AIPMT - 2003

Q.1 If a ball is thrown vertically upwards with speed u, the distance covered during the last 't' seconds of its ascent is :

(1) ut (2) $\frac{1}{2}gt^2$

(3) $ut - \frac{1}{2}gt^2$ (4) (u + gt)t

Q.2 A particle moves along a circle of radius $\left(\frac{20}{\pi}\right)$m with constant tangential acceleration. If the velocity of the particle is 80 m/s at the end of the second revolution after motion has begun, the tangential acceleration is : -

(1) 40 m/s^{-2} (2) 640 π ms^{-2}

(3) 160 π ms^{-2} (4) 40 π ms^{-2}

Q.3 A thin circular ring M and radius 'r' is rotating about its axis with a constant angular velocity ω. Four objects each of mass m, are kept gently to the opposite ends of two perpendicular diameters of the ring. The angular velocity of the ring will be -

(1) $\frac{M\omega}{4m}$ (2) $\frac{M\omega}{M+4m}$

(3) $\frac{(M+4m)\omega}{M}$ (4) $\frac{(M+4m)\omega}{M+4m}$

Q.4 A stationary particle explodes into two particles of masses m_1 and m_2 which move in opposite directions with velocities v_1 and v_2. The ratio of their kinetic energies E_1/E_2 is :

(1) m_2/m_1 (2) m_1/m_2

(3) 1 (4) m_1v_2/m_2v_1

Q.5 A solid cylinder of mass M and radius R rolls without slipping down an inclined plane of length L and height h. What is the speed of its centre of mass when the cylinder reaches its bottom -

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

(3) $\sqrt{\frac{4}{3}gh}$ (4) $\sqrt{4gh}$

Q.6 When a long spring is stretched by 2 cm, its potential energy is U. If the spring is stretched by 10 cm, the potential energy stored in it will be :

(1) U/5 (2) 5 U (3) 10 U (4) 25 U

Q.7 The acceleration due to gravity on the planet A is 9 times the acceleration due to gravity on planet B. A man jumps to a height of 2m on the surface of A. What is the height of jump by the same person on the planet B.

(1) 2/9 m (2) 18 m

(3) 6 m (4) 2/3 m

Q.8 A monkey of mass 20 kg is holding a vertical rope. The rope will not break when a mass of 25 kg is suspended from it but will break if the mass exceeds 25 kg. What is the maximum acceleration with which the monkey can climb up along the rope ? (g = 10 m/s^2)

(1) 5 m/s^2 (2) 10 m/s^2

(3) 25 m/s^2 (4) 2.5 m/s^2

Q.9 A man weighs 80 kg He stands on a weighing scale in a lift which is moving upwards with a uniform acceleration of 5m/s^2. What would be the reading on the scale ? (g = 10 m/s^2)

(1) Zero (2) 400 N

(3) 800 N (4) 1200 N

Q.10 A ball rolls without slipping. The radius of gyration of the ball about an axis passing through its centre of mass is K. If radius of the ball be R, then the fraction of total energy associated with its rotational energy will be :

(1) $\frac{K^2+R^2}{R^2}$ (2) $\frac{K^2}{R^2}$

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

Q.11 The vector sum of two forces is perpendicular to their vector differences. In that case, the forces :

(1) Are equal to each other

(2) Are equal to each other in magnitude

(3) Are not equal to each other in magnitude

(4) Cannot be predicted

Q.12 Two spheres of masses m and M are situated in air and the gravitational force between them is F. The space around the masses in now filled with a liquid of specific density 3. The gravitational force will now be :

(1) 3F (2) F

(3) F/3 (4) F/9

Q.13 A man throws ball with the same speed vertically upwards one after the other at an interval of 2 seconds. What should be the speed of the throw so that more than two balls are in the sky at any time ? (Given g = 9.8 m/s^2)

(1) More than 19.6 m/s
(2) At least 9.8 m/s
(3) Any speed less than 19.6 m/s
(4) Only with speed 19.6 m/s

Q.14 A convex lens is dipped in a liquid whose refractive index is equal to the refractive index of the lens. Then its focal length will

(1) Become zero
(2) Become infinite
(3) Become small, but non-zero
(4) Remain unchanged

