AIPMT - 2007

Q.1 Dimensions of resistance in an electrical circuit, in terms of dimension of mass M, of length L, of time T and of current I, would be:-

(1) $ML^2T^{-3}I^{-2}$ (2) $ML^2T^{-3}I^{-1}$

(3) ML^2T^{-2} (4) $ML^2T^{-1}I^{-1}$

Q.2 A particle moving along x-axis has acceleration f, at time t, given by $f = f_0\left(1-\frac{t}{T}\right)$, where f_0 and T are constants. The particle at t = 0 has zero velocity. In the time interval between t = 0 and the instant when f = 0, the particle's velocity (v_x) is:

(1) $\frac{1}{2}f_0T$ (2) f_0T (3) $\frac{1}{2}f_0T^2$ (4) f_0T^2

Q.3 A car moves from X to Y with a uniform speed v_u and returns to Y with a uniform speed v_d. The average speed for this round trip is:-

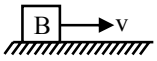
(1) $\frac{v_u+v_d}{2}$ (2) $\frac{2v_dv_u}{v_d+v_u}$

(3) $\sqrt{v_uv_d}$ (4) $\frac{v_dv_u}{v_d+v_u}$

Q.4 A particle staring from the origin (0, 0) moves in a straight line in the (x, y) plane. Its coordinates at a later time are $(\sqrt{3},3)$. The path of the particle makes with the x-axis an angle of:-

(1) 0º (2) 30º (3) 45º (4) 60º

Q.5 A block B is pushed momentarily along a horizontal surface with an initial velocity v. If μ is the coefficient of sliding friction between B and the surface, block B will come to rest after a time:-



(1) v/g (2) v/(gμ) (3) gμ/v (4) g/v

Q.6 A vertical spring with force constant K is fixed on a table. A ball of mass m at a height h above the free upper end of the spring falls vertically on the spring so that the spring is compressed by a distance d. The net work done in the process is:-

(1) $mg(h-d)+\frac{1}{2}Kd^2$ (2) $mg(h+d)+\frac{1}{2}Kd^2$

(3) $mg(h+d)-\frac{1}{2}Kd^2$ (4) $mg(h-d)-\frac{1}{2}Kd^2$

Q.7 A wheel as angular acceleration of 3.0 rad/sec^2 and initial angular speed of 2.00 rad/sec. In a time of 2 sec it has rotated through an angle (in radian) of :

(1) 4 (2) 6 (3) 10 (4) 12

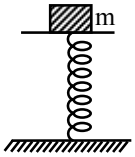
Q.8 $\vec{A}$ and $\vec{B}$ are two vectors and θ is the angle between them, if $|\vec{A}\times\vec{B}| = \sqrt{3}(\vec{A}.\vec{B})$ the value of θ is:-

(1) 90º (2) 60º (3) 45º (4)30º

Q.9 The position x of a particle with respect to time t along x-axis is given by $x = 9t^2 - t^3$ where x is in metres and t in seconds. What will be the position of this particle when it achieves maximum speed along the + x direction ?

(1) 24 m (2) 32 m (3) 54m (4) 81m

Q.10 A mass of 2.0 kg is put on a flat pan attached to a vertical spring fixed on the ground as shown in the figure. The mass of the spring and the pan is negligible. When pressed slightly and released the mass executes a simple harmonic motion. The spring constant is 200N/m. What should be the minimum amplitude of the motion so that the mass gets detached from the pan (Take g = 10 m/s^2)



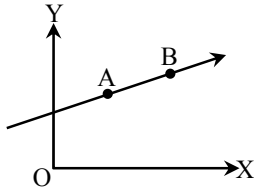
(1) 4.0 cm

(2) 8.0 cm

(3) 10.0 cm

(4) Any value less than 12.0 cm

Q.11 A particle of mass m moves in the XY plane with a velocity v along the straight line AB. If the angular momentum of the particle with respect to origin O is L_A when it is at A and L_B when it is at B, then :



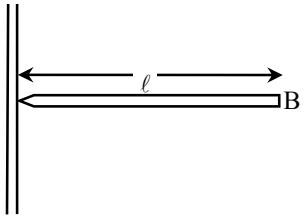
(1) $L_A < L$

(2) $L_A > L_B$

(3) $L_A = L_B$

(4) The relationship between L_A and L_B depends upon the slope of the line AB

Q.12 A uniform rod AB of length ℓ and mass m is free to rotate about point A. The rod is released from rest in the horizontal position. Given that the moment of inertia of the rod about A is $\frac{m\ell^2}{3}$, the initial angular acceleration of the rod will be:-



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

Q.13 Two satellites of earth, S_1 and S_2, are moving in the same orbit. The mass of S_1 is four times the mass of S_2. Which one of the following statements is true ?

(1) The kinetic energies of the two satellites are equal

(2) The time period of S_1 is four times that of S_2

(3) The potential energies of earth and satellite in the two cases are equal

(4) S_1 and S_2 are moving with the same speed

Q.14 Assuming the sun to have a spherical outer surface of radius r, radiating like a black body at temperature t°C, the power received by a unit surface, (normal to the incident rays) at distance R from the centre of the Sun is:-

Where σ is the Stefan's Constant.

(1) $r^2\sigma (t + 273)^4/R^2$

(2) $4\pi r^2\sigma t^4/R^2$

(3) $r^2\sigma (t + 273)^4/4\pi R^2$

(4) $16\pi^2 r^2\sigma t^4/R^2$

Q.15 An engine has an efficiency of 1/6. When the temperature of sink is reduced by 62°C, its efficiency is doubled. Temperature of the source is-

(1) 99°C (2) 124°C

(3) 37°C (4) 62°C

Q.16 A black body is at 727°C. It emits energy at a rate which is proportional to:

(1) $(727)^4$ (2) $(727)^2$

(3) $(1000)^4$ (4) $(1000)^2$

Q.17 The frequency of a light wave in a material is 2×10^{14} Hz and wavelength is 5000 Å. The refractive index of material will be:-

(1) 1.33 (2) 1.40 (3) 1.50 (4) 3.00

Q.18 The phase difference between the instantaneous velocity and acceleration of a particle executing simple harmonic motion is:-

(1) Zero (2) 0.5 π

(3) π (4) 0.707π

Q.19 The particle executing simple harmonic motion has a ienetic energy $K_0 \cos^2\omega t$. The maximum values of the potential energy and the total energy are respectively:-

(1) K_0 and K_0 (2) 0 and $2K_0$

(3) $\frac{K_0}{2}$ and K_0 (4) K_0 and $2K_0$

Q.20 A particle executes simple harmonic oscillation with an amplitude a. The period of oscillation is T. The minimum time taken by the particle to travel half of the amplitude from the equilibrium position is:

(1) T/2 (2) T/4 (3) T/8 (4) T/12

Q.21 The electric and magnetic field of an electromagnetic wave are:-

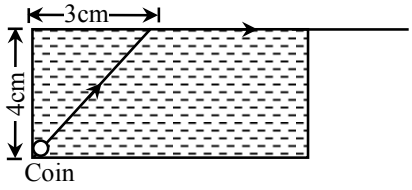
(1) in phase and perpendicular to each other

(2) in phase and parallel to each other

(3) in opposite phase and perpendicular to each other

(4) in opposite phase and parallel to each other

Q.22 A small coin is resting on the bottom of a beaker filled with a liquid. A ray of light from the coin travels upto the surface of the liquid and moves along its surface (see figure)

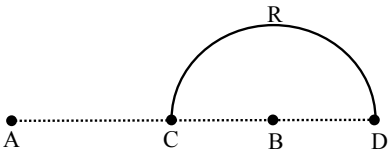


How fast is the light traveling in the liquid ?

