{2r_2}$

Since $B_1 = B_2$; and $r_1 = 2r_2$ therefore $I_1 = 2I_2$ Again if R_1 and R_2 are resistance of the coil 1 and 2 then $R_1 = 2R_2$ (as $R \propto$ length $= 2\pi r$) and if V_1 and V_2 are the potential difference across them respectively, then

$\frac{V_1}{V_2} = \frac{I_1 R_1}{I_2 R_2} = \frac{(2I_2)(2R_2)}{I_2 R_2} = 4$

9. $f = \frac{1}{2\pi\sqrt{LC}}$ & $f' = \frac{1}{2\pi\sqrt{2L(4C)}}$

Therefore $f' = \left(\frac{1}{2\sqrt{2}}\right)\frac{1}{2\pi\sqrt{LC}} = \frac{f}{2\sqrt{2}}$

10. Energy released = $28 - 2 \times 2.2 = 28 - 4.4 = 23.6$ MeV

11. $R_1 = R_0 e^{-\lambda t_1}$ & $R_2 = R_0 e^{-\lambda t_2}$

$\Rightarrow \frac{R_1}{R_2} = \frac{e^{-\lambda t_1}}{e^{-\lambda t_2}} = e^{-\lambda(t_1 - t_2)} \Rightarrow R_1 = R_2\, e^{-\lambda(t_1 - t_2)}$

12. According to question $12.1 = 13.6\left(\frac{1}{\ell^2} - \frac{1}{n^2}\right)$

$\Rightarrow n^2 = \frac{13.6}{1.5} \approx 9 \Rightarrow n = 3$

No. of spectral lines emitted

$= \frac{n(n-1)}{2} = \frac{(3)(2)}{2} = 3$

13. $U = \frac{1}{2}K(2)^2$ & $U' = \frac{1}{2}K(8)^2$

$\Rightarrow \frac{U'}{U} = \left(\frac{8}{2}\right)^2 = 16 \Rightarrow U' = 16U$

14. For complementary angles, range will be same

OR

$$\frac{R_1}{R_2} = \frac{\left[\frac{u^2 \sin 2(45-\theta)}{g}\right]}{\left[\frac{u^2 \sin 2(45+\theta)}{g}\right]} = \frac{u^2 \sin(90-2\theta)}{u^2 \sin(90+2\theta)}$$

$$= \frac{\cos 2\theta}{\cos 2\theta} = 1$$

15. By using work energy theorem

$W = \Delta KE = \frac{1}{2}mv_2^2 - \frac{1}{2}mv_1^2$

Now $s = \frac{1}{3}t^2 \quad \Rightarrow v = \frac{2}{3}t$

$\Rightarrow v_1 = 0,\ v_2 = \frac{2}{3} \times 2 = \frac{4}{3}\ ms^{-1}$

Therefore $W = \frac{1}{2} \times 3\left(\frac{4}{3}\right)^2 - \frac{1}{2} \times 3 \times (0)^2 = \frac{8}{3}\ J$

16. $x = 40 + 12t - t^3 \Rightarrow v\ \frac{dx}{dt} = 12 - 3t^2$

$\Rightarrow v = 0$ at $t = 2$ sec

Distance travelled by particle before coming to rest

$= \mathbf{x}$ (at $t = 2$) $- \mathbf{x}$ (at $t = 0$)

$= [40 + 12 \times 2 - 2^3] - [40] = 16$ m

17. $v = at + \frac{b}{t+c} \Rightarrow [c]\ [t] = T;$

$[v] = [at] \Rightarrow [a] = \frac{[v]}{[t]} = LT^{-2};$

$[b] = (LT^{-1})\ T = L$

18. Shifting in microscope = upward shifting in mark

$= t\left(1 - \frac{1}{\mu}\right) = 3\left(1 - \frac{1}{1.5}\right) = 1$ cm

19. By using work energy theorem $W = \Delta KE$

(here $\Delta KE = 0$) $\Rightarrow 300 - W_{gravity} - W_{friction} = 0$

$\Rightarrow W_{friction} = 300 - mgh$

$= 300 - (2)(10)(10) = 100J$

20. $\beta = \frac{\Delta I_C}{\Delta I_B} = \frac{(10-5)\times 10^{-3}}{(150-100)\times 10^{-6}} = 100$

24. By using $M = K\sqrt{L_1L_2}$ Here $K = 1$, $L_1 = 2mH$

$L_2 = 8mH \Rightarrow M = \sqrt{16} = 4$ mH

26. According to given situation

$h\nu = E_0 + K$ & $2h\nu = E_0 + K' \Rightarrow K' = K + h\nu$

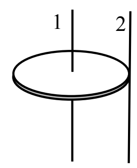
27. In given situation output C is high only when both inputs A and B are high so logic ckt gate is AND gate.