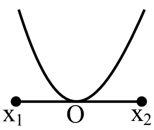
Q.15 An observer moves towards a stationary source of sound with a speed 1/5th of the speed of sound. The wavelength and frequency of the source emitted are λ and f respectively. The apparent frequency and wavelength recorded by the observer are respectively :

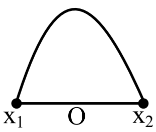
(1) 1.2f, 1.2λ (2) 1.2f, λ
(3) f, 1.2λ (4) 0.8f, 0.8λ

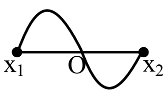
Q.16 The time period of a mass suspended from a spring is T. If is the spring is cut into four equal parts and the same mass is suspend from one of the parts, then the new time period will be -

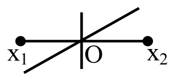
(1) T/4 (2) T
(3) T/2 (4) 2T

Q.17 A particle of mass m oscillates with simple harmonic motion between points x_1 and x_2, the equilibrium position being O. Its potential energy is plotted. It will be as given below in the graph :

(1) 

(2) 

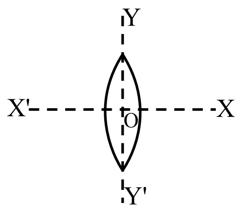
(3) 

(4) 

Q.18 In case of a forced vibration, the resonance wave becomes very sharp when the :

(1) Damping force is small
(2) Restoring force is small
(3) Applied periodic force is small
(4) Quality factor is small

Q.19 A equiconvex lens is cut into two halves along (i) XOX' and (ii) YOY' as shown in the figure. Let f, f' f'' be the focal lengths of the complete lens, of each half in case (i), and of each half in case (ii), respectively



Choose the correct statement from the following-

(1) f' = f, f'' = 2f (2) f' = 2f, f'' = f
(3) f' = f, f'' = f (4) f' = 2f, f'' = 2f

Q.20 We consider the radiation emitted by the human body. Which of the following statements is true :

(1) The radiation emitted is in the infrared region
(2) The radiation is emitted only during the day
(3) The radiation is emitted during the summers and absorbed during the winters
(4) The radiation emitted lies in the ultraviolet region and hence is not visible

Q.21 An ideal gas heat engine operates in a carnot cycle between 227ºC and 127ºC. It absorbs 6 kcal at the higher temperature. The amount of heat (in kcal) converted into work is equal to -

(1) 4.8 (2) 3.5 (3) 1.6 (4) 1.2

Q.22 Consider a compound slab consisting of two different materials having equal thicknesses and thermal conductivities K and 2K, respectively. The equivalent thermal conductivity of the slab is -

(1) 2/6 K (2) $\sqrt{2}$K
(3) 3K (4) 4/3 K

Q.23 The potential energy of a simple harmonic oscillator when the particle is half way to its end point is -

(1) 2/3 E (2) 1/8 E
(3) 1/4 E (4) 1/2 E

Q.24 A charge q is located at the centre of a cube. The electric flux through any face is -

(1) $\frac{2\pi q}{6(4\pi\varepsilon_0)}$ (2) $\frac{4\pi q}{6(4\pi\varepsilon_0)}$

(3) $\frac{\pi q}{6(4\pi\varepsilon_0)}$ (4) $\frac{q}{6(4\pi\varepsilon_0)}$

Q.25 An electron is moving round the nucleus of a hydrogen atom in a circular orbit of radius r. The coulomb force $\vec{F}$ between the two is -

(1) $K\frac{e^2}{r^2}\hat{r}$ (2) $-K\frac{e^2}{r^3}\hat{r}$

(3) $K\frac{e^2}{r^3}\vec{r}$ (4) $-K\frac{e^2}{r^3}\vec{r}$

(where $K = \frac{1}{4\pi\varepsilon_0}$)

Q.26 A long solenoid carrying a current produces a magnetic field B along its axis. If the current is doubled and the number of turns per cm is halved, the new value of the magnetic field is -

(1) B/2 (2) B (3) 2B (4) 4B

Q.27 A charged particle moves through a magnetic field in a direction perpendicular to it. Then the