(1) 1.2×10^8 m/s (2) 1.8×10^8 m/s

(3) 2.4×10^8 m/s (4) 3.0×10^8 m/s

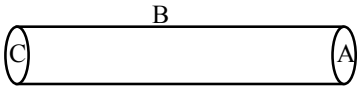
Q.23 Charge +q and –q are placed at points A and B respectively which are at distance 2L apart, C is the midpoint between A and B. The work done in moving a charge + Q along the semicircle CRD is:-



(1) $-\frac{qQ}{6\pi \in_0 L}$ (2) $\frac{qQ}{4\pi \in_0 L}$

(3) $\frac{qQ}{2\pi \in_0 L}$ (4) $\frac{qQ}{6\pi \in_0 L}$

Q.24 A hollow cylinder has a charge q coulomb within it. If ϕ is the electric flux in units of voltmeter associated with the curved surface B, the flux linked with the plane surface A in units of voltmeter will be-



(1) $\frac{q}{\in_0} - \phi$ (2) $\frac{1}{2}\left(\frac{q}{\in_0} - \phi\right)$

(3) $\frac{q}{2 \in_0}$ (4) $\frac{\phi}{3}$

Q.25 Three point charges +q, –2q and +q are placed at points (x = 0, y = a, z = 0), (x = 0,y = 0, z = 0) and (x = a, y = 0, z = 0) respectively. The magnitude and direction of the electric dipole moment vector of this charge assembly are:-

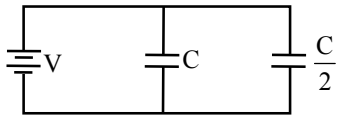
(1) $\sqrt{2}$ qa along + x direction

(2) $\sqrt{2}$ qa along + y direction

(3) $\sqrt{2}$ qa along the line joining points (x = 0, y = 0, z = 0) and (x = a, y = a, z = 0)

(4) qa along the line joining points (x = 0, y = 0, z = 0) and (x = a, y = a, z = 0)

Q.26 Two condensers, one of capacity C and the other of capacity $\frac{C}{2}$, are connected to a V-volt battery, as shown-

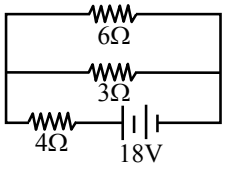


The work done in charging fully both the condensers is:

(1) $\frac{1}{2}CV^2$ (2) $2CV^2$

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

Q.27 The total power dissipated in watts in the circuit shown here is:-



(1) 4W (2) 16W

(3) 40W (4) 54W

Q.28 A steady current of 1.5 amp flows through a copper voltameter for 10 minutes. If the electrochemical equivalent of copper is 30×10^{-5} gm coulomb^{-1}, the mass of copper deposited on the electrode will be: -

(1) 0.27 gm (2) 0.40 gm

(3) 0.50 gm (4) 0.67 gm

Q.29 If the cold junction of a thermo-couple is kept at 0ºC and the hot junction is kept at TºC, then the relation between neutral temperature (T_n) and temperature of inversion (T_i) is:

(1) $T_n = T_i + T$ (2) $T_n = T_i/2$

(3) $T_n = 2T_i$ (4) $T_n = T_i - T$

Q.30 Three resistances P, Q, R each of 2Ω and an unknown resistance S form the four arms of a Wheatstone bridge circuit. When a resistance of 6Ω is connected in parallel to S the bridge gets balanced. What is the value of S ?

(1) 1Ω (2) 2Ω (3) 3Ω (4) 6Ω

Q.31 The resistance of an ammeter is 13Ω and its scale is graduated for a current upto 100 amps. After and additional shunt has been connected to this ammeter it becomes possible to measure currents upto 750 amperes by this meter. The value of shunt-resistance is-

(1) 2 kΩ (2) 20Ω (3) 2Ω (4) 0.2Ω

Q.32 Under the influence of a uniform magnetic field a charged particle is moving in a circle of radius R with constant speed v. The time period of the motion-

(1) depends on R and not on v

(2) depends on v and not on R

(3) depends on both R and v

(4) is independent of both R and v

Q.33 A charged particle (charge q) is moving in a circle of radius R with uniform speed v. The associated magnetic moment μ is given by:

(1) q v R (2) q v R/2

(3) q v R^2 (4) qv $R^2/2$

Q.34 A beam of electrons passes undeflected through mutually perpendicular electric and magnetic fields. It the electric field is switched off, and the same magnetic field is maintained, the electrons move:

(1) along a straight line

(2) in an elliptical orbit

(3) in a circular orbit

(4) along a parabolic path

Q.35 The primary and secondary coils of a transformer have 50 and 1500 turns respectively. If the magnetic flux ϕ linked with the primary coil is given by $\phi = \phi_0 + 4t$, where ϕ is in webers, t is time in seconds and ϕ_0 is a constant, the output voltage across the secondary coil is:

(1) 30 volts (2) 90 volts

(3) 120 volts (4) 220 volts

Q.36 What is the value of inductance L for which the current is a maximum in a series LCR circuit with C = 10 μF and $\omega = 1000 s^{-1}$?

(1)10 mH

(2) 100 mH

(3) 1 mH

(4) cannot be calculated unless R is known

Q.37 A transformer is used to light a 100 W and 110V lamp from a 220V mains. If the main current is 0.5 amp, the efficiency of the transformer is approximately-

(1) 10% (2) 30% (3) 50% (4) 90%

Q.38 Nickel shows ferromagnetic property at room temperature. If the temperature is increased beyond Curie temperature then it will show:-

(1) diamagnetism

(2) paramagnetism

(3) anti ferromagnetism

(4) no magnetic property

Q.39 A 5 watt source emits monochromatic light of wavelength 5000 Å. When placed 0.5 m away, it liberates photoelectrons from a photosensitive metallic surface. When the source is moved to a distance of 1.0m, the number of photo electrons liberated will :

(1) be reduced by a factor of 2

(2) be reduced by a factor of 4

(3) be reduced by a factor of 8

(4) be reduced by a factor of 16

Q.40 Monochromatic light of frequency 6.0×10^{14} Hz is produced by a laser. The power emitted is 2×10^{-3}W. The number of photons emitted, on the average, by the source per second is:-

(1) 5×10^{14} (2) 5×10^{15}

(3) 5×10^{16} (4) 5×10^{17}

Q.41 In a mass spectrometer used for measuring the masses of ions, the ions are initially accelerated by an electric potential V and then made to describe semicircular paths of radius R using a magnetic field B. If V and B are kept constant, the ratio $\left(\frac{\text{Charge on the ion}}{\text{mass of the ion}}\right)$ will be proportional to:-

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

Q.42 If the nucleus $^{27}_{13}A\ell$ has a nuclear radius of about 3.6 fm, the $^{125}_{52}Te$ would have its radius approximately as:-

(1) 4.8 fm (2) 6.0 fm

(3) 9.6 fm (4) 12.0 fm

Q.43 In radioactive decay process, the negatively charged emitted β-particles are:-

(1) the electrons orbiting around the nucleus

(2) the electrons present inside the nucleus

(3) the electrons produced as a result of the decay of neutrons inside the nucleus

(4) the electrons produced as a result of collisions between atoms

Q.44 A nucleus $^{A}_{Z}X$ has mass represented by M(A,Z). If M_p and M_n denote the mass of proton and neutron respectively and B.E. the binding energy in MeV, then:

(1) B.E. = $M(A,Z) - ZM_p - (A-Z)M_n$

(2) B.E. = $[M(A, Z) - ZM_p - (A - Z)M_n]C^2$

(3) B.E. = $[ZM_p + (A - Z)M_n - M(A, Z)]C^2$

(4) B.E. = $[ZM_p + AM_n - M(A, Z)]C^2$

Q.45 Two radioactive substances A and B have decay constants 5λ and λ respectively. At t = 0 they have the same number of nuclei. The ratio of number of nuclei of A to those of B will be $\left(\frac{1}{e}\right)^2$ after a time interval:-

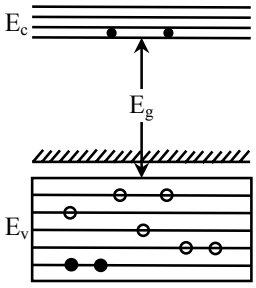
(1) $\frac{1}{2\lambda}$ (2) $\frac{1}{4\lambda}$ (3) 4λ (4) 2λ

Q.46 The total energy of electron in the ground state of hydrogen atom is –13.6 eV. The kinetic energy of an electron in first excited state is:-

(1) 1.7 eV (2) 3.4 eV

(3) 6.8 eV (4) 13.6 eV

Q.47 In the energy band diagram of a material shown below, the open circles and filled circles denote holes and electrons respectively. The material is:-



(1) an n-type semiconductor

(2) a p-type semiconductor

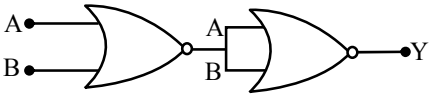
(3) an insulator

(4) a metal

Q.48 A common emitter amplifier has voltage gain of 50, an input impedance of 100Ω and an output impedance of 200 Ω. The power gain of the amplifier is:-

(1) 100 (2) 500 (3) 1000 (4) 1250

Q.49 In the following circuit, the output Y for all possible inputs A and B is expressed by the truth table:-



(1)

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

(2)

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

(3)

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

(4)

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

Q.50 For a cubic crystal structure which one of the following relations indicating the cell characteristics is correct:

(1) $a = b = c$ and $\alpha = \beta = \gamma = 90^\circ$

(2) $a \neq b \neq c$ and $\alpha \neq \beta$ and $\gamma \neq 90^\circ$

(3) $a \neq b \neq c$ and $\alpha = \beta = \gamma = 90^\circ$

(4) $a = b = c$ and $\alpha \neq \beta \neq \gamma = 90^\circ$

Q.51 With which of the following electronic configuration of an atom has the lowest ionization enthalpy:

(1) $1s^2 2s^2 2p^6$ (2) $1s^2 2s^2 2p^5$

(3) $1s^2 2s^2 2p^3$ (4) $1s^2 2s^2 2p^5 3s^1$

Q.52 An element, X has the following isotopic composition;

^{200}X : 90%

^{199}X : 8.0%

^{202}X : 2.0%

The weighted average atomic mass of the naturally-occurring element X is closest to:

(1) 199 amu (2) 200 amu

(3) 201 amu (4) 202 amu

Q.53 Concentrated aqueous sulphuric acid is 98% H_2SO_4 by mass and has a density of 1.80 $g.mL^{-1}$. Volume of acid required to make 1 litre of 0.1 M H_2SO_4 solution is:

(1) 5.55 mL (2) 11.10 mL

(3) 16.65 mL (4) 22.20 mL

Q.54 Consider the following sets of quantum number:

	n	ℓ	m	s
(a)	3	0	0	+½
(b)	2	2	1	+½
(c)	4	3	–2	–½
(d)	1	0	–1	–½
(e)	3	2	3	+½

Which of the following sets of quantum number is not possible:

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

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

Q.55 The number of moles of $KMnO_4$ that will be needed to react with one mole of sulphite ion in acidic solution is:

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

Q.56 In a first order reaction $A \rightarrow B$, if k is rate constant and initial concentration of the reactant A is 0.5 M then the half-life is:

(1) $\frac{\ell n 2}{k}$ (2) $\frac{0.693}{0.5k}$ (3) $\frac{\log 2}{k}$ (4) $\frac{\log 2}{k\sqrt{0.5}}$

Q.57 The reaction of hydrogen an iodine monochloride is given as

$H_{2(g)} + 2ICl_{(g)} \rightarrow 2HCl_{(g)} + I_{2(g)}$

This reaction is of first order with respect to $H_{2(g)}$ and $ICl_{(g)}$, following mechanisms were proposed Mechanism A:

$H_{2(g)} + 2ICl_{(g)} \rightarrow 2HCl_{(g)} + I_{2(g)}$

Mechanism B :

$H_{2(g)} + ICl_{(g)} \rightarrow HCl_{(g)} + HI_{(g)}$; Slow

$HI_{(g)} + ICl_{(g)} \rightarrow HCl_{(g)} + I_{2(g)}$; Fast

Which of the above mechanism(s) can be consistent with the given information about the reaction:

(1) A only (2) B only

(3)A and B both (4) Neither A nor B

Q.58 If 60% of a first order reaction was completed in 60 minutes, 50% of the same reaction would be completed in approximately:

(1) 40 minutes (2) 50 minutes

(3) 45 minutes (4) 60 minutes

(log 4 = 0.60, log 5 = 0.69)

Q.59 The equilibrium constant of the reaction:

$Cu(s) + 2Ag^{+}(aq) \rightarrow Cu^{2+}(aq) + 2Ag(s)$; $E^{\circ} = 0.46V$ at 298 K is:

(1) 4.0×10^{15} (2) 2.4×10^{10}

(3) 2.0×10^{10} (4) 4.0×10^{10}

Q.60 0.5 molal aqueous solution of a weak acid (HX) is 20% ionised. If K_f for water is 1.86 K kg mol^{-1}, the lowering in freezing point of the solution is:

(1) –0.56 K (2) –1.12 K

(3) 0.56 K (4) 1.12 K

Q.61 The efficiency of a fuel cell is given by :

(1) $\frac{\Delta S}{\Delta G}$ (2) $\frac{\Delta H}{\Delta G}$ (3) $\frac{\Delta G}{\Delta S}$ (4) $\frac{\Delta G}{\Delta H}$

Q.62 Consider the following reactions:

(a) $H^{+}_{(aq)} + OH^{-}_{(aq)} = H_2O_{(1)}, \Delta H = -X_1 kJ\ mol^{-1}$

(b) $H_{2(g)} + \frac{1}{2} O_{2(g)} = H_2O_{(l)}, \Delta H = -X_2 kJ\ mol^{-1}$

(c) $CO_{2(g)} + H_{2(g)} = CO_{(g)} + H_2O_{(\ell)} - X_3\ kJ\ mol^{-1}$

(d) $C_2H_{2(g)} + \frac{5}{2} O_{2(g)} = 2CO_{2(g)} + H_2O_{(\ell)} + X_4 kJ\ mol^{-1}$

Enthalpy of formation of $H_2O_{(1)}$ is:

(1) $+X_1$ kJ mol^{-1} (2) $-X_2$ kJ mol^{-1}

(3) $+X_3$ kJ mol^{-1} (4) $-X_4$ kJ mol^{-1}

Q.63 Given that bond energies of H–H and Cl–Cl are 430 kJ mol^{-1} and 240 kJ mol^{-1} respectively and $\Delta_f H$ for HCl is –90 kJ mol^{-1}. Bond enthalpy of HCl is :

(1) 245 kJ mol^{-1} (2) 290 kJ mol^{-1}

(3) 380 kJ mol^{-1} (4) 425 kJ mol^{-1}

Q.64 The Langmuir adsorption isotherm is deduced using the assumption:

(1) The adsorbed molecules interact with each other

(2) The adsorption takes place in multilayer

(3) The adsorption sites are equivalent in their ability to adsorb the particle

(4) The heat of adsorption varies with coverage

Q.65 The following equilibrium constants are given-

$N_2 + 3H_2 \rightleftharpoons 2NH_3$; K_1

$N_2 + O_2 \rightleftharpoons 2NO$; K_2

$H_2 + \frac{1}{2}O_2 \rightleftharpoons H_2O$; K_3

The equilibrium constant for the oxidation of the NH_3 by oxygen to give NO is:

(1) $\frac{K_1K_2}{K_3}$ (2) $\frac{K_2K_3^3}{K_1}$

(3) $\frac{K_2K_3^2}{K_1}$ (4) $\frac{K_2^2K_3}{K_1}$

Q.66 Calculate the pOH of a solution at 25ºC that contains 1×10^{-10} M of hydronium ions, i.e. H_3O^{+};

(1) 1.000 (2) 7.000

(3) 4.000 (4) 9.000

Q.67 A weak acid HA has a K_a of 1.00×10^{-5}. If 0.100 mol of this acid is dissolved in one litre of water the percentage of acid dissociated at equilibrium is closest to :

(1) 0.100% (2) 99.0%

(3) 1.00% (4) 99.9%

Q.68 The fraction of total volume occupied by the atoms present in a simple cube is:

(1) $\frac{\pi}{4}$ (2) $\frac{\pi}{6}$

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

Q.69 Identify the correct order of the size of the following:

(1) $Ca^{2+} < Ar < K^{+} < Cl^{-} < S^{2-}$

(2) $Ca^{2+} < K^{+} < Ar < S^{2-} < Cl^{-}$

(3) $Ca^{2+} < K^{+} < Ar < Cl^{-} < S^{2-}$

(4) $Ar < Ca^{2+} < K^{+} < Cl^{-} < S^{2-}$

Q.70 In which of the following pairs, the two species are iso-structural ?

(1) BrO_3^- and XeO_3 (2) SF_4 and XeF_4

(3) SO_3^{2-} and NO_3^- (4) BF_3 and NF_3

Q.71 The correct order of C–O bond length among CO, CO_3^{2-}, CO_2 is:

(1) $CO < CO_2 < CO_3^{2-}$

(2) $CO_2 < CO_3^{2-} < CO$

(3) $CO < CO_3^{2-} < CO_2$

(4) $CO_3^{2-} < CO_2 < CO$

Q.72 Which one of the following ionic species has the greatest proton affinity to form stable compound:

(1) I^- (2) HS^- (3) NH_2^- (4) F^-

Q.73 In which of the following the hydration energy is higher than the lattice energy:

(1) $SrSO_4$ (2) $BaSO_4$

(3) $MgSO_4$ (4) $RaSO_4$

Q.74 Which of the following statements, about the advantage of roasting of sulphide ore before reduction is not true :

(1) Roasting of the sulphide to the oxide is thermodynamically feasible

(2) Carbon and hydrogen are suitable reducting agents for metal sulphides

(3) The $\Delta_f G^\theta$ of the sulphide is greater than those for CS_2 and H_2S

(4) The $\Delta_f G^\theta$ is negative for roasting for sulphide ore to oxide

Q.75 The correct order of increasing thermal stability of K_2CO_3, $MgCO_3$, $CaCO_3$ and $BeCO_3$ is:

(1) $K_2CO_3 < MgCO_3 < CaCO_3 < BeCO_3$

(2) $BeCO_3 < MgCO_3 < K_2CO_3 < CaCO_3$

(3) $BeCO_3 < MgCO_3 < CaCO_3 < K_2CO_3$

(4) $MgCO_3 < BeCO_3 < CaCO_3 < K_2CO_3$

Q.76 Sulphide ores of metals are usually concentrated by Froth Flotation process. Which one of the following sulphide ores offers and exception and is concentrated by chemical leaching ?

