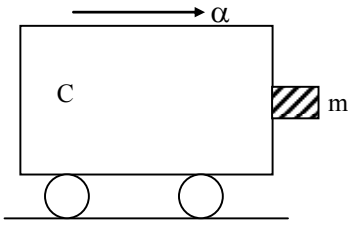
AIPMT - 2010

Q.1 A block of mass m is in contact with the cart C as shown in figure –



The coefficient of static friction between the block and the cart is μ. The acceleration α of the cart that will prevent the block from falling satisfies –

(1) $\alpha > \frac{mg}{\mu}$ (2) $\alpha > \frac{g}{\mu m}$

(3) $\alpha \geq \frac{g}{\mu}$ (4) $\alpha < \frac{g}{\mu}$

Q.2 The mass of a $^{7}_{3}Li$ nucleus is 0.042 u less than the sum of the masses of all its nucleons. The binding energy per nucleon of $^{7}_{3}Li$ nucleus is nearly –

(1) 46 MeV (2) 5.6 MeV
(3) 3.9 MeV (4) 23 MeV

Q.3 A circular disk of moment of inertia it is rotating in a horizontal plane, about its symmetry axis, with a constant angular speed ω_i. Another disk of moment of inertia I_b is dropped coaxially onto the rotating disk. Initially the second disk has zero angular speed. Eventually both the disks rotate with a constant angular speed ω_f. The energy lost by the initially rotating disc to friction is –

(1) $\frac{1}{2}\frac{I_b^2}{(I_t+I_b)}\omega_i^2$ (2) $\frac{1}{2}\frac{I_t^2}{(I_t+I_b)}\omega_i^2$

(3) $\frac{I_b-I_t}{(I_t+I_b)}\omega_i^2$ (4) $\frac{1}{2}\frac{I_bI_t}{(I_t+I_b)}\omega_i^2$

Q. 4 Which one of the following statement is FALSE ?

(1) Pure Si doped with trivalent impurities gives a p-type semiconductor
(2) Majority carriers in a n-type semiconductor are holes
(3) Minority carriers in a p-type semiconductor are electrons
(4) The resistance of intrinsic semiconductor decreases with increase of temperature

Q.5 The displacement of a particle along the x-axis is given by $x = a\sin^2\omega t$. The motion of the particle corresponds to –

(1) simple harmonic motion of frequency ω/π
(2) simple harmonic motion of frequency $3\omega/2\pi$
(3) non simple harmonic motion
(4) simple harmonic motion of frequency $\omega/2\pi$

Q.6 The radii of circular orbits of two satellite A and B of the earth, are 4R and R, respectively speed of satellite A is 3V, then the speed satellite B will be –

(1) 3V/4 (2) 6 V
(3) 12 V (4) 3 V/2

Q.7 A beam of cathode rays is subjected to crossed. Electric (E) and Magnetic fields (B). The fields are adjusted such that the beam is not deflected. The specific charge of the cathode rays is given by –

(1) $\frac{B^2}{2VE^2}$ (2) $\frac{2VB^2}{E^2}$

(3) $\frac{2VE^2}{B^2}$ (4) $\frac{E^2}{2VB^2}$

(where V is the potential difference between cathode and anode)

Q.8 A ball is droped from a high rise platform at t = 0 starting fro rest. After 6 seconds another ball is thrown downwards from the same platform with a speed v**.** The two balls meet at t = 18 s. What is the value of v ?
(take g = 10 m/s^2)

(1) 75 m/s (2) 55 m/s
(3) 40 m/s (4) 60 m/s

Q.9 A ray of light travelling in a transparent medium of refractive index μ, falls on a surface separating the medium from air at an angle of incidence of 45º. For which of the following value of μ the ray can undergo total internal reflection -

(1) μ = 1.33 (2) μ = 1.40
(3) μ = 1.50 (4) μ = 1.25

Q.10 The period of oscillation of a mass M suspended from a spring of negligible mass is T. If along with it another mass M is also suspended, the period of oscillation will now be

(1) T (2) T/ $\sqrt{2}$
(3) 2T (4) $\sqrt{2}$ T

Q.11 A cylindrical metallic rod in thermal contact with two reservoirs of heat at its two ends conducts an amount of heat Q in time t. The metallic rod is melted and the material is formed into a rod of half the radius of the original rod. What is the amount of heat conducted by the new rod, when placed in thermal contact with the two reservoirs in time t ?

(1) $\frac{Q}{4}$ (2) $\frac{Q}{16}$

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

Q.12 A ball moving with velocity 2m/s collides head on with another stationary ball of double the mass. If the coefficient of restitution is 0.5, the their velocities (in m/s) after collision will be –

(1) 0, 1 (2) 1, 1

(3) 1, 0.5 (4) 0, 2

Q.13 A transverse wave is represented by y = A sin (ωt – kx). For what value of the wavelength is the wave velocity equal to the maximum particle velocity –

(1) πA/2 (2) πA

(3) 2πA (4) A

Q.14 A particle has initial velocity $\left(3\hat{i}+4\hat{j}\right)$ and has acceleration $\left(0.4\hat{i}+0.3\hat{j}\right)$.Its speed after 10 s is –

(1) 7 units (2) 7 $\sqrt{2}$ units

(3) 8.5 units (4) 10 units

Q.15 An engine pumps water through a hose pipe. Water passes through the pipe and leaves it with a velocity of 2 /s. The mass per unit length of water in the pipe is 100 kg/m. What is the power of the engine –

(1) 400 W (2) 200 W

(3) 100 W (4) 800 W

Q.16 A thin ring of radius R meter has charge q coulomb uniformly spread on it. The ring rotates about its axis with a constant frequency of f revolutions/s. The value of magnetic induction in Wb/m^2 at the centre of the ring is –

(1) $\frac{\mu_0 qf}{2\pi R}$ (2) $\frac{\mu_0 q}{2\pi fR}$

(3) $\frac{\mu_0 q}{2fR}$ (4) $\frac{\mu_0 qf}{2R}$

Q.17 Which one of the following bonds produces a solid that reflects light in the visible region and whose electrical conductivity decreases with temperature and has high melting point ?

(1) metallic bonding

(2) vander Waal's bonding

(3) ionic bonding

(4) covalent bonding

Q.18 A particle moves a distance x in time t according to equation $x = (t + 5)^{-1}$. The acceleration of particle is proportional to –

(1) $(\text{velocity})^{3/2}$ (2) $(\text{distance})^2$

(3) $(\text{distance})^{-2}$ (4) $(\text{velocity})^{2/3}$

Q.19 A conducting circular loop is placed in a uniform magnetic field, B = .025 T with its plane perpendicular to the loop The radius of the loop is made to shrink at a constant rate of 1 mms^{-1}. The induced e.m.f. when the radius is 2 cm, is –

(1) 2 πμV (2) πμV

(3) $\frac{\pi}{2}$ μV (4) 2 μV

Q.20 The activity of a radioactive sample is measured as N_0 counts per minute at t = 0 and N_0/e counts per minute at t = 5 minutes. The time (in minutes) at which the activity reduces to half its value is –

(1) $\log_e 2/5$

(2) $\frac{5}{\log_e 2}$

(3) $5 \log_{10} 2$

(4) $5 \log_e 2$

Q.21 Two particles which are initially at rest, move towards each other under the action of their internal attraction. If their speeds are v and 2v at any instant, then the speed of centre of mass of the system will be –

(1) 2v (2) zero

(3) 1.5v (4) v

Q.22 A particle of mass M is situated at the center of a spherical shell of same mass and radius a. The gravitational potential at a point situated at $\frac{a}{2}$ distance from the centre, will be –

(1) $-\frac{3GM}{a}$ (2) $-\frac{2GM}{a}$

(3) $-\frac{GM}{a}$ (4) $-\frac{4GM}{a}$

Q.23 The device that can act as a complete electronic circuit is –

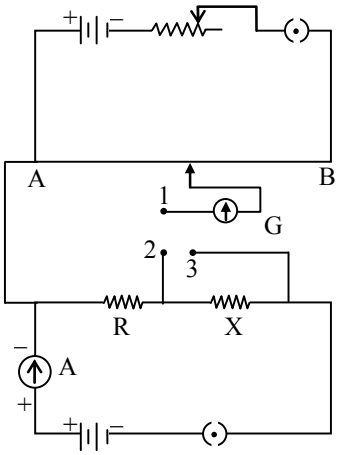
(1) Junction diode

(2) Integrated circuit

(3) Junction transistor

(4) Zener diode

Q.24 A potentiometer circuit is set up as shown. The potential gradient across the potentiometer wire, is k volt/cm and the ammeter, present in the circuit, reads 1.0 A when two way key is switched off. The balance points, when the key between the terminals (i) 1 and 2 (ii) 1 and 3, is plugged in, are found to be at lengths $\ell_1$cm and ℓ_2 cm respectively. The magnitudes, of the resistors R and X, in ohms, are then, equal respectively to –



(1) k $(\ell_2 - \ell_1)$ and kℓ_2

(2) kℓ_1 and k $(\ell_2 - \ell_1)$

(3) k $(\ell_2 - \ell_1)$ and kℓ_1

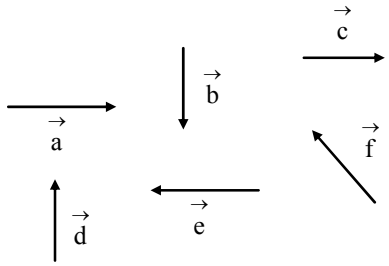
(4) kℓ_1 and kℓ_2

Q.25 A tuning fork of frequency 512 Hz makes 4 beats per second with the vibrating string of a string of a piano. The beat frequency decreases to 2 beats per second, when the tension in the piano string is slightly increased. The frequency of the piano string before increasing the tension was –

(1) 510 Hz (2) 514 Hz

(3) 516 Hz (4) 508 Hz

Q.26 Six vectors, $\vec{a}$ through $\vec{f}$ have the magnitudes and directions indicated in the figure. Which of the following statements is true?