(1) Speed of the particle remains unchanged

(2) Direction of the particle remains unchanged

(3) Acceleration remains unchanged

(4) Velocity remains unchanged

Q.28 A bar magnet is oscillating in the Earth's magnetic field with a period T. What happens to this period and motion if this mass is quadrupled -

(1) Motion remains S.H. with time period = T/2

(2) Motion remains S.H. with time period = 2T

(3) Motion remains S.H. with time period = 4T

(4) Motion remains S.H. with time and period remains nearly constant

Q.29 Two 220 volt, 100 watt bulbs are connected first in series and then in parallel. Each time the combination is connected to a 220 volt a.c. supply line. The power drawn by the combination in each case respectively will be :

(1) 50 watt, 100 watt

(2) 100 watt, 50 watt

(3) 200 watt, 150 watt

(4) 50 watt, 200 watt

Q.30 An electric kettle has two heating coils. When one of the coils is connected to an a.c. source, the water in the kettle boils in 10 minutes. When the other coil is used the water boils in 40 minutes. If both the coils are connected in parallel, the time taken by the same quantity of water to boil will be :

(1) 8 min (2) 4 min

(3) 25 min (4) 15 min

Q.31 In a Wheatstone's bridge all the four arms have equal resistance R. If the resistance of the galvanometer arm is also R, the equivalent resistance of the combination as seen by the battery is :

(1) R/4 (2) R/2

(3) R (4) 2R

Q.32 Three capacitors each of capacity 4 μF are to be connected in such a way that the effective capacitance of 6μF. This can be done by -

(1) connecting all of them in series

(2) connecting them in parallel

(3) connecting two in series and one in parallel

(4) connecting two in parallel and one in series

Q.33 Solar energy is mainly caused due to :

(1) burning of hydrogen in the oxygen

(2) fission of uranium present in the sun

(3) fusion of protons during synthesis of heavier elements

(4) gravitational contraction

Q.34 Fuse wire is a wire of

(1) high resistance and high melting point

(2) high resistance and low melting point

(3) low resistance and low melting point

(4) low resistance and high melting point

Q.35 The volume occupied by an atom is greater than the volume of the nucleus by a factor of about

(1) 10^1 (2) 10^5

(3) 10^{10} (4) 10^{15}

Q.36 A photoelectric cell is illuminated by a point source of light 1 m away. When the source is shifted to 2m then -

(1) each emitted electron carries one quarter of the initial energy

(2) number of electrons emitted is half the initial number

(3) each emitted electron carries half the initial energy

(4) number of electrons emitted is a quarter of the initial number

Q.37 A sample of radioactive element has a mass of 10 gm at an instant t = 0. The approximate mass of this element in the sample after two mean lives is :

(1) 1.35 gm (2) 2.50 gm

(3) 3.70 gm (4) 6.30 gm

Q.38 In which of the following systems will be radius of the first orbit (n = 1) be minimum -

(1) Doubly ionized lithium

(2) Singly ionized helium

(3) Deuterium atom

(4) Hydrogen atom

Q.39 Reverse bias applied to a junction diode

(1) Lowers the potential barrier

(2) raises the potential barrier

(3) increases the majority carrier current

(4) increases the minority carrier current

Q.40 J.J. Thomson's cathode-ray tube experiment demonstrated that

(1) cathode rays are streams of negatively charged ions

(2) all the mass of an atom is essentially in the nucleus

(3) the e/m of electrons is much greater than the e/m of protons

(4) the e/m ratio of the cathode ray particles changes when a different gas is placed in the discharge tube

Q.41 Which of the following ray are not electromagnetic waves

(1) X-rays (2) γ-rays

(3) β-rays (4) Heat rays

Q.42 A n-p-n transistor conducts when

(1) both collector and emitter are positive with respect to the base

(2) collector is positive and emitter is negative with respect to the base

(3) collector is positive and emitter is at same potential as the base

(4) both collector and emitter are negative with respect to the base

Q.43 According to Curie's law, the magnetic susceptibility of a substance at an absolute temperature T is proportional to -

(1) 1/T (2) T

(3) $1/T^2$ (4) T^2

Q.44 Diamagnetic material in a magnetic field moves :