(1) Sphalerite (2) Argentite

(3) Galena (4) Copper pyrite

Q.77 Which one of the following anions is present in the chain structure of silicates:

(1) SiO_4^{4-} (2) $Si_2O_7^{6-}$

(3) $(Si_2O_5^{2-})_n$ (4) $(SiO_3^{2-})_n$

Q.78 Which one of the following orders correctly represents the increasing acid strengths of the given acids:

(1) $HOClO_3 < HOClO_2 < HOClO < HOCl$

(2) $HOCl < HOClO < HOClO_2 < HOClO_3$

(3) $HOClO < HOCl < HOClO_3 < HOClO_2$

(4) $HOClO_2 < HOClO_3 < HOClO < HOCl$

Q.79 Which of the following oxidation states are the most characteristic for lead and tin respectively:

(1) +2, +2 (2) +4, +2

(3) +2, +4 (4) +4, + 4

Q.80 Identify the incorrect statement among the following:

(1) Shielding power of 4f electrons is quite weak

(2) There is a decrease in the radii of the atoms or ions as one proceeds from La to Lu.

(3) Lanthanoid contraction is the accumulation of successive shrinkages

(4) As a result of lanthanoid contraction, the properties of 4d series of the transition elements have no similarities with the 5d series of elements.

Q.81 Which one of the following ions is the most stable in aqueous solution ?

(1) Mn^{3+} (2) Cr^{3+} (3) V^{3+} (4) Ti^{3+}

(At. No. Ti = 22, V = 23, Cr = 24, Mn = 25)

Q.82 The d electron configuration of Cr^{2+}, Mn^{2+}, Fe^{2+} and Ni^{2+} are $3d^4$, $3d^5$, $3d^6$ and $3d^8$ respectively. Which one of the following aqua complex will exhibit the minimum paramagnetic behaviour ?

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

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

(At. No. Cr = 24, Mn= 25, Fe = 26, Ni = 28)

Q.83 Which of the following will give a pair of enantiomorphs:

(1) $[Pt(NH_3)_4][PtCl_6]$

(2) $[Co(NH_3)_4Cl_2]NO_2$

(3) $[Cr(NH_3)_6][Co(CN)_6]$

(4) $[Co(en)_2Cl_2]Cl$

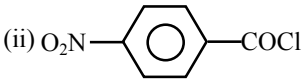
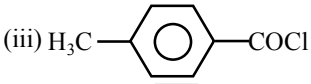
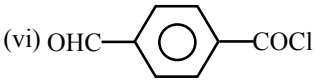
(en = $NH_2\,CH_2\,CH_2\,NH_2$)

Q.84 If NaCl is doped with 10^{-4} mole% of $SrCl_2$, the concentrate of cation vacancies will be:
($N_A = 6.02 \times 10^{23}$ mol^{-1})
(1) 6.02×10^{14} mol^{-1} (2) 6.02×10^{15} mol^{-1}
(3) 6.02×10^{16} mol^{-1} (4) 6.02×10^{17} mol^{-1}

Q.85 Which of the following presents the correct order of the acidity in the given compounds:
(1) $FCH_2COOH > ClCH_2COOH > BrCH_2COOH > CH_3COOH$
(2) $CH_3COOH > BrCH_2COOH > ClCH_2COOH > FCH_2COOH$
(3) $FCH_2COOH > CH_3COOH > BrCH_2COOH > ClCH_2COOH$
(4) $BrCH_2COOH > ClCH_2COOH > FCH_2COOH > CH_3COOH$

Q.86 The product formed in Aldol condensation is:
(1) An alpha, beta unsaturated ester
(2) A beta-hydroxy acid
(3) A beta-hydroxy aldehyde or a beta-hydroxy ketone
(4) An alpha-hydroxy aldehyde or ketone

Q.87 Reduction of aldehydes and ketones into hydrocarbons using zinc amalgam and conc. HCl is called:
(1) Wolff-Kishner Reduction
(2) Clemmensen Reduction
(3) Cope Reduction
(4) Dow Reduction

Q.88 Consider the following compounds:
(i) C_6H_5COCl
(ii) 
(iii) 
(vi) 
The correct decreasing order of their reactivity towards hydrolysis is:
(1) (ii) > (iv) > (i) > (iii)
(2) (ii) > (iv) > (iii) > (i)
(3) (i) > (ii) > (iii) > (iv)
(4) (iv) > (ii) > (i) > (iii)

Q.89 Which one of the following on treatment with 50% aqueous sodium hydroxide yields the corresponding alcohol and acid:
(1) $CH_3-\overset{\overset{O}{\|}}{C}-CH_3$ (2) $C_6H_5CH_2CHO$
(3) C_6H_5CHO (4) $CH_3CH_2CH_2CHO$

Q.90 Which one of the following on reduction with lithium aluminium hydride yield a secondary amine:
(1) Methyl Cyanide (2) Nitroethane
(3) Methylisocyanide (4) Acetamide

Q.91 The order decreasing reactivity towards an electrophilic reagent, for the following:
(a) Benzene
(b) Toluene
(c) Chlorobenzene and
(d) Phenol
Would be:
(1) d > b > a > c (2) a > b > c > d
(3) b > d > a > c (4) d > c > b > a

Q.92 Predict the product C obtained in the following reaction of butyne-1:
$CH_3-CH_2-C \equiv CH + HCl \longrightarrow B \xrightarrow{HI} C$
(1) $CH_3CH_2-\overset{\overset{I}{|}}{\underset{\underset{Cl}{|}}{C}}-CH_3$
(2) $\underset{\underset{Cl}{|}}{CH_3CH}-CH_2-CH_2I$
(3) $CH_3-CH_2-CH_2-\overset{\overset{I}{|}}{\underset{\underset{Cl}{|}}{C}}-H$
(4) $CH_3-CH_2-\underset{\underset{I}{|}}{CH}-CH_2Cl$

Q.93 Which of the compounds with molecular formula C_5H_{10} yields acetone on ozonolysis:
(1) 2-Methyl-1-butene (2) 2-Methyl-2-butene
(3) 3-Methyl-1-butene (4) Cyclopentane

Q.94 If there is no rotation of plane polarized light by a compound in a specific solvent, through to the chiral, it may mean that :
(1) The compound may be a racemic mixture
(2) The compound is certainly a chiral
(3) The compound is certainly meso
(4) There is no compound in the solvent

Q.95 For the following:

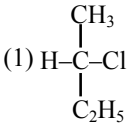
(a) I^- (b) Cl^- (c) Br^-

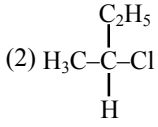
The increasing order of nucleophilicity would be:

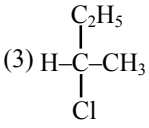
(1) $Br^- < Cl^- < I^-$ (2) $I^- < Br^- < Cl^-$

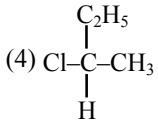
(3) $Cl^- < Br^- < I^-$ (4) $I^- < Cl^- < Br^-$

Q.96 $CH_3–CHCl–CH_2–CH_3$ has a chiral centre, which one of the following represents its R configurations:

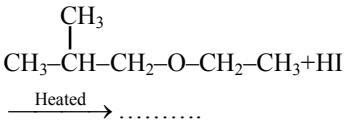
(1) 

(2) 

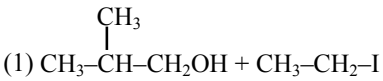
(3) 

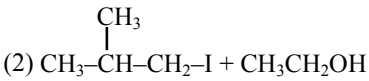
(4) 

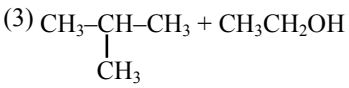
Q.97 In the reaction

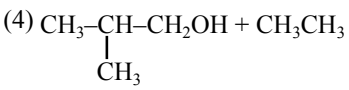


Which of the following compounds will be formed ?