28. Power factor $= \cos\phi = \frac{R}{|Z|} = \frac{8}{\sqrt{8^2 + (31-25)^2}}$

$= \frac{8}{\sqrt{8^2 + 6^2}} = \frac{8}{10} = 0.8$

29. $F = \frac{\Delta p}{\Delta t} = \frac{2mv\sin 30^\circ}{0.25} = 24$ N

30.



$I_2 = I_1 + MR^2 = \frac{3}{2}MR^2$

31. For a photon $E = pc$

$\Rightarrow p = \frac{E}{c} = \frac{10^6 \times 1.6 \times 10^{-19}}{3 \times 10^8} = 5.33 \times 10^{-22}$ $kgms^{-1}$

32. $R = R_0A^{1/3} \Rightarrow A_{Ge} = \left(\frac{R_{Ge}}{R_{Be}}\right)^3 (A_{Be}) = (2)^3(9)$

$= 8 \times 9 = 72$

33. $C_P = \frac{7}{2}R \Rightarrow C_V = C_P - R = \frac{5}{2}R \Rightarrow \gamma = \frac{C_P}{C_V} = \frac{7}{5}$

34. According to question and by using COME

$-\frac{GMm}{R+R} + \frac{1}{2}m(fv)^2 = 0 + 0$

$\Rightarrow fv = \sqrt{\frac{GM}{R}}$ but $v = \sqrt{\frac{2GM}{R}}$

Therefore $f\sqrt{\frac{2GM}{R}} = \sqrt{\frac{GM}{R}} \Rightarrow f = \frac{1}{\sqrt{2}}$

35. Number of beats per second

$= \frac{v}{\lambda_1} - \frac{v}{\lambda_2} = 330\left(\frac{1}{5} - \frac{1}{5.5}\right) = 66 - 60 = 6$

36. As voltage drop across

$8\Omega = \sqrt{2\times 8} = 4V \quad \left(\because P = \frac{V^2}{R}\right)$

Therefore voltage drop across $3\Omega = 3V$

[$\because$ 4V is divided in ratio of resistances between 1Ω and 3Ω]

Hence power dissipated in $3\Omega = \frac{(3)^2}{3} = 3$ watt

38. $V = \frac{\omega}{k} = \frac{4\pi}{0.5\pi} = 8\ ms^{-1}$

39. Time of reverberation $\propto \frac{V}{A}$ (sabine's formula)

Where V = volume of room and A = area of room

42. $P = P_1 + P_2 = \frac{1}{f_1} + \frac{1}{f_2} = \frac{1}{25} + \frac{1}{(-25)} = 0$

43. Work done in rotating a dipole from θ_1 to θ_2 is

$W = pE(\cos\theta_1 - \cos\theta_2)$

Here $\theta_1 = 0^\circ$ and $\theta_2 = 90^\circ$ therefore W = pE

44. According to question

Q = constant and C$\downarrow$ therefore V$\uparrow$

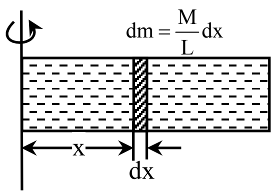
45. Average velocity $= \frac{\text{Displacement}}{\text{Time taken}} = \frac{0}{62.8} = 0$

Average speed $= \frac{\text{Distance}}{\text{Time taken}} = \frac{2\pi r}{T}$

$= \frac{(2\pi)(100)}{(62.8)} = 10 ms^{-1}$

46. $\phi = \vec{E}\cdot\vec{S} = ES\cos 90^\circ = 0$ ($\therefore$ area vector is $\perp^r$ to $\vec{E}$)

47.

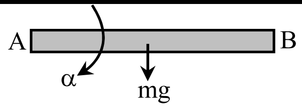


Consider a small mass element dm at distance x from axis

Required force $F = \int dF = \int (dm)(\omega^2)(x)$

$= \int_0^L \frac{M}{L}\omega^2 x\,dx = \frac{M\omega^2 L}{2}$

48.