(1) from stronger to the weaker parts of the field

(2) from weaker to the stronger parts of the field

(3) perpendicular to the field

(4) in none of the above directions

Q.45 If a full wave rectifier circuit is operating from 50 Hz mains, the fundamental frequency in the ripple will be :

(1) 25 Hz (2) 50 Hz

(3) 70.7 Hz (4) 100 Hz

Q.46 Barrier potential of a p-n junction diode does not depend on -

(1) diode design (2) temperature

(3) forward bias (4) doping density

Q.47 The mass of proton is 1.0073 u and that of neutron is 1.0087 u (u = atomic mass unit). The binding energy of ${}^{4}_{2}He$ is (Given : helium nucleus mass ≈ 4.0015 u)

(1) 0.0305 J (2) 0.0305 erg

(3) 28.4 MeV (4) 0.061 u

Q.48 The mass number of a nucleus is

(1) always less than its atomic number

(2) always more than its atomic number

(3) sometimes equal to its atomic number

(4) sometimes less than and sometimes more than its atomic number

Q.49 A nuclear reaction given by

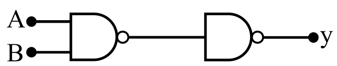
$$_{Z}X^{A} \rightarrow {}_{Z+1}Y^{A} + {}_{-1}e^{0} + \bar{\nu}$$

represents

(1) β-decay (2) γ-decay

(3) fusion (4) fission

Q.50 Following diagram performs the logic function of :



(1) AND gate (2) NAND gate

(3) OR gate (4) XOR gate

Q.51 The ions O^{2-}, F^{-}, Na^{+}, Mg^{2+} and Al^{3+} are isoelecronic. Their ionic radii show :

(1) A significant increase from O^{2-} to Al^{3+}

(2) A significant decrease from O^{2-} to Al^{3+}

(3) An increase from O^{2-} to F^{-} and then decrease from Na^{+} to Al^{3+}

(4) An decrease from O^{2-} to F^{-} and then increase from Na^{+} to Al^{3+}

Q.52 Which one of the following compounds is not a protonic acid :

(1) $B(OH)_3$ (2) $PO(OH)_3$

(3) $SO(OH)_2$ (4) $SO_2(OH)_2$

Q.53 The value of Planck's constant is 6.63×10^{-34}Js. The velocity of light is 3.0×10^{8} ms^{-1}. Which value is closest to the wavelength in nanometers of a quantum of light with frequency of 8×10^{15} s^{-1} :

(1) 2×10^{-25} (2) 5×10^{-18}
(3) 4×10^{1} (4) 3×10^{7}

Q.54 Which of the following statements is not correct for sigma- and pi- bonds formed between two carbon atoms :

(1) Sigma-bond is stronger than a pi-bond
(2) Bond energies of sigma- and pi-bonds are of the order of 264 KJ/mol and 347 KJ/mol, respectively
(3) Free rotation of atoms about a sigma bond is allowed but not in case of a pi-bond
(4) Sigma-bond determines the direction between carbon atoms but a pi-bond has no primary effect in this regard

Q.55 The oxidation states of sulphur in the anions SO_3^{2-}, $S_2O_4^{2-}$ and $S_2O_6^{2-}$ follow the order -

(1) $S_2O_4^{2-} < SO_3^{2-} < S_2O_6^{2-}$
(2) $SO_3^{2-} < S_2O_4^{2-} < S_2O_6^{2-}$
(3) $S_2O_4^{2-} < S_2O_6^{2-} < SO_3^{2-}$
(4) $S_2O_6^{2-} < S_2O_4^{2-} < SO_3^{2-}$

Q.56 The pyknometric density of sodium chloride crystal is 2.165×10^{3} kg m^{-3} while its X-ray density is 2.178×10^{3} kg m^{-3}. The fraction of unoccupied sites in sodium chloride crystal is :

(1) 5.96 (2) 5.96×10^{-2}
(3) 5.96×10^{-1} (4) 5.96×10^{-3}

Q.57 For the reaction :

$C_3H_8(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(\ell)$ at constant temperature, $\Delta H - \Delta E$ is :