(1) 

(2) 

(3) 

(4) 

Q.98 Which one of the following vitamins is water-soluble:

(1) Vitamin A (2) Vitamin B

(3) Vitamin E (4) Vitamin K

Q.99 RNA and DNA are chiral molecules, their chirality is due to:

(1) D-sugar Component

(2) L-sugar component

(3) Chiral bases

(4) Chiral phosphate ester units

Q.100 Which one of the following polymers is prepared by condensation polymerization ?

(1) Styrene (2) Nylon-66

(3) Teflon (4) Rubber

Q.101 Biological organization starts with:-

(1) Atomic level

(2) Submicroscopic molecular level

(3) Cellular level

(4) Organismic level

Q.102 About 98 percent of the mass of every living organism is composed of just six elements including carbon, hydrogen, nitrogen, oxygen and:

(1) Calcium and phosphorus

(2) Phosphorus and sulphur

(3) Sulphur and magnesium

(4) Magnesium and sodium

Q.103 Which one of the following is an example of negative feedback loop in humans ?

(1) Secretion of sweat glands and constriction of skin blood vessels when it is too hot

(2) Constriction of skin blood vessels and contraction of skeletal muscles when it is too cold

(3) Secretion of tears after falling of sand particles into the eye

(4) Salivation of mouth at the sight of delicious food

Q.104 What is common to whale, seal and shark ?

(1) Homoeiothermy

(2)Seasonal migration

(3) Thick subcutaneous fat

(4) Convergent evolution

Q.105 Which one of the following is not a constituent of cell membrane ?

(1) Phospholipids (2) Cholesterol

(3) Glycolipids (4) Proline

Q.106 Select the wrong statement from the following:

(1) The chloroplasts are generally much larger than mitochondria

(2) Both chloroplasts and mitochondria contain an inner and an outer membrane

(3) Both chloroplasts and mitochondria have an internal compartment, the thylakoid space bounded by the thylakoid membrane

(4) Both chloroplasts and mitochondria contain DNA

Q.107 The overall goal of glycolysis, Krebs cycle and the electron transport system is the formation of:-

(1) Nucleic acids

(2) ATP in small stepwise units

(3) ATP in one large oxidation reaction

(4) Sugars

Q.108 If the mean and the median pertaining to a certain character of a population are of the same value, the following is most likely to occur:-
(1) A skewed curve
(2) A normal distribution
(3) A bi-modal distribution
(4) a T-shaped curve

Q.109 Which one of the following is a slime mould ?
(1) Anabaena (2) Rhizopus
(3) Physarum (4) Thiobacillus

Q.110 For a critical study of secondary growth in plants, which one of the following pairs is suitable?
(1) Wheat and maiden hair fern
(2) Sugarcane and sunflower
(3) Teak and pine
(4) Deodar and fern

Q.111 Which one of the following statements about mycoplasma is wrong?
(1) They cause diseases in plants
(2) They are also called PPLO
(3) They are pleomorphic
(4) They are sensitive to penicillin

Q.112 In the prothallus of a vascular cryptogam, the antherozoids and eggs mature at different times. As a result:
(1) Self fertilization is prevented
(2) There is no change in success rate of fertilization
(3) There is high degree of sterility
(4) One can conclude that the plant is apomictic

Q.113 Two plants can be conclusively said to belong to the same species if they :
(1) Have same number of chromosomes
(2) Can reproduce freely with each other and form seeds
(3) Have more than 90 percent similar genes
(4) Look similar and possess identical secondary metabolites.

Q.114 If you are asked to classify the various algae into distinct groups, which of the following characters you should choose ?
(1) Chemical composition of the cell wall
(2) Types of pigments present in the cell
(3) Nature of stored food materials in the cell
(4) Structural organization of thallus

Q.115 Flagellated male gametes are present in all the three of which one of the following sets ?
(1) Riccia, Dryopteris and Cycas
(2) Anthoceros, Funaria and Spirogyra
(3) Zygnema, Saprolegnia and Hydrilla
(4) Fucus, Marsilea and Calotropis

Q.116 In gymnosperms, the pollen chamber represents:
(1)The microsporangium in which pollen grains develop
(2) A cell in the pollen grain in which the sperms are formed
(3) A cavity in the ovule in which pollen grains are stored after pollination
(4) An opening in the megagametophyte through which the pollen tube approaches the egg

Q.117 Spore dissemination in some liverworts is aided by :
(1) Peristome teeth (2) Elaters
(3) Indusium (4) Calyptra

Q.118 Which pair of the following belongs to Basidiomycetes ?
(1) Morchella and Mushrooms
(2) Birds' nest fungi and Pufballs
(3) Pufballs and Claviceps
(4) Peziza and Stink horns

Q.119 ICBN stands for :
(1) Indian Code of Botanical Nomenclature
(2) Indian Congress of Biological Names
(3) International code of Botanical Nomenclature
(4) International Congress of Biological Names

Q.120 Ergot of rye is caused by a species of:-
(1) Claviceps (2) Phytophthora
(3) Uncinula (4) Ustilago

Q.121 When two species of different genealogy come to resemble each other as a result of adaptation, the phenomenon is termed:-
(1) Convergent evolution
(2) Divergent evolution
(3) Microevolution
(4) Co-evolution

Q.122 Adaptive radiation refers to:-
(1) Power of adaptation in an individual to a variety of environments
(2) Adaptations due to Geographical isolation
(3) Evolution of different species from a common ancestor
(4) Migration of members of a species to different geographical areas

Q.123 The living organisms can be unexceptionally distinguished from the non-living things on the basis of their ability for:-
(1) Growth and movement
(2) Responsiveness to touch
(3) Interaction with the environment and progressive evolution
(4) Reproduction

Q.124 The finches of Galapogas islands provide an evidence in favour of-
(1) Biogeographical Evolution
(2) Special Creation
(3) Evolution due to Mutation
(4) Retrogressive Evolution

Q.125 One of the important consequences of geographical isolation is:-
(1) Random creation of new species
(2) No change in the isolated fauna
(3) Preventing Speciation
(4) Speciation through reproductive isolation

Q.126 Industrial melanism as observed in peppered moth proves that:-
(1) Melanism is a pollution-generated feature
(2) The true black melanic forms arise by a recurring random mutation
(3) The melanic form of the moth has no selective advantage over lighter form in industrial area
(4) The lighter-form the moth has no selective advantage either in polluted industrial area or non-polluted area

Q.127 The concept of chemical evolution is based on-
(1) Possible origin of life by combination of chemicals under suitable environmental conditions
(2) Crystallization of chemicals
(3) Interaction of water, air and clay under intense heat
(4) Effect of solar radiation on chemicals

Q.128 Among the human ancestors the brain size was more than 1000 CC in:-
(1) Homo habilis
(2) Homo neanderthalensis
(3) Homo erectus
(4) Ramapithecus

Q.129 Which of the following pairs are correctly matched ?

Animals	Morphological features
(A) Crocodile	4-chambered heart
(B) Sea Urchin	Parapodia
(C) Obelia	Metagenesis
(D) Lemur	Thecodont

(1) Only A and B (2) A, C and D
(3) B, C and D (4) Only A and D

Q.130 Select the correct statement from the following:
(1) Mutations are random and directional
(2) Darwinian variations are small and directionless
(3) Fitness is the end result of the ability to adapt and gets selected by nature
(4) All mammals except whales and camels have seven cervical vertebrae

Q.131 Which one of the following is a matching pair of a body feature and the animal possessing it ?
(1) Ventral heart – Scorpion
(2) Post-anal tail – Octopus
(3) Ventral central nervous system – Leech
(4) Pharyngeal gill slits Absent in embryo – Chamaeleon

Q.132 What is common between parrot, platypus and kangaroo ?
(1) Ovoparity
(2) Homoiothermy
(3) Toothless jaws
(4) Functional post-anal tail

Q.133 What is true about Nereis, Scorpion, Cockroach and Silver fish ?
(1) They all belong to the same phylum
(2) They all have jointed paired appendages
(3) They all possess dorsal heart
(4) None of them is aquatic

Q.134 Which one of the following statement is correct ?
(1) Ontogeny repeats phylogeny
(2) Stem cells are specialized cells
(3) There is no evidence of the existence of gills during embryogenesis of mammals
(4) All plant & animal cells are totipotent

Q.135 "Foolish Seedling" disease of rice led to the discovery of :-
(1) IAA (2) GA
(3) ABA (4) 2, 4-D

Q.136 Passage cells are thin-walled cells found in:-
(1) Central region of style through which the pollen tube grows towards the ovary.
(2) Endodermis of roots facilitating rapid transport of water from cortex to pericycle
(3) Phloem elements that serve as entry points for substances for transport to other plant parts
(4) Testa of seeds to enable emergence of growing embryonic axis during seed germination.