(1) $\vec{b} + \vec{c} = \vec{f}$

(2) $\vec{d} + \vec{c} = \vec{f}$

(3) $\vec{d} + \vec{e} = \vec{f}$

(4) $\vec{b} + \vec{e} = \vec{f}$

Q.27 A galvanometer has a coil of resistance 100 Ω and gives a full scale deflection for 30 mA current. If it is to work as a voltmeter of 30 volt range, the resistance required to be added will be –

(1) 900 Ω (2) 1800 Ω

(3) 500 Ω (4) 1000 Ω

Q.28 A gramophone record is revolving with angular velocity ω. A coin is placed at a distance r from the centre of the record. The static coefficient of friction is μ. The coin will revolve with the record if –

(1) $r = \mu g\omega^2$ (2) $r < \frac{\omega^2}{\mu g}$

(3) $r \leq \frac{\mu g}{\omega^2}$ (4) $r \geq \frac{\mu g}{\omega^2}$

Q.29 Which of the following statement is false for the properties of electromagnetic waves ?

(1) both electric and magnetic field vectors attain the maxima and minima at the same place and same time

(2) The energy in electromagnetic wave is divided equally between electric and magnetic vectors

(3) Both electric and magnetic field vectors are parallel to each other and perpendicular to the direction of propagation of wave

(4) These waves do not require any material medium for propagation

Q.30 The energy of a hydrogen atom in the ground state is – 13.6 eV. The energy of He^+ ion in the first excited state will be –
(1) – 13.6 eV (2) – 27.2 eV
(3) – 54.4 eV (4) – 6.8 eV

Q.31 The dimension of $\frac{1}{2}\in_0 E^2$, where $\in_0$ is permittivity of free space and E is electric field, is –
(1) ML^2T^{-2} (2) $ML^{-1}T^{-2}$
(3) ML^2T^{-1} (4) MLT^{-1}

Q.32 In producing chlorine by electrolysis 100 kW power at 125 V is being consumed. How much chlorine per minute is liberated (E.C.E. of chlorine is 0.367×10^{-6} kg/C) –
(1) 1.76×10^{-3} kg
(2) 9.67×10^{-3} kg
(3) $17.6\ 1\times 10^{-3}$ kg
(4) 3.67×10^{-3} kg

Q.33 A man of 50 kg mass is standing in a gravity free space at a height of 10 m above the floor. He throws a stone of 0.5 kg mass downwards with a speed 2 m/s. When the stone reaches the floor, the distance of the man above the floor will be –
(1) 9.9 m (2) 10.1 m
(3) 10 m (4) 20 m

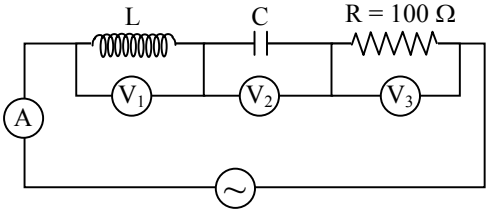
Q.34 An alpha nucleus of energy $\frac{1}{2}mv^2$ bombards a heavy nuclear target of charge Ze. Then the distance of closest approach for the alpha nucleus will be proportional to –
(1) $\frac{1}{Ze}$ (2) v^2
(3) $\frac{1}{m}$ (4) $\frac{1}{v^4}$

Q.35 A lens having focal length f and aperture of diameter d forms an image of intensity I. Aperture of diameter $\frac{d}{2}$ in central region of lens is covered by a black paper. Focal length of lens and intensity of image now will be respectively –
(1) f and $\frac{I}{4}$ (2) $\frac{3f}{4}$ and $\frac{I}{2}$
(3) f and $\frac{3I}{4}$ (4) $\frac{f}{4}$ and $\frac{I}{2}$

Q.36 If ΔU and ΔW represent the increase in internal energy and work done by the system respectively in a thermodynamical process, which of the following is true ?
(1) $\Delta U = -\Delta W$, in a adiabatic process
(2) $\Delta U = \Delta W$, in a isothermal process
(3) $\Delta U = \Delta W$, in a adiabatic process
(4) $\Delta U = -\Delta W$, in a isothermal process

Q.37 The total radiant energy per unit area, normal to the direction of incidence, received at a distance R from the centre of a star of radius r, whose outer surface radiates as a black body at a temperature TK is given by –
(1) $\sigma r^2T^4/R^2$
(2) $\sigma\ r^2T^4/4\pi r^2$
(3) $\sigma\ r^4T^4/r^4$
(4) $4\pi\ \sigma\ r^2T^4/R^2$
(Where σ is Stefan's Contant)

Q.38 In the given circuit the reading of voltmeter V_1 and V_2 are 300 volts each. The reading of the voltmeter V_3 and ammeter A are respectively –



220 V, 50 Hz
(1) 150 V, 2.2 A (2) 220 V, 2.2 A
(3) 220 V, 2.0 A (4) 100 V, 2.0 A

Q.39 A 220 volt input is supplied to a transformer. The output circuit draws a current of 2.0 ampere at 440 volts. If the efficiency of the transformer is 80%, the current drawn by the primary windings of the transformer is –
(1) 3.6 ampere (2) 2.8 ampere
(3) 2.5 ampere (4) 5.0 ampere

Q.40 A source S_1 is producing, 10^{15} photons per second of wavelength 5000 Å. Another source S_2 is producing 1.02×10^{15} photons per second of wavelength 5100 Å.
Then, (power of S_2)/(power of S_1) is equal to –
(1) 1.00 (2) 1.02
(3) 1.04 (4) 0.98

Q.41 A common emitter amplifier has a voltage gain of 50, an input impedance of 100 Ω and an output impedance of 200 Ω. The power gain of the amplifier is –
(1) 500 (2) 1000
(3) 1250 (4) 50

Q.42 A vibration magnetometer placed in magnetic meridian has a small bar magnet. The magnet executes oscillations with a time period of 2 sec in earth's horizontal magnetic field of 24 microtesla. When a horizontal field of 18 microtesla is produced opposite to the earth's field by placing a current carrying wire, the new time period of magnet will be –

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

Q.43 Two positive ions, each carrying a charge q, are separated by a distance d. If F is the force of repulsion between the ions, the number of electrons missing from each ion will be (e being the charge on an electron) –

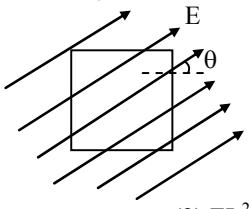
(1) $\frac{4\pi\varepsilon_0 Fd^2}{e^2}$ (2) $\sqrt{\frac{4\pi\varepsilon_0 Fe^2}{d^2}}$

(3) $\sqrt{\frac{4\pi\varepsilon_0 Fd^2}{e^2}}$ (4) $\frac{4\pi\varepsilon_0 Fd^2}{q^2}$

Q.44 The potential difference that must be applied to stop the fastest photo electrons emitted by a nickel surface, having work function 5.01 eV, when ultraviolet light of 200 nm falls on it, must be –

(1) 2.4 V (2) – 1.2 V
(3) – 2.4 V (4) 1.2 V

Q.45 A square surface of side L meter in the plane of the paper is placed in a uniform electric field E (volt/m) acting along the same plane at an angle θ with the horizontal side of the square as shown in figure. The electric flux linked to the surface, in units of volt-m, is –



(1) EL^2 (2) $EL^2 \cos\theta$
(3) $EL^2 \sin\theta$ (4) Zero

Q.46 A series combination of n_1 capacitors, each of value C_1, is charged by a source of potential difference 4V. When another parallel combination of n_2 capacitors, each of value C_2, is charged by a source of potential difference V, it is has the same (total) energy stored in it, as the first combination has. The value of C_2, in terms of C_1, is then –

(1) $\frac{2C_1}{n_1 n_2}$ (2) $16\,\frac{n_2}{n_1}\,C_1$

(3) $2\,\frac{n_2}{n_1}\,C_1$ (4) $\frac{16C_1}{n_1 n_2}$

Q.47 Electromagnets are made of soft iron because soft iron has –

(1) low retentivity and high coercive force
(2) high retentivity and high coercive force
(3) low retentivity and low coercive force
(4) high retentivity and low coercive force

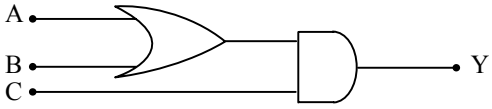
Q.48 A square current carrying loop is suspended in a uniform magnetic field acting in the plane of the loop. If the force on one arm of the loop is $\vec{F}$, the net force on the remaining three arms of the loop is –

(1) $3\vec{F}$ (2) $-\vec{F}$
(3) $-3\vec{F}$ (4) $\vec{F}$

Q.49 Consider the following two statements –
(A) Kirchhoff's junction law follows from the conservation of charge
(B) Kirchhoff's loop law follows from the conservation of energy
Which of the following is correct ?