(1) + RT (2) – 3RT
(3) + 3RT (4) – RT

Q.58 In Haber process 30 litres of dihydrogen and 30 litres of dinitrogen were taken for reaction which yielded only 50% of the expected product. What will be the composition of gaseous mixture under the above condition in the end :

(1) 20 litres ammonia, 20 litres nitrogen, 20 litres hydrogen
(2) 10 litres ammonia, 25 litres nitrogen, 15 litres hydrogen
(3) 20 litres ammonia, 10 litres nitrogen, 30 litres hydrogen
(4) 20 litres ammonia, 25 litres nitrogen, 15 litres hydrogen

Q.59 The densities of graphite and diamond at 298 K are 2.25 and 3.31 g cm^{-3}, respectively. If the standard free energy difference (ΔG^o) is equal to 1895 J mol^{-1}, the pressure at which graphite will be transformed into diamond at 298 K is -

(1) 9.92×10^{8} Pa (2) 9.92×10^{7} Pa
(3) 9.92×10^{6} Pa (4) 9.92×10^{5} Pa

Q.60 What is the entropy change (in JK^{-1} mol^{-1}) when one mole of ice is converted into water at 0ºC ? (The enthalpy change for the conversion of ice to liquid water is 6.0 KJ mol^{-1} at 0ºC)

(1) 20.13 (2) 2.013
(3) 2.198 (4) 21.98

Q.61 The reaction quotient (Q) for the reaction :

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

is given by $Q = \dfrac{[NH_3]^2}{[N_2][H_2]^3}$. The reaction will proceed from right to left if :

(1) $Q = K_C$ (2) $Q < K_C$
(3) $Q > K_C$ (4) $Q = 0$

(where K_C is the equilibrium constant)

Q.62 The activation energy for a simple chemical reaction $A \rightarrow B$ is E_a in forward direction. The activation energy for reverse reaction :

(1) Is negative of E_a
(2) Is always less than E_a
(3) Can be less than or more than E_a
(4) Is always double of E_a

Q.63 Which of the following statements is not true :

(1) Among halide ions, iodide is the most powerful reducing agent
(2) Fluorine is the only halogen that does not show a variable oxidation state
(3) HOCl is a stronger acid than HOBr
(4) HF is a stronger acid than HCl

Q.64 The method of zone refining of metals is based on the principle of :

(1) Greater mobility of the pure metal than that of the impurity
(2) Higher melting point of the impurity than that of the pure metal
(3) Greater noble character of the solid metal than that of the impurity
(4) Greater solubility of the impurity in the molten state than in the solid

Q.65 On the basis of the information available from the reaction :

$\frac{4}{3}Al + O_2 \rightarrow \frac{2}{3}Al_2O_3, \Delta G = -827 KJ\,mol^{-1}$ of O_2, the minimum e.m.f. required to carry out electrolysis of Al_2O_3 is (F = 96500 C mol^{-1})

(1) 2.14 V (2) 4.28 V
(3) 6.42 V (4) 8.56 V

Q.66 The reaction A $\rightarrow$ B follows first order kinetics. The time taken for 0.8 mole of A to produce 0.6 mole of B is 1 hour. What is the time taken for conversion of 0.9 mole of A to produce 0.675 mole of B

(1) 1 hour (2) 0.5 hour
(3) 0.25 hour (4) 2 hour

Q.67 The solubility product of AgI at 25ºC is 1.0×10^{-16} $mol^2\,L^{-2}$. The solubility of AgI in 10^{-4} N solution of KI at 25ºC is approximately (in mol L^{-1}) :

(1) 1.0×10^{-16} (2) 1.0×10^{-12}
(3) 1.0×10^{-10} (4) 1.0×10^{-8}

Q.68 Formation of a solution from two components can be considered as :

(i) Pure solvent $\rightarrow$ separated solvent molecules, ΔH_1
(ii) Pure solvent $\rightarrow$ separated solvent molecules, ΔH_2
(iii) Separated solvent and solute molecules $\rightarrow$ solution, ΔH_3

Solution so formed will be ideal if : -

(1) $\Delta H_{Soln} = \Delta H_1 + \Delta H_2 + \Delta H_3$
(2) $\Delta H_{Soln} = \Delta H_1 + \Delta H_2 - \Delta H_3$
(3) $\Delta H_{Soln} = \Delta H_1 - \Delta H_2 - \Delta H_3$
(4) $\Delta H_{Soln} = \Delta H_3 - \Delta H_1 - \Delta H_2$