Q.137 The first acceptor of electrons from an excited chlorophyll molecule of photosystem II is:-
(1) Quinone (2) Cytochrome
(3) Iron-sulphur protein (4) Ferredoxin

Q.138 All enzymes of TCA cycle are located in the mitochondrial matrix except one which is located in inner mitochondrial membranes in eukaryotes and in cytosol in prokaryotes. This enzyme is:-
(1) Succinate dehydrogenase
(2) Lactate dehydrogenase
(3) Isocitrate dehydrogenase
(4) Malate dehydrogenase

Q.139 The wavelength of light absorbed by Pr form of phytochrome is:-
(1) 620 nm (2) 640 nm
(3) 680 nm (4) 720 nm

Q.140 Opening of floral buds into flowers, is a type of:
(1) Autonomic movement of growth
(2) Autonomic movement of locomotion
(3) Autonomic movement of variation
(4) Paratonic movement of growth

Q.141 Which one of the following pairs, is not correctly matched ?
(1) IAA – Cell wall elongation
(2) Abscissic acid – Stomatal closure
(3) Gibberellic acid – Leaf fall
(4) Cytokinin – Cell division

Q.142 One gene-one enzyme relationship was established for the first time in:
(1) *Diplococus pneumoniae*
(2) *Neurospora crassia*
(3) *Salmonella typhimurium*
(4) *Escherichia Coli*

Q.143 Male gametes in angiosperms are formed by the division of:
(1) Microspore mother cell
(2) Microspore
(3) Generative cell
(4) Vegetative cell

Q.144 Two cells A and B are contiguous. Cell A has osmotic pressure 10 atm, turgor pressure 7 atm and diffusion pressure deficit 3 atm. Cell B has osmotic pressure 8 atm, turgor pressure 3 atm and diffusion pressure deficit 5 atm. The result will be:-
(1) Movement of water from cell A to B
(2) Movement of water from cell B to A
(3) No movement of water
(4) Equilibrium between the two

Q.145 In the leaves of C_4 plants, malic acid formation during CO_2 fixation occurs in the cells of :
(1) Epidermis (2) Mesophyll
(3) Bundle Sheath (4) Phloem

Q.146 Which of the following is a flowering plant with nodules containing filamentous nitrogen-fixing microorganism ?
(1) *Cicer arietinum*
(2) *Casuarina equisetifolia*
(3) *Crotalaria juncea*
(4) *Cycas revoluta*

Q.147 Which one of the following is surrounded by a callose wall ?
(1) Pollen grain
(2) Microspore mother cell
(3) Male gamete
(4) Egg

Q.148 Which one of the following elements is not an essential micronutrient for plant growth ?
(1) Ca (2) Mn (3) Zn (4) Cu

Q.149 If you suspect deficiency of antibodies in a person, to which of the following would you look for confirmatory evidence ?
(1) Haemocytes
(2) Serum albumins
(3) Serum globulins
(4) Fibrinogen in the plasma

Q.150 Which one of the following is a fat-soluble vitamin and its related deficiency disease ?
(1) Calciferol – Pellagra
(2) Ascorbic acid – Scurvy
(3) Retinol – Xerophthalmia
(4) Cobalamine – Beri-beri

Q.151 Which one of the following mammalian cells is not capable of metabolizing glucose to carbon-dioxide aerobically ?
(1) Red blood cells
(2) White blood cells
(3) Unstriated muscle cells
(4) Liver cells

Q.152 Compared to a bull a bullok is docile because of:-
(1) Lower levels of adrenalin/noradrenalin in its blood
(2) Higher levels of thyroxin
(3) Higher levels of cortisone
(4) Lower levels of blood testosterone

Q.153 In the human female, menstruation can be deferred by the administration of:-
(1)FSH only
(2) LH only
(3) Combination of FSH and LH
(4) Combination of estrogen and progesterone

Q.154 In human body, which one of the following is anatomically correct ?
(1) Cranial nerve – 10 pairs
(2) Floating ribs – 2 pairs
(3)Collar bones – 3 pairs
(4) Salivary glands – 1 pair

Q.155 In which one of the following preparations are you likely to come across cell junctions most frequently ?
(1) Hyaline cartilage (2) Ciliated epithelium
(3) Thrombocytes (4) Tendon

Q.156 A drop of each of the following, is placed separately on four slides. Which of them will not coagulate ?
(1) Whole blood from pulmonary vein
(2) Blood plasma
(3) Blood serum
(4) Sample from the thoracic duct of lymphatic system

Q.157 Feeling the tremors of an earthquake a scared resident of seventh floor of a multistoried building starts climbing down the stairs rapidly. Which hormone initiated this action ?
(1) Gastrin (2) Thyroxin
(3) Adrenaline (4) Glucagon

Q.158 A person who is on a long hunger strike and is surviving only on water, will have:-
(1) Less urea in his urine
(2) More sodium in his urine
(3) Less amino acids in his urine
(4) More glucose in his blood

Q.159 Which one of the following pairs of structures distinguishes a nerve cell from other types of cell ?
(1) Nucleus and mitochondria
(2) Perikaryon and dendrites
(3) Vacuoles and fibres
(4)Flagellum and medullary sheath

Q.160 Which part of ovary in mammals acts as an endocrine gland after ovulation ?
(1)Vitelline membrane
(2) Graffian follicle
(3) Stroma
(4) Germinal epithelium

Q.161 During the transmission of nerve impulse through a nerve fibre, the potential on the inner side of the plasma membrane has which type of electric charge ?
(1) First positive, then negative and again back to positive
(2) First negative, then positive and again back to negative
(3) First positive, then negative and continue to be negative
(4) First negative, then positive and continue to be positive

Q.162 A person is having problems with calcium and phosphorus metabolism in his body. Which one of the following glands may not be functioning properly ?
(1) Thyroid (2) Parathyroid
(3) Parotid (4) Pancreas

Q.163 Identify the odd combination of the habitat and the particular animal concerned :
(1) Rann of Kutch – Wild Ass
(2) Dachigam National Park – Snow Leopard
(3) Sunderbans – Bengal Tiger
(4) Periyar – Elephant

Q.164 In which one of the following the BOD (Biochemical Oxygen Demand) of sewage (S), distillery effluent (DE), paper mill effluent (PE) and sugar mill effluent (SE) have been arranged in ascending order ?
(1) S < DE < PE < SE
(2) SE < S < PE < DE
(3) SE < PE < S < DE
(4) PE < S < SE < DE

Q.165 Which one of the following ecosystem types has the highest annual net primary productivity ?
(1) Temperate deciduous forest
(2) Tropical rain forest
(3) Tropical deciduous forest
(4) Temperate evergreen forest

Q.166 Which one of the following is being utilized as a source of biodiesel in the Indian country side ?
(1) Pongamia (2) Euphorbia
(3) Beetroot (4) Sugarcane

Q.167 In a coal fired power plant electrostatic precipitators are installed to control emission of:-
(1) CO (2) SO_2 (3) NOx (4) SPM

Q.168 Which one of the following is not a bioindicator of water pollution ?
(1) Sewage fungus (2) Sludge-worms
(3) Blood-worms (4) Stone flies

Q.169 A high density of elephant population in an area can result in :-
(1) Predation on one another
(2) Mutualism
(3) Intra specific competition
(4) Inter specific competition

Q.170 Geometric representation of age structure is a characteristic of :-
(1) Ecosystem (2) Biotic community
(3) Population (4) Landscape

Q.171 Which one of the following pairs of organisms are exotic species introduced in India ?
(1) Nile perch, Ficus religiosa
(2) Ficus religiosa, Lantana camara
(3) Lantana camara, Water hyacinth
(4) Water hyacinth, Prosopis cinereria

Q.172 One of endangered species of Indian medicinal plants is that of:-
(1) Nepenthes (2) Podophyllum
(3) Ocimum (4) Garlic

Q.173 A genetically engineered micro-organism used successfully in bioremediation of oil spills is a species of-
(1) Bacillus (2) Pseudomonas
(3) Trichoderma (4) Xanthomonas

Q.174 A sequential expression of a set of human genes occurs when a steroid molecule binds to the:-
(1) Ribosome (2) Transfer RNA
(3) Messenger RNA (4) DNA sequence

Q.175 The Okazaki fragments in DNA chain growth:-
(1) Polymerize in the 5'-to-3' direction and explain 3'- to 5' DNA replication
(2) Result in transcription
(3) Polymerize in the 3'-to-5' direction and forms replication fork
(4) Prove semi-conservative nature of DNA replication