(1) Both (A) and (B) are wrong
(2) (A) is correct and (B) is wrong
(3) (A) is wrong and (B) is correct
(4) Both (A) and (B) are correct

Q.50 To get an output Y = 1 from the circuit shown below, the input must be –



	A	B	C
(1)	0	1	0
(2)	0	0	1
(3)	1	0	1
(4)	1	0	0

Q.51 For the reaction $N_2O_5(g) \rightarrow 2NO_2(g) + \frac{1}{2}O_2(g)$ the value of rate of disappearance of N_2O_5 is given as 6.25×10^{-3} mol L^{-1} s^{-1}. The rate of formation of NO_2 and O_2 is given respectively as:

(1) 6.25×10^{-3} mol L^{-1} s^{-1} and
6.25×10^{-3} mol L^{-1} s^{-1}

(2) 1.25×10^{-2} mol L^{-1} s^{-1} and
3.125×10^{-3} mol L^{-1} s^{-1} and

(3) 6.25×10^{-3} mol L^{-1} s^{-1} and
3.125×10^{-3} mol L^{-1} s^{-1}

(4) 1.25×10^{-2} mol L^{-1} s^{-1} and
6.25×10^{-3} mol L^{-1} s^{-1}

Q.52 Liquid hydrocarbons can be converted to a mixture of gaseous hydrocarbons by
(1) Oxidation
(2) Cracking
(3) Distillation under reduced pressure
(4) Hydrolysis

Q.53 In which of the following pairs of molecules/ ions, the central atoms have sp^2 hybridization?
(1) NO_2^- and NH_3
(2) BF_3 and NO_2^-
(3) NH_2^- and H_2O
(4) BF_3 and NH_2^-

Q.54 Which one of the following does not exhibit the phenomenon of mutarotation?
(1) (+) Sucrose (2) (+) Lactose
(3) (+) Maltose (4) (–) Fructose

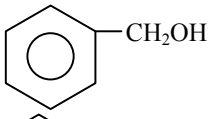
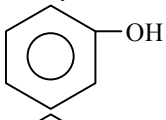
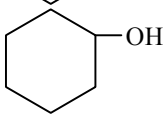
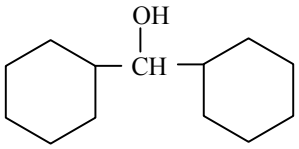
Q.55 Which one of the following species does not exist under normal conditions?
(1) Be_2^+ (2) Be_2
(3) B_2 (4) Li_2

Q.56 Which of the following complex ion is not expected to absorb visible light?
(1) $[Ni(CN)_4]^{2-}$
(2) $[Cr(NH_3)_6]^{3+}$
(3) $[Fe(H_2O)_6]^{2+}$
(4) $[Ni(H_2O)_6]^{2+}$

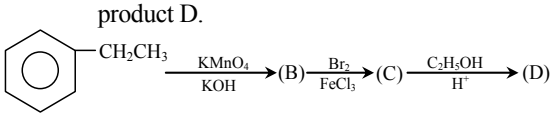
Q.57 Given are cyclohexanol (I), acetic acid (II) 2,4,6-trinitrophenol (III) and phenol (IV). In these the order of decreasing acidic character will be
(1) III > II > IV > I
(2) II > III > I > IV
(3) II > III > IV > I
(4) III > IV > II > I

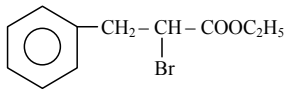
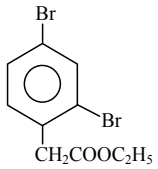
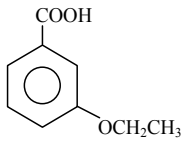
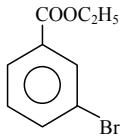
Q.58 If pH of a saturated solution of $Ba(OH)_2$ is 12, the value of its $K_{(SP)}$ is
(1) $4.00 \times 10^{-6}\ M^3$
(2) $4.00 \times 10^{-7}\ M^3$
(3) $5.00 \times 10^{-6}\ M^3$
(4) $5.00 \times 10^{-7}\ M^3$

Q.59 The reaction of toluene with Cl_2 in presence of $FeCl_3$ gives 'X' and reaction in presence of light gives 'Y'. Thus, 'X' and 'Y' are
(1) X = Benzal chloride,
Y = o-chlorotoluene
(2) X = m– chlorotoluene,
Y = p- chlorotoluene
(3) X = o-and p- chlorotoluene
Y = Trichloromethyl benzene
(4) X = Benzyl chloride,
Y = m- chlorotoluene

Q.60 Which one of the following compounds has the most acidic nature?
(1) 
(2) 
(3) 
(4) 

Q.61 In a set of reactions, ethyl benzene yielded a product D.

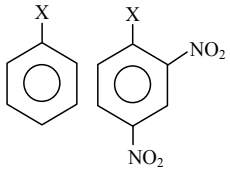


'D' would be :
(1) 
(2) 
(3) 
(4) 

Q.62 What is $[H^+]$ in mol/L of a solution that is 0.20 M in CH_3COONa and 0.10 M in CH_3COOH? K_a for $CH_3COOH = 1.8 \times 10^{-5}$.
(1) 3.5×10^{-4} (2) 1.1×10^{-5}
(3) 1.8×10^{-5} (4) 9.0×10^{-6}

Q.63 For an endothermic reaction, energy of activation is E_a and enthalpy of reaction is ΔH (both of these in kJ/mol). Minimum value of E_a will be:
(1) less than ΔH (2) equal to ΔH
(3) more than ΔH (4) equal to zero

Q.64 The correct order of increasing reactivity of C–X bond towards nucleophile in the following compounds is:



(I) (II) $(CH_3)_3C - X$ (III) $(CH_3)_2CH - X$ (IV)

(1) I < II < IV < III (2) II < III < I < IV
(3) IV < III < I < II (4) III < II < I < IV

Q.65 For the reduction of silver ions with copper metal, the standard cell potential was found to be + 0.46 V at 25°C. The value of standard Gibbs energy. $\Delta G°$ will be ($F = 96500\ C\ mol^{-1}$).
(1) –89.0 kJ (2) –89.0 J
(3) –44.5 kJ (4) –98.0 kJ

Q.66 In which of the following equilibrium K_c and K_p are not equal?

(1) $2NO_{(g)} \rightleftharpoons N_{2(g)} + O_{2(g)}$

(2) $SO_{2(g)} + NO_{2(g)} \rightleftharpoons SO_{3(g)} + NO_{(g)}$

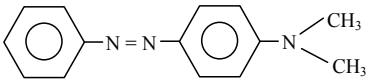
(3) $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$

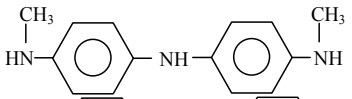
(4) $2C_{(s)} + O_{2(g)} \rightleftharpoons 2CO_{2(g)}$

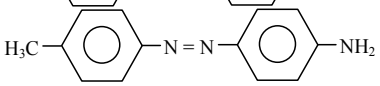
Q.67 Which of the following ions will exhibit colour in aqueous solutions?
(1) La^{3+} (z = 57) (2) Ti^{3+} (z = 22)
(3) Lu^{3+} (z = 71) (4) Sc^{3+} (z =21)

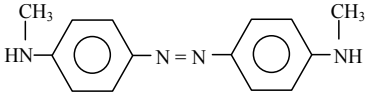
Q.68 Aniline in a set of the following reactions yielded a coloured product 'Y'.