Q.69 For which one of the following equations is ΔH°_{react} equal to ΔH°_f for the product :

(1) $N_2(g) + O_3(g) \rightarrow N_2O_3(g)$
(2) $CH_4(g) + 2Cl_2(g) \rightarrow CH_2Cl_2(l) + 2HCl(g)$
(3) $Xe(g) + 2F_2(g) \rightarrow XeF_4(g)$
(4) $2CO(g) + O_2(g) \rightarrow 2CO_2(g)$

Q.70 The following equilibria are given :

$N_2 + 3H_2 \rightleftharpoons 2NH_3 \quad K_1$
$N_2 + O_2 \rightleftharpoons 2NO \quad K_2$
$H_2 + \frac{1}{2}O_2 \rightleftharpoons H_2O \quad K_3$

The equilibrium constant of the reaction $2NH_3 + \frac{5}{2}O_2 \rightleftharpoons 2NO + 3H_2O$ in terms of K_1, K_2 and K_3 is :

(1) $K_1 K_1 K_3$ (2) $\frac{K_1K_2}{K_3}$
(3) $\frac{K_1K_3^2}{K_2}$ (4) $\frac{K_2K_3^3}{K_1}$

Q.71 The molar heat capacity of water at constant pressure, C, is 75 JK^{-1} mol^{-1}. When 1.0 KJ of heat is supplied to 100 g of water which is free to expand, the increase in temperature of water is :

(1) 1.2 K (2) 2.4 K
(3) 4.8 K (4) 6.6 K

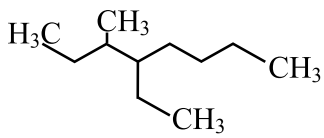
Q.72 If the rate of the reaction is equal to the rate constant, the order of the reaction is -

(1) 0 (2) 1
(3) 2 (4) 3

Q.73 The temperature dependence of rate constant (k) of a chemical reaction is written in terms of Arrhenius equation, $k = A.e^{-E^*/RT}$. Activation energy (E*) of the reaction can be calculated by plotting

(1) k vs T (2) k vs $\frac{1}{\log T}$
(3) log k vs $\frac{1}{T}$ (4) log k vs $\frac{1}{\log T}$

Q.74 IUPAC name of the compound given below is :



(1) 4-Ethyl-3-methyloctane
(2) 3-Methyl-4-ethyloctane
(3) 2, 3-Diethylheptane
(4) 5-Ethyl-6-methylocatane

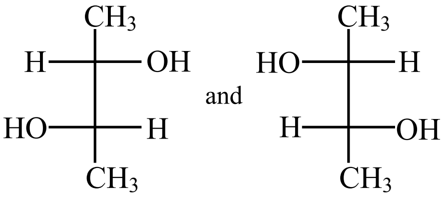
Q.75 In this reaction :

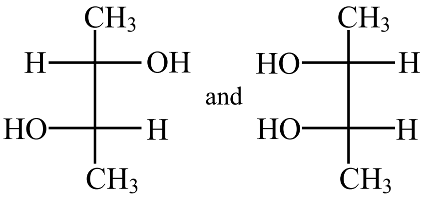
$CH_3CHO + HCN \rightarrow CH_3CH(OH)CN \xrightarrow{H.OH} CH_3CH(OH)COOH$

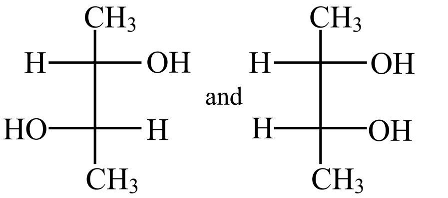
an asymmetric centre is generated. The acid obtained would be :

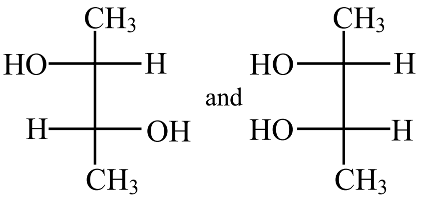
(1) D-isomer
(2) L-isomer
(3) 50% D + 50% L -isomer
(4) 20% D + 80% L -isomer

Q.76 Which of the following pairs of compounds are enantiomers :

(1) 

(2) 

(3) 

(4) 

Q.77 In a set of the given reactions, acetic acid yielded a product C.