Here $\tau = I\alpha$

$\Rightarrow (mg)\left(\frac{\ell}{2}\right) = \left(\frac{m\ell^2}{3}\right)(\alpha) \Rightarrow \alpha = \frac{3g}{2\ell}$

49. $|\vec{A}+\vec{B}| = |\vec{A}-\vec{B}| \Rightarrow |\vec{A}+\vec{B}|^2 = |\vec{A}-\vec{B}|^2$

$\Rightarrow A^2 + B^2 + 2AB\cos\theta = A^2 + B^2 - 2AB\cos\theta$

$\Rightarrow \cos\theta = 0 \Rightarrow \theta = 90^\circ$

50. $\therefore h = \frac{1}{2}gt^2 \therefore \frac{t_1}{t_2} = \sqrt{\frac{h_1}{h_2}} = \sqrt{\frac{16}{25}} = \frac{4}{5}$

51. If ΔG system < 0, the process is spontaneous

If ΔG system > 0, the process is nonspontaneous

If ΔG system = 0, the process is in equilibrium

52. For isotonic solution $\pi_1 = \pi_2$

or $C_1 = C_2$ (conc. in mol/lit.)

(Urea solution) (unknown solution)

$\frac{10}{60} = \frac{5\times 1000}{m_w \times 100}$

$m_w = 300$ gm mol^{-1}

54. For $H_2(g) + Br_2(g) \rightarrow 2HBr(g)$

$\because \Delta n_g = 0$

$\therefore \Delta H = \Delta E + \Delta n_g RT$

$\Rightarrow \Delta H = \Delta E$

55. $CH_3CH_2COOH \xrightarrow{SOCl_2} CH_3CH_2COCl$ (B)

$CH_3CH_2COCl \xrightarrow{NH_3} CH_3CH_2CONH_2$ (C)

$CH_3CH_2NH_2 \xleftarrow[Br_2]{KOH} CH_3CH_2CONH_2$

(D) (C)

58. For CsBr no. of formulas/unit cell

n = 1 (like CsCl type)

$C.D. = \frac{n\times M}{V\times N_A} \left[\begin{array}{l} M = 133 + 80 = 213 \\ V = a^3 = (436.6\times 10^{-12})^3 \end{array}\right]$

$C.D. = \frac{1\times 213\text{gm}}{83.22\times 10^{-24}\text{cm}^3 \times 6.02\times 10^{23}} = 4.25\text{gm/cm}^3$

60. $\Delta x \times \Delta V \geq \dfrac{h}{4\pi m}$

$\because \Delta x = 0.1$ Å

$= 1 \times 10^{-11}$ m

$\Delta V \geq \dfrac{h}{4\pi m \times \Delta x}$

$\Delta V \geq \dfrac{6.626 \times 10^{-34}\,\text{J sec}}{4 \times 3.14 \times 9.11 \times 10^{-31}\,\text{kg} \times 10^{-11}\,\text{m}}$

$\Delta V \geq 5.79 \times 10^{6}$ m sec^{-1}

61. $2KCN + CuSO_4 \rightarrow K_2SO_4 + Cu(CN)_2$

$\underset{\text{unstable}}{Cu(CN)_2} \rightarrow CuCN + (CN)_2$

$CuCN + 3KCN \rightarrow K_3[Cu(CN)_4]$ i.e. $[Cu(CN)_4]^{3-}$

64. For the reaction

$Br_2(\ell) + Cl_2(g) \rightarrow 2BrCl(g)$

$\Delta H = 30$ kJ/mol

$\Delta S = 105$ JK^{-1} mol^{-1}

For at equilibrium $\Delta G = 0$

$\therefore \Delta G = \Delta H - T\Delta S$

$\Delta H = T\Delta S$

$T = \dfrac{\Delta H}{\Delta S} = \dfrac{30 \times 1000\,\text{J mol}^{-1}}{105\,\text{JK}^{-1}\text{mol}^{-1}} = 285.7\text{K}$

65. Due to F centre defect colourless ionic crystal Converts into coloured ionic crystal

67. For the cell reaction

$Fe + 2Fe^{3+} \rightarrow 3Fe^{2+}$

Anode reaction is $Fe \rightarrow Fe^{2+} + 2e^{-}$

Cathode reaction is $2Fe^{3+} + 2e^{-} \rightarrow 2Fe^{2+}$

$E^{\circ}_{Cell} = E^{\circ}_{Cathode} - E^{\circ}_{Anode}$ (E° is reduction potential)

$= 0.771 - (-0.441)$

$E^{\circ}_{Cell} = 1.212$ V

71. $CH_3\text{–}\underset{\underset{O}{\|}}{C}\text{–}H \xrightarrow{HCN} CH_3\text{–}\underset{\underset{OH}{|}}{CH}\text{–}CN \xrightarrow{H^{\oplus}/H_2O} CH_3\text{–}\underset{\underset{OH}{|}}{\overset{*}{C}H}\text{–}COOH$

(Rac. mixture)

73.