The structure of 'Y' would be:

(1) 

(2) 

(3) 

(4) 

Q.69 Acetamide is treated with the following reagents separately. Which one of these would yield methyl amine?
(1) $NaOH - Br_2$ (2) Sodalime
(3) Hot conc. H_2SO_4 (4) PCl_5

Q.70 An aqueous solution is 1.00 molal in KI. Which change will cause the vapour pressure of the solution to increase?
(1) addition of NaCl
(2) addition of Na_2SO_4
(3) addition of 1.00 molal KI
(4) addition of water

Q.71 A solution of sucrose (molar mass = 342 g mol^{-1}) has been prepared by dissolving 68.5 g of sucrose in 1000 g of water. The freezing point of the solution obtained will be : (K_f for water = 1.86 K kg mol^{-1})
(1) –0.372°C (2) –0.520°C
(3) + 0.372°C (4) – 0.570°C

Q.72 Which of the following alkaline earth metal sulphates has hydration enthalpy higher than the lattice enthalpy?
(1) $CaSO_4$ (2) $BeSO_4$
(3) $BaSO_4$ (4) $SrSO_4$

Q.73 Which one of the following ions has electronic configuration [Ar] $3d^6$?
(1) Ni^{3+} (2) Mn^{3+}
(3) Fe^{3+} (4) Co^{3+}
(At. nos. Mn = 25, Fe = 26, Co = 27, Ni = 28)

Q.74 An increase in equivalent conductance of a strong electrolyte with dilution is mainly due to:
(1) increase in ionic mobility of ions
(2) 100% ionization of electrolyte at normal dilution
(3) increase in both i.e. number of ions and ionic mobility of ions
(4) increase in number of ions

Q.75 Crystal field stabilization energy for high spin d^4 octahedral complex is
(1) $-1.8\ \Delta_0$ (2) $-1.6\ \Delta_0 + P$
(3) $-1.2\ \Delta_0$ (4) $-0.6\ \Delta_0$

Q.76 Oxidation states of P in $H_4P_2O_5$, $H_4P_2O_6$, $H_4P_2O_7$, are respectively:
(1) +3, +5, + 4 (2) +5, +3, +4
(3) +5, +4, +3 (4) +3, +4, +5

Q.77 Which of the following statements about primary amines is 'False'?
(1) Alkyl amines are stronger bases than aryl amines
(2) Alkyl amines react with nitrous acid to produce alcohols
(3) Aryl amines react with nitrous acid to produce phenols
(4) Alkyl amines are stronger bases than ammonia

Q.78 The correct order of increasing bond angles in the following species is:
(1) $Cl_2O < ClO_2 < ClO_2^-$
(2) $ClO_2 < Cl_2O < ClO_2^-$
(3) $Cl_2O < ClO_2^- < ClO_2$
(4) $ClO_2^- < Cl_2O < ClO_2$

Q.79 Among the given compounds, the most susceptible to nucleophilic attack at the carbonyl group is :
(1) CH_3COOCH_3 (2) CH_3CONH_2
(3) $CH_3COOCOCH_3$ (4) CH_3COCl

Q.80 25.3 g of sodium carbonate, Na_2CO_3 is dissolved in enough water to make 250 mL of solution. If sodium carbonate dissociates completely, molar concentration of sodium ion, Na^+ and carbonate ions, CO_3^{2-} are respectively
(Molar mass of Na_2CO_3= 106 g mol^{-1})
(1) 0.955 M and 1.910 M
(2) 1.910 M and 0.955 M
(3) 1.90 M and 1.910 M
(4) 0.477 and 0.477 M

Q.81 In a buffer solution containing equal concentration of B^- and HB, the K_b for B^- is 10^{-10}. The pH of buffer solution is:
(1) 10 (2) 7 (3) 6 (4) 4

Q.82 The existence of two different coloured complexes with the composition of $[Co(NH_3)_4Cl_2]^+$ is due to
(1) linkage isomerism
(2) geometrical isomerism
(3) coordination isomerism
(4) ionization isomerism

Q.83 Property of the alkaline earth metals that increases with their atomic number:
(1) Solubility of their hydroxides in water
(2) Solubility of their sulphates in water
(3) Ionization energy
(4) Electronegativity

Q.84 During the kinetic study of the reaction, 2A + B → C + D, following results were obtained:

Run	[A]/mol L^{-1}	[B]/mol L^{-1}	Initial rate of formation of D/mol L^{-1} min^{-1}
I	0.1	0.1	6.0×10^{-3}
II	0.3	0.2	7.2×10^{-2}
III	0.3	0.4	2.88×10^{-1}
IV	0.4	0.1	2.40×10^{-2}

Based on the above data which one of the following is correct?
(1) rate = k $[A]^2$ [B]
(2) rate = k [A] [B]
(3) rate = k $[A]^2$ $[B]^2$
(4) rate = k [A] $[B]^2$

Q.85 Which of the following pairs has the same size?
(1) Fe^{2+}, Ni^{2+} (2) Zr^{4+}, Ti^{4+}
(3) Zr^{4+}, Hf^{4+} (4) Zn^{2+}, Hf^{4+}

Q.86 The correct order of the decreasing ionic radii among the following isoelectronic species is :
(1) $Ca^{2+} > K^+ > S^{2-} > Cl^-$
(2) $Cl^- > S^{2-} > Ca^{2+} > K^+$
(3) $S^{2-} > Cl^- > K^+ > Ca^{2+}$
(4) $K^+ > Ca^{2+} > Cl^- > S^{2-}$

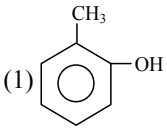
Q.87 In which one of the following species the central atom has the type of hybridization which is not the same as that present in the other three?
(1) SF_4 (2) I_3^-
(3) $SbCl_5^{2-}$ (4) PCl_5

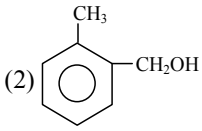
Q.88 Standard entropies of X_2, Y_2 and XY_3 are 60, 40 and 50 JK^{-1} mol^{-1} respectively. For the reaction $\frac{1}{2}X_2 + \frac{3}{2}Y_2 \rightleftharpoons XY_3$, $\Delta H = -30$ kJ to be at equilibrium, the temperature should be:
(1) 750 K (2) 1000 K
(3) 1250 K (4) 500 K

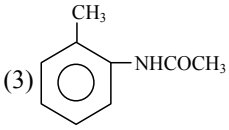
Q.89 Which of the following represents the correct order of increasing electron gain enthalpy with negative sign for the elements O, S, F and Cl?
(1) Cl < F < O < S
(2) O < S < F < Cl
(3) F < S < O < Cl
(4) S < O < Cl < F

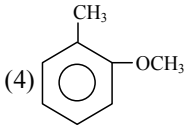
Q.90 Which one of the following compounds is a peroxide?
(1) KO_2 (2) BaO_2
(3) MnO_2 (4) NO_2

Q.91 Which one is most reactive towards electrophilic reagent?

(1) 

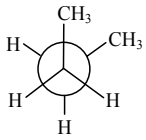
(2) 

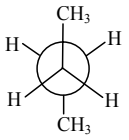
(3) 

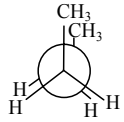
(4) 

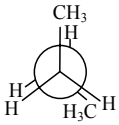
Q.92 Which one of the following is employed as a Tranquilizer drug?
(1) Promethazine (2) Valium
(3) Naproxen (4) Mifepristone

Q.93 In the following the most stable conformation of n-butane is:

(1) 

(2) 

(3) 

(4) 

Q.94 Which of the following reactions will not result in the formation of carbon-carbon bonds?
(1) Reimer-Tieman reaction
(2) Cannizaro reaction
(3) Wurtz reaction
(4) Friedel-Crafts acylation

Q.95 Which of the following structures represents Neoprene polymer?

(1) $\left(CH_2 - \underset{\displaystyle Cl}{\underset{|}{C}} = CH - CH_2\right)_n$

(2) $\left(CH_2 - \underset{\displaystyle CN}{\underset{|}{CH}}\right)_n$

(3) $\left(CH_2 - \underset{\displaystyle Cl}{\underset{|}{CH}}\right)_n$

(4) $\left(\underset{\displaystyle C_6H_5}{\underset{|}{CH}} - CH_2\right)_n$

Q.96 Which one is most reactive towards S_N1 reaction?
(1) $C_6H_5CH\,(C_6H_5)Br$
(2) $C_6H_5CH\,(CH_3)Br$
(3) $C_6H_5C(CH_3)\,(C_6H_5)\,Br$
(4) $C_6H_5CH_2Br$

Q.97 AB crystrallizes in a body centred cubic latticve with edge length 'a' equal to 387 pm. The distance between two oppositively charged ions in the lattice is:
(1) 335 pm (2) 250 pm
(3) 200 pm (4) 300 pm

Q.98 The number of atoms in 0.1 mol of a triatomic gas is : ($N_A = 6.02 \times 10^{23}$ mol^{-1})
(1) 6.026×10^{22} (2) 1.806×10^{23}
(3) 3.600×10^{23} (4) 1.800×10^{22}

Q.99 Which one of the following molecular hydrides acts as a Lewis acid?
(1) NH_3 (2) H_2O
(3) B_2H_6 (4) CH_4

Q.100 The tendency of BF_3, BCl_3 and BBr_3 to behave as Lewis acid decreases in the sequence:
(1) $BCl_3 > BF_3 > BBr_3$
(2) $BBr_3 > BCl_3 > BF_3$
(3) $BBr_3 > BF_3 > BCl_3$
(4) $BF_3 > BCl_3 > BBr_3$

Q.101 In vitro fertilization is a technique that involves transfer of which one of the following into the fallopian tube?
(1) Embryo only, upto 8 cell stage
(2) Either zygote or early embryo upto 8 cell stage
(3) Embryo of 32 cell stage
(4) Zygote only

Q.102 Which one of the following structures between two adjacent cells is an effective transport pathway?
(1) Plasmodesmata
(2) Plastoquinones
(3) Endoplasmic reticulum
(4) Plasmalemma