$CH_3COOH + PCl_5 \rightarrow A \xrightarrow[\text{Anh.AlCl}_3]{C_6H_6} B \xrightarrow[\text{ether}]{C_2H_5MgBr}$ 'C', product C would be

(1) $CH_3CH(OH)C_2H_5$ (2) $CH_3COC_6H_5$

(3) $CH_3CH(OH)C_6H_5$ (4) $CH_3-\overset{\overset{\large C_2H_5}{|}}{C}(OH)C_6H_5$

Q.78 The compound $CH_3-\overset{\overset{\large CH_3}{|}}{C}=CH-CH_3$ on reaction with $NaIO_4$ in the presence of $KMnO_4$ given :

(1) CH_3COCH_3

(2) $CH_3COCH_3 + CH_3COOH$

(3) $CH_3COCH_3 + CH_3CHO$

(4) $CH_3CHO + CO_2$

Q.79 The e.m.f. of a Daniell cell at 298 K is E_1.

$Zn/SO_4(0.01\ M)\ ||\ CuSO_4(1.0\ M)/Cu$

When the concentration of $ZnSO_4$ is 1.0 M and that of $CuSO_4$ is 0.01 M, the e.m.f. is changed to E_2. What is the relationship between E_1 and E_2 :

(1) $E_1 > E_2$ (2) $E_1 < E_2$

(3) $E_1 = E_2$ (4) $E_2 = 0 \neq E_1$

Q.80 According to the adsorption theory of catalysis, the speed of the reaction increase because :

(1) The concentration of reactant molecules at the active centers of the catalyst becomes high due to adsorption

(2) In the process of adsorption, the activation energy of the molecules becomes large

(3) Adsorption produces heat which increases the speed of the reaction

(4) Adsorption lowers the activation energy of the reaction.

Q.81 Which one of the following characteristics of the transition metals is associated with their catalytic activity :

(1) High enthalpy of atomization

(2) Paramagnetic behaviour

(3) Colour of hydrated ions

(4) Variable oxidation states

Q.82 The basic character of the transition metal monoxides follows the order :

(1) VO > CrO > TiO > FeO

(2) CrO > VO > FeO > TiO

(3) TiO > FeO > VO > CrO

(4) TiO > VO > CrO > FeO

(Atomic nos. Ti = 22, V = 23, Cr = 24, Fe = 26)

Q.83 The correct order of ionic radii of Y^{3+}, La^{3+}, Eu^{3+}, and Lu^{3+} is : -

(1) $Y^{3+} < La^{3+} < Eu^{3+} < Lu^{3+}$

(2) $Y^{3+} < Lu^{3+} < Eu^{3+} < La^{3+}$

(3) $Lu^{3+} < Eu^{3+} < La^{3+} < Y^{3+}$

(4) $La^{3+} < Eu^{3+} < Lu^{3+} < Y^{3+}$

Atomic nos. Y = 39, La = 57, Eu = 63, Lu = 71.

Q.84 According to IUPAC nomenclature sodium nitroprusside is named as :

(1) Sodium nitroferricyanide

(2) Sodium nitroferrocyanide

(3) Sodium pentacyanonitrosyl ferrate (II)

(4) Sodium pentacyanonitrosyl ferrate (III)

Q.85 The number of unpaired electrons in the complex ion $[CoF_6]^{3-}$ is : (A + No = Co = 27)

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

Q.86 Which one of the following octahedral complexes will not show geometric isomerism ? (A and B are monodentate ligands)

(1) $[MA_2B_4]$ (2) $[MA_3B_3]$

(3) $[MA_4B_2]$ (4) $[MA_5B]$

Q.87 Vitamin B_{12} contains :

(1) Fe(II) (2) Co(III)

(3) Zn(II) (4) Ca(II)

Q.88 Among the following which is not the π-bonded organometallic compound :