$CH_3\text{–}O\text{–}\underset{\underset{CH_3}{|}}{CH}\text{–}CH_3 + HI \xrightarrow{SN^2} CH_3I + CH_3\text{–}\underset{\underset{CH_3}{|}}{CH}\text{–}OH$

74. Reactivity $\propto \dfrac{1}{\text{steric} - \text{Hinderence}}$

75. $\because$ Heat of hydrogenation of cyclohaxene

$= -119.5$ kJ/mol

$\therefore$ Heat of hydrogenation of benzene

$= 3 \times -119.5 = -358.5$ KJ/mol

Resonance energy

= Observed ΔH – Calculated ΔH

$-150.4 = -358.5 - x$

$x = -208.1$ KJ

76.

$CH_3\text{–}\underset{\underset{O}{\|}}{C}\text{–}\boxed{OC_2H_5 + H}\text{–}\overset{\alpha}{C}H_2\text{–}\underset{\underset{O}{\|}}{C}\text{–}OC_2H_5 \xrightarrow{C_2H_5ONa, -C_2H_5OH}$

$\underset{\text{(AAE)}}{CH_3\text{–}\underset{\underset{O}{\|}}{C}\text{–}CH_2\text{–}\underset{\underset{O}{\|}}{C}\text{–}OC_2H_5}$

77. For the reaction $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$

$\dfrac{-d[N_2]}{dt} = -\dfrac{1}{3}\dfrac{d}{dt}([H_2]) = \dfrac{1}{2}\dfrac{d}{dt}([NH_3])$

$\therefore \dfrac{d}{dt}([NH_3]) = -\dfrac{2}{3}\dfrac{d}{dt}([H_2])$

80. Cr^{+3}

t_2g			eg	
1	1	1		

3d(xy, yz, xz)

81. ΔT_f = molality $\times K_f$

$\Delta T_f = \left(\dfrac{1 \times 1000}{250 \times 51.2}\right) \times 5.12$

$\Delta T_f = 0.4$ K

83 $[H^+] = 10^{-8}$ M

Due to dilute solution.

$[H^+] = 10^{-8} + 10^{-7}$ M

$= 10^{-7}\,[0.1 + 1]$M

$= 1.1 \times 10^{-7}$ M

$= 1.1 \times 10^{-7}$ M

$\simeq 1.0525 \times 10^{-7}$ M

85. $A/A^+ (xM) \,||\, B^+(yM)/B$

$E_{cell} = +0.20$ V $\quad \therefore \Delta G = -$ Ve

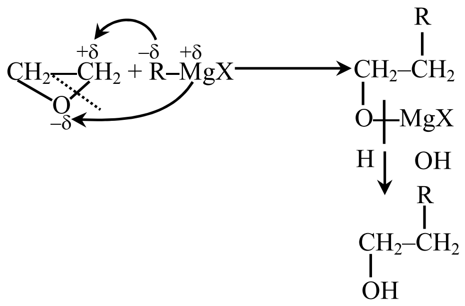
Therefore given cell reaction is spontaneous

At Anode $\quad A \rightarrow A^+ + e^-$

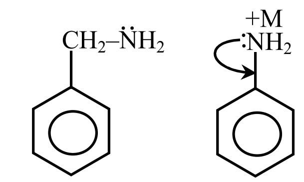
At Cathode $\quad \underline{B^+ + e^- \rightarrow B}$

Cell reaction $\quad A + B^+ \rightarrow A^+ + B$

86.



88.



Benzyl amine $\qquad$ Aniline

* Benzylamine has localised lone pair therefore it is more basic.

89. In the ClF_3, Cl atom is sp^3d hybridised, having trigonal bipyramidal geometry, in which axial bonds are longer than equatorial bonds.

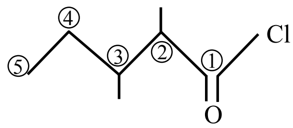
91. Charge density $\propto$ hydration. Therefore hydrated size of Li^+ is large and having less mobility. Down the group degree of hydration decreases.

93. $O = \overset{+}{N} \rightarrow O$ sp hybridization hence Linear

94. Al_2O_3 and Sb_2O_3 are amphoteric, SeO_2 is acidic and Bi_2O_3 is basic.

97. Element of At. no. = 16 is sulphur, its diatomic molecule is like O_2 which have two unpaired e^- according to MOT.

100.



2-3-dimethyl pentanoyl chloride