Q.103 Single-celled eukaryotes are included in:
(1) Protista (2) Fungi
(3) Archaea (4) Monera

Q.104 The genetically-modified (GM) brinjal in India has been developed for:
(1) Insect-resistance
(2) Enhancing shelf life
(3) Enhancing mineral content
(4) Drought-resistance

Q.105 In unilocular ovary with a single ovule the placentation is:
(1) Marginal (2) Basal
(3) Free Central (4) Axile

Q.106 An element playing important role in nitrogen fixation is:
(1) Molybdenum (2) Copper
(3) Manganese (4) Zinc

Q.107 Sertoli cells are found in :
(1) ovaries and secrete progesterone
(2) adrenal cortex and secrete adrenaline
(3) seminiferous tubules and provide nutrition to germ cells
(4) pancreas and secrete cholecystokinin

Q.108 Which one of the following cannot be explained on the basis of Mendel's Law of Dominance?
(1) The discrete unit controlling a particular character is called a factor
(2) Out of one pair of factors one is dominant, and the other recessive
(3) Alleles do not show any blending and both the characters recover as such in F_2 generation
(4) Factors occur in pairs

Q.109 Apomictic embryos in citrus arise from :
(1) Synergids
(2) Maternal sporophytic tissue in ovule
(3) Antipodal cells
(4) Diploid egg

Q.110 One example of animals having a single opening to the outside that serves both as mouth as well as anus is
(1) Octopus
(2) Asterias
(3) Ascidia
(4) Fasciola

Q.111 Select the correct statement from the ones given below :
(1) Barbiturates when given to criminals make them tell the truth
(2) Morphine is often given to persons who have undergone surgery as a pain killer
(3) Chewing tobacco lowers blood pressure and heart rate
(4) Cocaine is given to patients after surgery as it stimulates recovery

Q.112 Listed below are four respiratory capacities (a-d) and four jumbled respiratory volumes of a normal human adult:

	Respiratory capacities	**Respiratory volumes**
(a)	Residual volume	2500 mL.
(b)	Vital capacity	3500 mL
(c)	Inspiratory reserve volume	1200 mL
(d)	Inspiratory capacity	4500 mL

Which one of the following is the correct matching of two capacities and volumes?
(1) (b) 2500 mL, (c) 4500 mL
(2) (c) 1200 mL, (d) 2500 mL
(3) (d) 3500 mL, (a) 1200 mL
(4) (a) 4500 mL, (b) 3500 mL

Q.113 The chief water conducting elements of xylem in gymnosperms are :
(1) Vessels (2) Fibres
(3) Transfusion tissue (4) Tracheids

Q.114 Ringworm in humans is caused by :
(1) Bacteria (2) Fungi
(3) Nematodes (4) Viruses

Q.115 Which one of the following is not a micronutrient?
(1) Molybdenum (2) Magnesium
(3) Zinc (4) Boron

Q.116 Membrane-bound organelles are absent in:
(1) Saccharomyces
(2) Streptococcus
(3) Chalamydomonas
(4) Plasmodium

Q.117 Vasa efferentia are the ductules leading from:
(1) Testicular lobules to rete testis
(2) Rete testis to vas deferens
(3) Vas deferens to epididymis
(4) Epididymis to urethra

Q.118 Select the correct statement from the following:
(1) Biogas is produced by the activity of aerobic bacteria on animal waste
(2) Methanobacterium is an aerobic bacterium found in rumen of cattle
(3) Biogas, commonly called gobar gas, is pure methane
(4) Activated sludge-sediment in settlement tanks of sewage treatment plant is a rich source of aerobic bacteria

Q.119 Select the two correct statements out of the four (a-d) given below about lac operon.
(a) Glucose or galactose may bind with the repressor and inactivate it
(b) In the absence of lactose the repressor binds with the operator region
(c) The z-gene codes for permease
(d) This was elucidated by Francois Jacob and Jacque Monod
The correct statements are :
(1) (b) and (c) (2) (a) and (c)
(3) (b) and (d) (4) (a) and (b)

Q.120 Keel is characteristic of the flowers of:
(1) Gulmohur (2) Cassia
(3) Calotropis (4) Bean

Q.121 The kind of epithelium which forms the inner walls of blood vessels is:
(1) cuboidal epithelium
(2) columnar epithelium
(3) ciliated columnar epithelium
(4) squamous epithelium

Q.122 Which one of the following has its own DNA?
(1) Mitochondria
(2) Dictyosome
(3) Lysosome
(4) Peroxisome

Q.123 Transfer of pollen grains from the anther to the stigma of another flower of the same plant is called :
(1) Xenogamy
(2) Geitonogamy
(3) Karyogamy
(4) Autogamy

Q.124 The genotype of a plant showing the dominant phenotype can be determined by –
(1) Test cross
(2) Dihybrid cross
(3) Pedigree analysis
(4) Back cross

Q.125 PGA as the first CO_2 fixation product was discovered in photosynthesis of –
(1) Bryophyte
(2) Gymnosperm
(3) Angiosperm
(4) Algae

Q.126 Study the four statements (a–d) given below and select the two correct ones out of them –
(a) A lion eating a deer and a sparrow feeding on grain are ecologically similar in being consumers
(b) Predator star fish Pisaster helps in maintaining species diversity of some invertebrates
(c) Predators ultimately lead to the extinction of prey species
(d) Production of chemicals such as nicotine, strychnine by the plants are metaboilic disorders
The two correct stament are-
(1) a and d (2) a and b
(3) b and c (4) c and d

Q.127 Seminal plasma in human males is rich in –
(1) fructose and calcium
(2) glucose and calcium
(3) DNA and testosterone
(4) ribose and potassium

Q.128 ABO blood groups in humans are controlled by the gene I. It has three alleles – I^A, I^B and i. Since there are three different alleles, six different genotypes are possible. How many phenotypes can occur –
(1) Three (2) One
(3) Four (4) Two

Q.129 Breeding of crops with high levels of minerals, vitamins and proteins is called –
(1) Somatic hybridisation
(2) Biofortification
(3) Biomagnification
(4) Micorpropagation

Q.130 A common biocontrol agent for the control of plant diseases is –
(1) Baculovirus (2) Bacillus thuringiensis
(3) Glomus (4) Trichoderma

Q.131 Widal test is used for the diagnosis of –
(1) Malaria (2) Pneumonia
(3) Tuberculosis (4) Typhoid

Q.132 Injury to adrenal cortex is not likely to affect the secretion of which one of the following ?
(1) Aldosterone
(2) Both Androstenedione and Dehydroepiandrosterone
(3) Adrenaline
(4) Cortisol

Q.133 Low Ca^{++} in the body fluid may be the cause of
(1) Tetany
(2) Anaemia
(3) Angina pectoris
(4) Gout

Q.134 Which one of the following pairs is incorrectly matched –
(1) Glucagon – Beta cells (source)
(2) Somatostatin – Delta cells (source)
(3) Corpus luteum – Relaxin (secretion)
(4) Insuling – Diabetes mellitus (disease)

Q.135 Select the correct statement from the ones given below with respect to dihybrid cross –
(1) Tightly linked genes on the same chromosome show higher recombinations
(2) Genes far apart on the same chromosome show very few recombinations
(3) Genes loosely linked on the same chromosome show similar recombinations as the tightly linked ones
(4) Tightly linked genes on the same chromosome show very few recombination

Q.136 Which one of the following statements regards to the excretion by the human kidneys is correct –
(1) Descending limb of Loop of Henly is impermeable to water
(2) Distal convoluted tubule is incapable in reabsorbing HCO_3
(3) nearly 99 percent of the glomerular filtrate is reabsorbed by the renal tube
(4) Ascending limb of Loop of Henly is impermeable to electrolytes

Q.137 The nerve centres which control the body temperature and the urge for eating are contained in –
(1) Hypothalamus (2) Pons
(3) Cerebellum (4) Thalamus

Q.138 The biomass available for consumption by the herbivores and the decomposers is called –
(1) Net primary productivity
(2) Secondary productivity
(3) Standing crop
(4) Gross primary productivity

Q.139 If due to some injury the chordae tendinae of the tricuspid value of the human heart is partially non-functional, what will be the immediate effect –
(1) The flow of blood into the arota will be slowed down
(2) The pacemaker will stop working
(3) The blood will tend to flow back into the left atrium
(4) The flow of blood into the pulmonary artery will be reduced

Q.140 Ovary is half-inferior in the flowers of –
(1) Guava (2) Plum
(3) Brinjal (4) Cucumber

Q.141 which one of the following is used as vector for cloning genes into higher organisms?
(1) Baculovirus
(2) Salmonella typhimurium
(3) Rhizopus nigricans
(4) Retrovirus

Q.142 The one aspect which is not a salient feature of genetic code, is its being –
(1) Degenerate
(2) Ambiguous
(3) Universal
(4) Specific

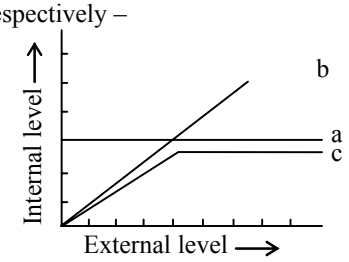
Q.143 Which one of the following is an example of ex-situ conservation ?
(1) Wild life sanctuary
(2) Seed bank
(3) Sacred groves
(4) National park