Q.176 In the hexaploid wheat, the haploid(n) and basic(x) numbers of chromosomes are:
(1) n = 21 and x = 7 (2) n = 7 and x = 21
(3) n = 21 and x = 21 (4) n = 21 and x = 14

Q.177 Molecular basis of organ differentiation depends on the modulation in transcription by-
(1) Anticodon (2) RNA polymerase
(3) Ribosome (4) Transcription factor

Q.178 Telomere repetitive DNA sequences control the function of eukaryote chromosomes because they:
(1) Prevent chromosome loss
(2) Act as replicons
(3) Are RNA transcription initiator
(4) Help chromosome pairing

Q.179 Inheritance of skin colour in humans is an example of:-
(1) Codominance
(2) Chromosomal aberration
(3) Point mutation
(4) Polygenic inheritance

Q.180 A common test to find the genotype of a hybrid is by:-
(1) Crossing of one F1 progeny with male parent
(2) Crossing of one F2 progeny with male parent
(3) Crossing of one F2 progeny with female parent
(4) Studying the sexual behaviour of F_1 progenies

Q.181 During transcription, RNA polymerase holoenzyme binds to a gene promoter and assumes a saddle-like structure. What is it's DNA-binding sequence ?
(1) TATA (2) TTAA
(3) AATT (4) CACC

Q.182 Two genes R and Y are located very close on the chromosomal linkage map of maize plant. When RRYY and rryy genotypes are hybridized, the F_2 segregation will show:-
(1) Higher number of the parental types
(2) Higher number of the recombinant types
(3) Segregation in the expected 9 : 3 : 3 : 1 ratio
(4) Segregation in 3 : 1 ratio

Q.183 In maize, hybrid vigour is exploited by:-
(1) Inducing mutations
(2) Bombarding the seeds with DNA
(3) Crossing of two inbred parental lines
(4) Harvesting seeds from the most productive plants

Q.184 Differentiation of organs and tissues in a developing organism, is associated with-
(1) Deletion of genes
(2) Developmental mutations
(3) Differential expression of genes
(4) Lethal mutations

Q.185 In pea plants, yellow seeds are dominant to green. If a heterozygous yellow seeded plant is crossed with a green seeded plant, what ratio of yellow and green seeded plants would you expect in F_1 generation ?
(1) 3 : 1 (2) 50 : 50
(3) 9 : 1 (4) 1 : 3

Q.186 The length of DNA molecule greatly exceeds the dimensions of the nucleus in eukaryotic cells. How is this DNA accommodated ?
(1) Through elimination of repetitive DNA
(2) Deletion of non-essential genes
(3) Super-coiling in nucleosomes
(4) DNase digestion

Q.187 In cloning of cattle a fertilized egg is taken out of the mother's womb and:-
(1) From this upto eight identical twins can be produced
(2) The egg is divided into 4 pairs of cells which are implanted into the womb of other cows
(3) In the eight cell stage, cells are separated and cultured until small embryos are formed which are implanted into the womb of other cows.
(4) In the eight cell stage the individual cells are separated under electrical field for further development in culture media

Q.188 Which one of the following statements is correct ?
(1) At present it is not possible to grow maize without chemical fertilizers
(2) Extensive use of chemical fertilizers may lead to eutrophication of nearby water bodies
(3) Both Azotobacter and Rhizobium fix atmospheric nitrogen in root nodules of plants
(4) Cyanobacteria such as Anabaena and nostoc are important mobilizers of phosphates and potassium for plant nutrition in soil

Q.189 The population of an insect species shows an explosive increase in numbers during rainy season followed by its disappearance at the end of the season. What does this show ?
(1) The population of its predators increases enormously
(2) S-shaped or sigmoid growth of this insect
(3) The food plants mature and die at the end of the rainy season
(4) Its population growth curve is of J-type

Q.190 The two polynucleotide chain in DNA are:-
(1) Semiconservative
(2) Parallel
(3) Discontinuous
(4) Antiparallel

Q.191 A plant requires magnesium for:
(1) Cell wall development
(2) Holding cells together
(3) Protein synthesis
(4) Chlorophyll synthesis

Q.192 Probiotics are-
(1) Live microbial food supplement
(2) Safe antibiotics
(3) Cancer inducting microbes
(4) New kind of food allergens

Q.193 Bowman's glands are located in the
(1) Olfactory epithelium of our nose
(2) Proximal end of uriniferous tubules
(3) Anterior pituitary
(4) Female reproductive system of cockroach

Q.194 Increased asthmatic attacks in certain seasons are related to:
(1) Low temperature
(2) Hot and humid environment
(3) Eating fruits preserved in tin containers
(4) Inhalation of seasonal pollen

Q.195 A human male produces sperms with the genotypes AB, Ab, AB, and ab pertaining to two diallelic characters in equal proportions. What is the corresponding genotype of this person ?
(1) AABB (2)AaBb
(3) AaBB (4) AABb

Q.196 Which one of the following pairs is wrongly matched ?
(1) Coliforms – Vinegar
(2) Methanogens – Gobar gas
(3) Yeast – Ethanol
(4) Streptomycetes – Antibiotic

Q.197 Which one of the following pairs is mismatched ?
(1) Bombyx mori – Silk
(2) Pila globosa – Pearl
(3) Apis indica – Honey
(4) Kenia lacca – Lac

Q.198 Which one of the following is a viral disease of poultry ?
(1) Pasteurellosis (2) Salmonellosis
(3) Coryza (4) New Castle disease

Q.199 Ultrasound of how much frequency is beamed into human body for sonography ?
(1) 45 – 70 MHz (2) 30 – 45 MHz
(3) 15 – 30 MHz (4) 1 – 15 MHz

Q.200 Lysozyme that is present in perspiration, saliva and tears, destroys:
(1) Most virus – infected cells
(2) Certain fungi
(3) Certain types of bacteria
(4) All viruses

ANSWER KEY (AIPMT-2007)

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

HINTS & SOLUTIONS

1. $R = \frac{V}{I} = \frac{J}{IC} \equiv \frac{ML^2T^{-2}}{I^2T} = ML^2T^{-3}I^{-2}$

2. Acceleration $\frac{dv}{dt} = f = f_0\left(1-\frac{t}{T}\right)$

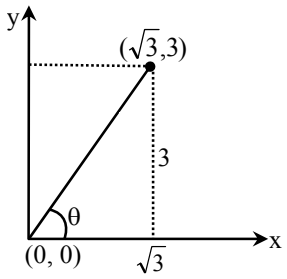
$\Rightarrow \int_0^v dv = f_0\int_0^T\left(1-\frac{t}{T}\right)dt$

$\Rightarrow v = f_0\left(t-\frac{t^2}{2T}\right)_0^T = f_0\left(T-\frac{T^2}{2T}\right) = \frac{1}{2}f_0T$

3. Average speed $= \frac{\text{Total distance}}{\text{Total time}}$

$= \frac{2d}{\frac{d}{v_u}+\frac{d}{v_d}} = \frac{2v_dv_u}{v_d+v_u}$

4.



$\tan\theta = \frac{3}{\sqrt{3}} = \sqrt{3}$

$\Rightarrow \theta = 60^\circ$

5. By using $v = u + at$,

$0 = v - \mu gt \Rightarrow t = \frac{v}{\mu g}$

6. Net work done = work done by gravitational force + work done by spring force

$= mg(h + d) - \frac{1}{2}Kd^2$

7. $\theta = \omega t + \frac{1}{2}\alpha t^2 = (2)(2) + \frac{1}{2}(3)(2)^2$

$= 4 + 6 = 10$ rad

8. $\because |\vec{A}\times\vec{B}| = \sqrt{3}(\vec{A}.\vec{B})$

$\therefore AB\sin\theta = \sqrt{3}AB\cos\theta$

$\Rightarrow \tan\theta = \sqrt{3} \Rightarrow \theta = 60^\circ$

9. $x = 9t^2 - t^3 \qquad \therefore v = 18t - 3t^2$

$\Rightarrow \frac{dv}{dt} = 18 - 6t$

for maximum speed $\frac{dv}{dt} = 0$, and $\frac{d^2v}{dt^2}$ negative

so $18 - 6t = 0 \Rightarrow t = 3s$

at $t = 3s$, $x = 9(3)^2 - (3)^3 = 81 - 27 = 54$ m

10. For given conditions $mg = m\omega^2a = ka$

$\Rightarrow a = \frac{mg}{k} = \frac{2\times10}{200} = 0.1 = 10$ cm

11. As perpendicular distance from origin is constant so $L_A = L_B$

12. $\because \tau = I\alpha \ \therefore (mg)\ \frac{\ell}{2} = \left(\frac{m\ell^2}{3}\right)\alpha \Rightarrow \alpha = \frac{3g}{2\ell}$.