Q.144 Which one of the following palindromic base sequences in DNA can be easily cut at about the middle by some particular restriction enzyme?
(1) 5' _____ CG TTCG _____ 3'
3' _____ATGGTA _____5'
(2) 5'_____GATATG _____3'
3'_____CTACTA _____5'
(3) 5'_____GAATTC _____3'
3'_____CTTAAG_____5'
(4) 5'_____CACGTA_____3'
3'_____CTCAGT_____5'

Q.145 Which one of the following statements is correct with respect to AIDS ?
(1) The HIV can be transmitted through eating food together with an infected person
(2) Drug addicts are least susceptible to HIV infection
(3) AIDS patients are being fully cured cent per cent with proper care and nutrition
(4) The causative HIV retrovirus enters helper T-lymphocytes thus reducing their numbers

Q.146 Phototropic curvature is the result of uneven distribution of –
(1) Gibberellin
(2) Phytochrome
(3) Cytokinins
(4) Auxin

Q.147 The figure given below is a diagrammatic representation of response of organisms to abiotic factors. What do a, b and c represent respectively –



	(a)	(b)	(c)
(1)	conformer	regulator	partial regulator
(2)	regulator	partial regulator	conformer
(3)	partial regulator	regulator	conformer
(4)	regulator	conformer	partial Regulator

Q.148 Male and female gametophytes are independent and free-living in –
(1) Mustard
(2) Castor
(3) Pinus
(4) sphagnum

Q.149 The technical term used for the androecium in a flower of China rose (Hibiscus rosasinensis) is
(1) Monoadelphous
(2) Diadelphous
(3) Polyandrous
(4) Polyadelphous

Q.150 Virus envelope is known as –
(1) Capsid
(2) Virion
(3) Nucleoprotein
(4) Core

Q.151 The permissible use of the technique aminocentesis is for –
(1) detecting sex of the unborn foetus
(2) artificial insemination
(3) transfer of embryo into the uterus of a surrogate mother
(4) Detecting any genetic abnormality

Q.152 During mitosis ER and nucleolus begin to disappear at –
(1) Late prophase
(2) Early metaphase
(3) Late metaphase
(4) Early prophase

Q.153 One of the free-living anaerobic nitrogen-fixer is
(1) Beijernickia
(2) Rhodospirillum
(3) Rhizobium
(4) Azotobacter

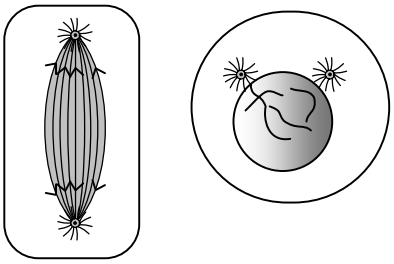
Q.154 DNA or RNA segment tagged with a radioactive moleculer is called –
(1) Vector
(2) Probe
(3) Clone
(4) Plasmid

Q.155 Darwin's finches are a good example of –
(1) Industrial melanism
(2) Connecting link
(3) Adaptive radiation
(4) Convergent evolution

Q.156 The signals for parturition orginate from –
(1) placenta only
(2) placenta as well as fully developed foetus
(3) oxytocin released from maternal pituitary
(4) fully developed foetus only

Q.157 What is true about RBCs in humans ?
(1) They carry about 20-25 per cent of CO_2
(2) They transport 99.5 per cent of O_2
(3) They transport about 80 per cent oxygen only and the rest 20 per cent of its transported in dissolved state in blood plasma
(4) They do not carry CO_2 at all

Q.158 Which stages of cell division do the following figures A and B represent respectively ?



(1) Metaphase - Telophase
(2) Telophase - Metaphase
(3) Late Anaphase - Prophase
(4) Prophase - Anaphase

Q.159 The main arena of variuos types of activites of a cell is –
(1) Plasma membrane
(2) Mitochondrian
(3) Cytoplasm
(4) Nucleus

Q.160 The common nitrogen-fixer in paddy fields is –
(1) Rhizobium (2) Azospirillum
(3) Oscillatoria (4) Frankia

Q.161 The principal nitrogenous excretory compound in humans is synthesised –
(1) in kidneys but eliminated mostly through liver
(2) in kidneys as well as eliminated by kidneys
(3) in liver and also eliminated by the same through bile
(4) in the liver, but eliminated mostly through kidneys

Q.162 Carrier ions like Na^+ facilitate the absorption of substances like –
(1) amino acids and glucose
(2) glucose and fatty acids
(3) fatty acids and glycerol
(4) fructose and some amino acids

Q.163 Which one of the following symbols and its representation, used in human pedigree analysis is correct –
(1) □—○ = meting between relatives
(2) ○ = unaffected male
(3) □ = unaffected female
(4) ◆ = male affected

Q.164 Which two of the following changes (a – d) usualy tend to occur in the plain dvellers when they move to high altitudes (3,500 m or more) ?
(a) Increase in red blood cell size
(b) Increase in red blood cell production
(c) Increased breathing rate
(d) Incrase in thrombocyte count
Changes occurring are –
(1) (b) and (c)
(2) (c) and (d)
(3) (a) and (d)
(4) (a) and (b)

Q.165 Toxic agents present in food which interfere with thyroxine synthesis lead to the development of –
(1) toxic goitre
(2) cretinism
(3) simple goitre
(4) thyrotoxicosis

Q.166 If for some reason our goblet cells are non-functional, this will adversely affect –
(1) production of somatostatin
(2) secretion of sebum from the sebaceous glands
(3) maturation of sperms
(4) smooth movement of food down the intestine

Q.167 The plasma membrane consists mainly of –
(1) phospholipids embedded in a protein bilayer
(2) proteins embedded in a phospholipid bilayer
(3) proteins embedded in a polymer of glucose molecules
(4) proteins embedded in a carbohydrate bilayer

Q.168 Which one of the following statements about all the four of Spongilla, Leech, Dolphin and Penguin is correct –
(1) Penguin is homoiothermic while the remaining three are poikilothermic
(2) Leech is fresh water form while all others are marine
(3) Spongilla has special collared cells called choanocytes, not found in the remaining three
(4) All are bilaterally symmetrical

Q.169 The first movements of the foetus and appearance of hair on its head are usually observed during which month of pregnancy?
(1) Fourth month (2) Fifth month
(3) Sixth month (4) Third month

Q.170 The scutellum observed in a grain of wheat or maize is comparable to which part of the seed in other monocotyledons?
(1) Cotyledon
(2) Endosperm
(3) Aleurone layer
(4) Plumule

Q.171 Which one of the following kinds of animals are triploblastic?
(1) Flat worms (2) Sponges
(3) Ctenophores (4) Corals

Q.172 Which one of the following statements about certain given animals is correct –
(1) Round worms (Aschelminthes) are pseudocoelomates
(2) Molluces are acoelomates
(3) Insects are pseudocoelomates
(4) Flat worms (Platyhelminthes) are coelomates

Q.173 Cu ions released from copper-releasing Intra Uterine Devices (IUDs) –
(1) make uterus unsuitable for implantation
(2) increase phagocytosis of sperms
(3) suppress sperm motility
(4) prevent ovulation

Q.174 The energy-releasing metabolic process in which substrate is oxidised without an external electron acceptor is called –
(1) Glycolysis
(2) Fermentation
(3) Aerobic respiration
(4) Photorespiration

Q.175 Restriction endonucleases are enzymes which –
(1) make cuts at specific positions within the DNA molecule
(2) recognize a specific nucleotide sequence for binding of DNA ligase
(3) restrict the action of the enzyme DNA polymerase
(4) remove nucleotides from the ends of the DNA molecule

Q.176 Which one of the folliwng is not a lateral meristem ?
(1) Intrafascicular cambium
(2) Interfascicular cambium
(3) Phellogen
(4) Intercalary meristem

Q.177 A renewable exhaustible natural resource is –
(1) Coal
(2) Petroleum
(3) Minerals
(4) Forest

Q.178 Photoperiodism was first characterised in –
(1) Tobacco (2) Potato
(3) Tomato (4) Cotton

Q.179 C_4 plants are more efficient in photosynthesis than C_3 plants due to –
(1) Higher leaf area
(2) Presence of large number of chloroplasts in the leaf cells
(3) Presence of thin cuticle
(4) Lower rate of photorespiration

Q.180 Alage have cell wall made up of –
(1) Cellulose, galactans and mannans
(2) Hemicellulose, pectins and proteins
(3) Pectins, cellulose and proteins
(4) Cellulose, hemicellulose and pectins

Q.181 Some hyperthermophilic organisms that grow in highly acidic (pH2) habitats belong to the two groups –
(1) Eubacteria and archea
(2) Cyanobacteria and diatoms
(3) Protists and mosses
(4) Liverworts and yeasts

Q.182 Genetic engineering has been successfully used for producing –
(1) transgenic mice for testing safety of polio vaccine before use in humans
(2) transgenic models for studying new treatments for certain cardiac disease
(3) transgenic Cow-Rosie which produces high fat milk for making ghee
(4) Animals like bulls for farm work as they have super power

Q.183 Some of the characteristics of Bt cotton are –
(1) Long fibre and resistance to aphids
(2) Medium yield, long fibre and resistance to beetle pests
(3) High yield and production of toxic protein crystals which kill dipteran pests
(4) High yield and resistance to bollworms

Q.184 Heartwood differs from sapwood in –
(1) Presence of rays and fibres
(2) Abscence of vessels and parenchyma
(3) Having dead and non-conducting elements
(4) Being susceptible to pests and pathogens

Q.185 Satellite DNA is useful tool in –
(1) Organ transplantation
(2) Sex determination
(3) Forensic science
(4) Genetic engineering

Q.186 The second maturation division of the mammalian ovum occurs –
(1) Shortly after ovulation before the ovum makes entry into the Fallopian tube
(2) Until after the ovum has been penetrated by a sperm
(3) Until the nucleus of the sperm has fused with that of the ovum
(4) in the Grafian follicle following the first maturation division

Q.187 Which one of the following does not follow the central dogma of molecular biology ?
(1) Pea (2) Mucor
(3) Chlamydomonas (4) HIV

Q.188 Which one of the following statements about human sperm is correct –
(1) Acrosome has a conical pointed structure used for piercing and penetrating the egg, resulting in fertilisation
(2) The sperm lysins in the acrosome dissolve th egg envelope facilitating fertilisation
(3) Acrosome serves as a sensory structure leading the sperm towards the ovum
(4) Acrosome serves no particular function

Q.189 Consider the following four statements (a–d) regarding kidney transplant and select the two correct ones out of these –
(a) Even if a kidney transplant is proper the recipient may need to take immunosuppresants for a long time
(b) The cell-mediated immune response is responsible for the graft rejection
(c) The B-lymphocytes are responsible for rejection of the graft
(d) The acceptance or rejection of a kidney transplant depends on specific interferons
The two correct statements are –
(1) (b) and (c) (2) (c) and (d)
(3) (a) and (c) (4) (a) and (b)

Q.190 Wind pollinated flowers are –
(1) small, brightly coloured, producing large number of pollen grains
(2) small, proudcing large number of dry pollen grains
(3) large producing abundant nectar and pollen
(4) small, producing nectar and dry pollen

Q.191 dB is a standard abbreviation used of the quantitative expression of –
(1) the density of bacteria in a medium
(2) a particular pollutant
(3) the dominant Bacillus in a culture
(4) a certain pesticide

Q.192 Which one of the following is one of the characteristics of a biological community?
(1) Stratification
(2) Natality
(3) Mortality
(4) Sex-ratio

Q.193 Which one of the following statements about morula in humans is correct –
(1) It has almost equal quantity of cytoplasm as an uncleaved zygote but much more DNA
(2) It has far less cytoplasm as well as less DNA than in an uncleaved zygote
(3) It has more or less equal quantity of cytoplasm and DNA as in uncleaved zygote
(4) It has more cytoplasm and more DNA than an uncleaved zygote

Q.194 Coiling of garden pea tendrils around any support is an example of –
(1) Thigmotaxis
(2) Thigmonasty
(3) Thigmotropism
(4) Thermotaxis

Q.195 The two gases making highest relative contribution to the green house gases are –
(1) CO_2 and CH_4
(2) CH_4 and N_2O
(3) CFC_5 and N_2O
(4) CO_2 and N_2O

Q.196 Which one of the following not used in organic farming?
(1) Glomus (2) Earthworm
(3) Oscillatoria (4) Snail

Q.197 Stirred-tank bioreactors have been designed for –
(1) Addition of preservatives to the product
(2) Purification of the product
(3) Ensuring anaerobic conditions in the culture vessel
(4) Availability of oxygen throughout the process

Q.198 The part of Fallopian tube closest to the voary is
(1) Isthmus (2) Infundibulum
(3) Cervix (4) Ampulla

Q.199 An improved variety of transgenic basmati rice
(1) Does not require chemical fertilizers and growth hormones
(2) gives high yield and is rich in vitamin A
(3) is completely resistant to all insect pests and disease of paddy
(4) gives high yield but has no characteristic atoms

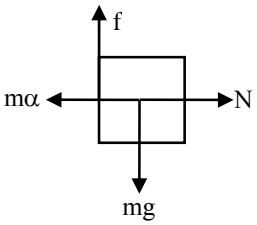
Q.200 Infectious proteins are present in –
(1) Gemini viruses
(2) Prions
(3) Viroids
(4) Satellite viruses

ANSWER KEY (AIPMT-2010)

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

HINTS & SOLUTIONS

Sol.1



Here f = mg and N = mα but $f \le \mu N$

So $mg \le \mu m\alpha \Rightarrow \alpha \ge \frac{g}{\mu}$

Sol.2 $\frac{BE}{\text{nucleon}} = \frac{0.042 \times 931}{7} = 5.6 \text{ MeV}$

Sol.3 By conservation of angular momentum

$I_t\omega_i = (I_t + I_b)\omega_f \Rightarrow \omega_f = \left(\frac{I_t}{I_t + I_b}\right)\omega_i$

loss in kinetic energy $= \frac{1}{2} I_t \omega_i^2 - \frac{1}{2}(I_t + I_b)(\omega_f^2)$

$= \frac{1}{2}\left(\frac{I_b I_t}{I_b + I_t}\right)\omega_i^2$

Sol.4 Electric and magnetic field vectors are perpendicular to each other in electromagnetic wave.

Sol.5 $x = a\sin^2\omega t = \frac{a}{2}(1 - \cos^2\omega t)$

Sol.6 Speed of satellite $V = \sqrt{\frac{GM}{r}}$

$\Rightarrow \frac{V_B}{V_A} = \sqrt{\frac{r_A}{r_B}} = \sqrt{\frac{4R}{R}} = 2$

$\Rightarrow V_B = (3V)(2) = 6V$

Sol.7 $qvB = qE \Rightarrow v = \frac{E}{B}$

but $\frac{1}{2}mv^2 = qV$ so $\frac{q}{m} = \frac{v^2}{2V} = \frac{E^2}{2VB^2}$

Sol.8 Let two balls meet at depth h from platform

So $h = \frac{1}{2}g(18)^2 = v(12) + \frac{1}{2}g(12)^2$

$\Rightarrow v = 75 \text{ ms}^{-1}$

Sol.9 For TIR $45 \ge \theta_C \Rightarrow \sin 45 \ge \sin\theta_C$

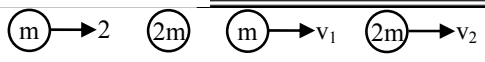
$\Rightarrow \frac{1}{\sqrt{2}} \ge \frac{1}{\mu} \Rightarrow \mu \ge \sqrt{2}$

Sol.10 $T = 2\pi\sqrt{\frac{M}{k}}$, $T' = 2\pi\sqrt{\frac{2M}{k}} = \sqrt{2}T$

Sol.11 $\frac{Q}{t} = \frac{kA(T_1 - T_2)}{\ell}$

$\frac{Q'}{t} = \frac{k\left(\frac{A}{4}\right)(T_1 - T_2)}{4\ell} = \frac{1}{16}\frac{kA(T_1 - T_2)}{\ell}$

$\Rightarrow Q' = \frac{Q}{16}$

Sol.12 

Initial condition Final condition

By conservation of linear momentum :

$2m = mv_1 + 2mv_2 \quad \Rightarrow v_1 + 2v_2 = 2$

by definition of e : $e = \frac{1}{2} = \frac{v_2 - v_1}{2-0}$

$\Rightarrow v_2 - v_1 = 1 \quad \Rightarrow v_1 = 0$ and $v_2 = 1 ms^{-1}$

Sol.13 Wave velocity $= n\lambda = \omega A$

$\Rightarrow \lambda = \frac{\omega A}{n} = \frac{\omega A}{\frac{\omega}{2\pi}} = 2\pi A$

Sol.14 $\vec{v} = \vec{u} + \vec{a}t = (3\hat{i} + 4\hat{j}) + (0.4\hat{i} + 0.3\hat{j})(10)$

$= 7\hat{i} + 7\hat{j}$

So speed $= |\vec{v}| = 7\sqrt{2}\ ms^{-1}$

Sol.15 Power $= Fv = v\left(\frac{m}{t}\right)v = v^2(\rho Av)$

$= \rho Av^3 = (100)(2)^3 = 800$ W

Sol.16 $B = \frac{\mu_0 I}{2R} = \frac{\mu_0}{2R}\left(\frac{q}{t}\right) = \frac{\mu_0 qf}{2R}$

Sol.18 $x = \frac{1}{t+5} \quad \Rightarrow v = \frac{dx}{dt} = -\frac{1}{(t+5)^2}$

Acceleration, $a = \frac{dv}{dt} = \frac{2}{(t+5)^3}$

$\Rightarrow$ a $\propto$ (velocity)$^{3/2}$

Sol.19 $\phi = (B)(\pi r^2) \Rightarrow e = \frac{d\phi}{dt} = (B)(2\pi r)\left(\frac{dr}{dt}\right)$

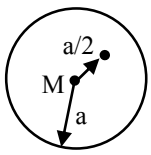
$= (0.025)(2\pi)(2 \times 10^{-2})(10^{-3}) = \pi\mu V$

Sol.20 $N = N_0 e^{-\lambda t} \Rightarrow \frac{N_0}{e} = N_0 e^{-\lambda(5)} \Rightarrow \lambda = \frac{1}{5}$

Now $\frac{N_0}{2} = N_0 e^{-\lambda(t)} \Rightarrow t = \frac{1}{\lambda}\ell n2 = 5\ell n2$

Sol.21 Net external force on system is zero.