13. K.E. $= \frac{GMm}{2r} \Rightarrow$ Kinetic energies are unequal

$T = \frac{2\pi r^{3/2}}{\sqrt{GM}} \Rightarrow$ Time period are equal

P.E. $= -\frac{GMm}{r} \Rightarrow$ Potential energies are unequal

$v = \sqrt{\frac{GM}{r}} \Rightarrow$ Orbital speeds are equal

14. Solar constant $= \frac{\sigma(4\pi r^2)T^4}{(4\pi R^2)} = \frac{\sigma r^2 (t+273)^4}{R^2}$

15. $\eta = 1 - \frac{T_2}{T_1} \Rightarrow \frac{1}{6} = 1 - \frac{T_2}{T_1}$

and $\frac{1}{3} = 1 - \frac{(T_2 - 62)}{T_1} \Rightarrow \frac{1}{3} = 1 - \frac{T_2}{T_1} + \frac{62}{T_1}$

$\Rightarrow \frac{1}{3} = \frac{1}{6} + \frac{62}{T_1} \ = \frac{1}{6} = \frac{62}{T_1}$

16. $E = \sigma T^4 \therefore E \propto (727 + 273)^4 \Rightarrow E \propto (1000)^4$

17. Refractive index $\mu = \frac{c}{v} = \frac{c}{v\lambda}$

$= \frac{3\times10^8}{2\times10^{14}\times5000\times10^{-10}} = 3$

18. If $v = v_0 \sin\omega t$ then $a = a_0 \cos\omega t$

$\Rightarrow$ phase difference $= \frac{\pi}{2} = 0.5\pi$

19. $\because$ K.E. $= K_0\cos^2\omega t$

$\therefore$ Maximum P.E. = Maximum K.E.

= Total energy = K_0

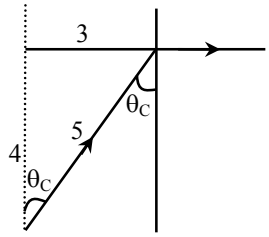
20. $\because \ x = a\sin\omega t$

$\therefore \ \frac{a}{2} = a\sin\omega t \Rightarrow \omega t = \frac{\pi}{6}$

$\Rightarrow \left(\frac{2\pi}{T}\right)t = \frac{\pi}{6} \Rightarrow t = \frac{T}{12}$

21. In EM waves $\vec{E}$ and $\vec{B}$ are in same phase and perpendicular to each other.

22.



$\frac{1}{\mu} = \sin\theta_C = \frac{3}{5} \Rightarrow \mu = \frac{5}{3}$

$\Rightarrow v = \frac{c}{\mu} = \frac{3\times10^8}{5/3} = \frac{9}{5}\times10^8$

$= 1.8 \times 10^8 \ ms^{-1}$

23. $W = \Delta U = Q(V_D - V_C)$ here $V_C = 0$

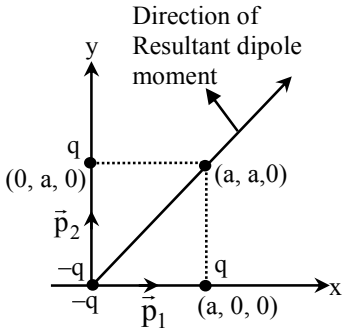
$= Q\left[\frac{q}{4\pi\epsilon_0(3L)} - \frac{q}{4\pi\epsilon_0(L)} - 0\right] = \frac{-Qq}{6\pi\epsilon_0 L}$

24. $\phi_{total} = \phi_{curved} + \phi_{plane\ surfaces} = \frac{q}{\epsilon_0}$

$\phi + 2\phi_A = \frac{q}{\epsilon_0} \Rightarrow \phi_A = \frac{1}{2}\left(\frac{q}{\epsilon_0} - \phi\right)$

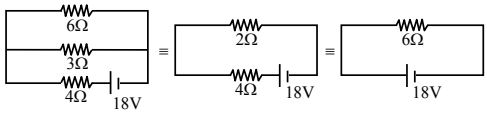
25. Magnitute $= \sqrt{p^2 + p^2} = \sqrt{2}p = \sqrt{2}qa$

Direction is shown in figure.



26. Work done in charging fully both the condensers $= \frac{1}{2}CV^2 + \frac{1}{2}\left(\frac{C}{2}\right)V^2 = \frac{3}{4}CV^2$

27.



Total power dissipated $= \frac{V^2}{R} = \frac{(18)(18)}{6}$

$= 54$ W

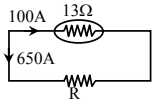
28. $m = ZIt = (30 \times 10^{-5})\,(1.5)\,(10 \times 60) = 0.27$ gm

29. $\because T_n = \dfrac{T_C + T_i}{2}$ & $T_C = 0^oC \therefore T_n = \dfrac{T_i}{2}$

30. for balanced wheatstone bridge circuit

$$\frac{2}{2} = \frac{2}{\left(\frac{6S}{S+6}\right)} \Rightarrow S + 6 = 3S \Rightarrow S = 3\Omega$$

31.



$13 \times 100 = 650 \times R$

$\Rightarrow R = 2\Omega$

32. $T = \dfrac{2\pi m}{qB}$ which is independent of both R and v.

33. Magnetic moment $M = IA = \left(\dfrac{qv}{2\pi R}\right)(\pi R^2)$

$$= \frac{qvR}{2}$$

34. In magnetic field a charged particle moves in a circular orbit.

35. Induced emf in primary coil

$$E_P = \frac{d\phi}{dt} = \frac{d}{dt}(\phi_0 + 4t) = 4 \text{volt}$$

Induced emf in secondary coil

$$\frac{E_S}{E_P} = \frac{N_S}{N_P} \Rightarrow \frac{E_S}{4} = \frac{1500}{50} \Rightarrow E_S = 120 \text{ volt}$$

36. Current is maximum at resonance

$$\Rightarrow \omega^2 = \frac{1}{LC} \Rightarrow L = \frac{1}{\omega^2 C}$$

$$= \frac{1}{(1000)^2 (10 \times 10^{-6})} = 0.1\text{H} = 100\text{mH}$$

37. The efficiency of transformer

$$\eta = \frac{V_S I_S}{V_P I_P} \times 100 = \frac{100}{220 \times 0.5} \times 100 \approx 90\%$$

38. Above curie temperature ferromagnetic material behaves as paramagnetic material.

39. No. of photoelectrons or intensity $\propto \dfrac{1}{(\text{distance})^2}$

40. $n = \dfrac{P}{hv} = \dfrac{2 \times 10^{-3}}{6.62 \times 10^{-34} \times 6 \times 10^{14}} = 5 \times 10^{15}$

41. Radius of semicircular path

$$R = \frac{mv}{qB} = \frac{\sqrt{2mqV}}{qB}$$

As V and B are constant so

$$R \alpha \frac{\sqrt{mq}}{q} \Rightarrow \frac{q}{m} \propto \frac{1}{R^2}$$

42. $\because R = R_0 A^{1/3}$

$$\therefore \frac{R_{Te}}{R_{Al}} = \left(\frac{125}{27}\right)^{1/3} = \left(\frac{5^3}{3^3}\right)^{1/3} = \frac{5}{3}$$

$$\Rightarrow R_{Te} = \left(\frac{5}{3}\right)(3.6) = 6 \text{ fm}$$

45. $\dfrac{N_A}{N_B} = \dfrac{N_0 e^{-\lambda_A t}}{N_0 e^{-\lambda_B t}} = \dfrac{e^{-5\lambda t}}{e^{-\lambda t}}$

$$\Rightarrow \frac{1}{e^{4\lambda t}} = \frac{1}{e^2} \Rightarrow t = \frac{1}{2\lambda}$$

46. Total energy in first excited state

$$= -\frac{13.4}{4} = -3.4 \text{ eV}$$

K.E. in first excited state = – total energy in that state = – (–3.4) = 3.4 eV

48. Voltage gain $= (\beta)\left(\dfrac{R_0}{R_i}\right) = 50$

$$\Rightarrow \beta = \frac{(50)(100)}{(200)} = 25$$

Power gain $= (\beta^2)\left(\dfrac{R_0}{R_i}\right) = (25)^2\left(\dfrac{200}{100}\right)$

$$= 625 \times 2 = 1250$$

49. For given logic circuit

$Y = \overline{\overline{A + B}} = A + B \Rightarrow$ OR gate

50. For cubic crystal structure

$a = b = c$ & $\alpha = \beta = \gamma = 90^o$