So $\vec{v}_{cm}$ = zero

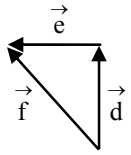
Sol.22 

$V_P = -\frac{GM}{a/2} - \frac{GM}{a} = -\frac{3GM}{a}$

Sol.24 $R = k\ell_1$ and $R + X = k\ell_2$

Sol.25 The frequency of the piano string may be 508 or 516 Hz.

As frequency $\propto \sqrt{\text{Tension}}$ so answer will be 508 Hz.

Sol.26 

$\Rightarrow \vec{f} = \vec{d} + \vec{e}$

Sol.27 Let required resistance be R then

$(R + R_g)I_g = V \Rightarrow (R + 100)(30 \times 10^{-3}) = 30$

$\Rightarrow R = 900\Omega$

Sol.28 Here friction force provides centripetal force so

$f = m\omega^2 r$ but $f \le \mu mg$

So $m\omega^2 r \le \mu mg \Rightarrow r \le \frac{\mu g}{\omega^2}$

Sol.30 $E_n = -13.6\left(\frac{Z^2}{n^2}\right) = (-13.6)\left(\frac{4}{4}\right) = -13.6$ eV

Sol.31 $\left[\frac{1}{2}\epsilon_0 E^2\right] =$ [Energy Density]

$= \frac{ML^2T^{-2}}{L^3} = ML^{-1}T^{-2}$

Sol.32 $m = ZIt = Z\left(\frac{P}{V}\right)t$

$= (0.367 \times 10^{-6})\left(\frac{100 \times 10^3}{125}\right)(60)$

$= 17.61 \times 10^{-3}$ kg

Sol.33 Let distance of man from the floor be (10 + x)m. As centre of mass of system remains at 10m above the floor.

So $50(x) = 0.5(10) \Rightarrow x = 0.1$ m

$\Rightarrow$ distance of the man above the floor = 10 + 0.1

= 10.1m

Sol.34 $\frac{1}{2}mv^2 = \frac{(Ze)(2e)}{4\pi\epsilon_0 d_{min}}$ then $d_{min.} \propto \frac{1}{m}$

Sol.35 f' = f & Intensity $\propto$ Area so $I' = I - \frac{I}{4} = \frac{3I}{4}$

Sol.36 $\Delta Q = \Delta U + \Delta W$ In adiabatic process $\Delta Q = 0$

Sol.37 Total radiant energy per unit area

$= \frac{\sigma(4\pi r^2)T^4}{4\pi R^2} = \frac{\sigma r^2 T^4}{R^2}$

Sol.38 $V_3 = 220$ volt, $I = \frac{220}{100} = 2.2A$

Sol.39 $\eta = \frac{V_S I_S}{V_P I_P} = 0.8 \Rightarrow I_P = \frac{(440)(20)}{(0.8)(200)} = 5A$

Sol.40 $\frac{\text{Power of } S_2}{\text{Power of } S_1} = \frac{n_2\left(\frac{hc}{\lambda_2}\right)}{n_1\left(\frac{hc}{\lambda_1}\right)} = \frac{n_2\lambda_1}{n_1\lambda_2} = 1$

Sol.41 Voltage gain $= \beta\left(\frac{R_{out}}{R_{in}}\right)$

$\Rightarrow \beta = \frac{50\times100}{200} = 25$

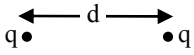
Power gain = β(Voltage gain)

$= (25)(50) = 1250$

Sol.42 $T = 2\pi\sqrt{\frac{I}{MB_H}}$, $T' = 2\pi\sqrt{\frac{I}{M(B_H - B)}}$

$\Rightarrow T' = 2T = 4s$

Sol.43



$F = \frac{(ne)^2}{4\pi\in_0 d^2} \Rightarrow n = \sqrt{\frac{4\pi\in_0 Fd^2}{e^2}}$

Sol.44 $h\nu = \phi_0 + eV_0$ where $h\nu = \frac{12400}{2000} = 6.2$ eV

$\Rightarrow V_0 = 6.2 - 5.01 = 1.19 \approx 1.20$ V

Sol.45 Here $\vec{E} \perp$ Area Vector

Sol.46 $\frac{1}{2}\left(\frac{C_1}{n_1}\right)(4V)^2 = \frac{1}{2}(n_2C_2) \Rightarrow C_2 = \frac{16C_1}{n_1n_2}$

Sol.48 Net force on loop is zero.

Sol.50 Y = (A + B).C

Sol.51 Given $-\frac{-d[N_2O_5]}{dt} = 6.25 \times 10^{-3}$ mol L^{-1} s^{-1}

For the reaction

$N_2O_5 \rightarrow 2NO_2 + \frac{1}{2}O_2$

$\frac{-d[N_2O_5]}{dt} = \frac{1}{2}\frac{d[NO_2]}{dt} = \frac{2d[O_2]}{dt}$

$\therefore \frac{d[NO_2]}{dt} = -\frac{2d[N_2O_5]}{dt} = 1.25\times10^{-2}$mol L^{-1} s^{-1}

$\therefore \frac{d[O_2]}{dt} = -\frac{1}{2}\frac{d[N_2O_5]}{dt}$

$= 3.125 \quad 10^{-3}$ mol L^{-1} s^{-1}

Sol.58 At 25 C pH + pOH = 14

$\therefore$ pOH = 2

$\therefore$ $[OH] = 10^{-2}$ M

Now Let solulity of $Ba(OH)_2$ be S

$Ba(OH)_2 \rightarrow Ba^{+2} + 2OH^{-2}$

S S 2S

$[OH^-] = 2s = 10^{-2}$

[Solubility of $Ba(OH)_2$] $S = \frac{10^{-2}}{2} = 5\times10^{-3}$ mol/L

Now Ksp for $Ba(OH)_2 = 4s^3$

$= 4 \times (5 \times 10^{-3})^3 = 5 \times 10^{-7}$ M^3

Sol.62 For acidic buffer solution

$[H^+] = \frac{Ka[CH_3COOH]}{[CH_3COO^-]}$

$= \frac{1.8\times10^{-5}\times0.10}{0.20} = 9 \times 10^{-6}$ M

Sol.65 $2Ag^+ + Cu \rightarrow 2Ag + Cu^{2+}$

n = 2

$\Delta G = -nFE_{cell}$

$\Delta G = -2 \times 96500 \times 0.46$ Joul

$\Delta G = -88.78$ kJ $\simeq -89$ kJ

Sol.70 According to raoults law

$P_s = PX_A$ (X_A = mole fraction of solvent)

and on addition of water the mole fraction of water in the solution increases therefore vapour pressure increases.

Sol.80 Molarity (M) $= \frac{wt}{mol.wt.}\ \frac{1000}{vol(ml)}$

$= \frac{25.3}{106} \times \frac{1000}{250}$

= .955 mol/L of Na_2CO_3

and $Na_2CO_3 \rightarrow 2Na^+ + CO_3^{-2}$

therefore $[Na^+] = 2 \times 0.955 = 1.910$ M

$[CO_3^{-2}] = 0.955$ M

Sol.81 For acidic buffer solution

$pH = pKa + \log\frac{[Salt]}{[Acid]}$

Given $[B^-] = [HB]$

and K_b for $B^- = 10^{-10}$

So $K_a = 10^{-4}$ for HB

pH = pka = 4

Sol.84 For order of A :

By run I & IV

[B] remain same but

[A] increases 4 times and rate of reaction also becomes 4 times

$\therefore$ order w.r.t. A is 1

for order of B

By Run III & III

[A] remains same but

[B] becomes 2 times and rate of reaction becomes 4 times

$\therefore$ order w.r.t. B is 2

$\therefore$ rate = $K[A]^1 [B]^2$

Sol.88 $\Delta S = \Sigma S_P - \Sigma S_R$

$$\Delta S = 50 - \left(\frac{1}{2}\times 60 + \frac{3}{2}\times 40\right)$$

$\Delta S = -40 \ \ JK^{-1} \ mol^{-1}$

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

at Equilibrium $\Delta G = 0$

$$\therefore \quad T = \frac{\Delta H}{\Delta S} = \frac{-30\times 10^3}{-40}$$

$T = 750$ K

Sol.97 For BCC

$$r^+ + r^- = \frac{\sqrt{3}a}{2}$$

$$\therefore \quad r^+ + r^- = \frac{\sqrt{3}\times 387}{2} \text{ pm}$$

$= 335.14$ pm $\approx$ 335 pm