(1) $K[PtCl_3(\eta^2\text{–}C_2H_4)]$

(2) $Fe(\eta^5\text{–}C_5H_5)_2$

(3) $Cr(\eta^6\text{–}C_6H_6)_2$

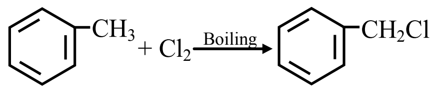
(4) $(CH_3)_4Sn$

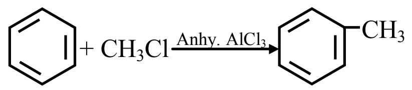
Q.89 The radioisotope, tritium $({}_1^3H)$ has a half-life of 12.3 years. If the initial amount of tritium is 32 mg, how many milligrams of its would remain after 49.2 years :

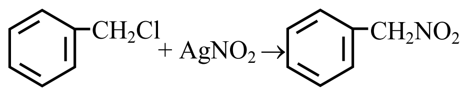
(1) 1 mg (2) 2 mg

(3) 4 mg (4) 8 mg

Q.90 Which one of the following is a free-radical substitution reaction :

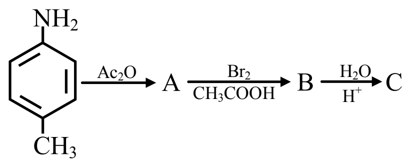
(1) 

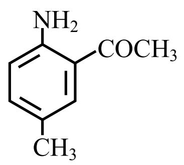
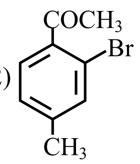
(2) 

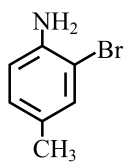
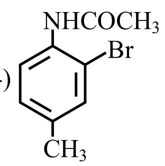
(3) 

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

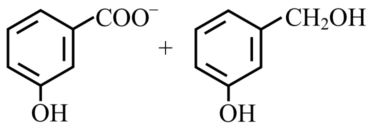
Q.91 The final product C, obtained in this reaction, would be :

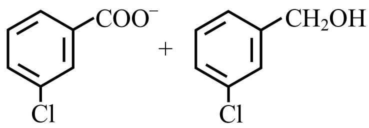


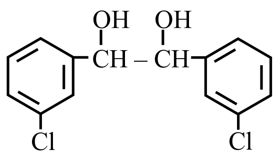
(1)  (2) 

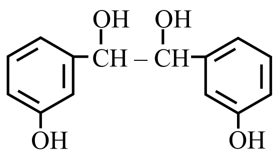
(3)  (4) 

Q.92 When m-chlorobenzaldehyde is treated with 50% KOH solution, the product(s) obtained is (are)

(1) 

(2) 

(3) 

(4) 

Q.93 The correct order of reactivity towards the electrophilic substitution of the compounds aniline (I), benzene (II) and nitrobenzene (III) is

(1) III > II > I (2) II > III > I

(3) I < II > III (4) I > II > III

Q.94 Which of the following orders of acid strength is correct :

(1) $RCOOH > ROH > HOH > HC \equiv CH$

(2) $RCOOH > HOH > ROH > HC \equiv CH$

(3) $RCOOH > HOH > HC \equiv CH > ROH$

(4) $RCOOH > HC \equiv CH > HOH > ROH$

Q.95 Acrolein is a hard, horny and a high melting point material. Which of the following represent its structure :

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

(2) $\left(-CH_2-\underset{\displaystyle COOC_2H_5}{\underset{|}{\overset{\displaystyle CH_3}{\overset{|}{C}}}}- \right)_n$

(3) $\left(-CH_2-\underset{\displaystyle COOC_2H_5}{\underset{|}{CH}}- \right)_n$

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

Q.96 A and B in the following reactions are :

$$R-\underset{\underset{O}{\|}}{C}-R' \xrightarrow{HCN/KCN} A \xrightarrow{B} R-\underset{R'}{C}\begin{matrix}OH \\ CH_2NH_2\end{matrix}$$

(1) $A = RR'C\begin{matrix}OH \\ COOH\end{matrix}$, $B = NH_3$

(2) $A = RR'C\begin{matrix}CN \\ OH\end{matrix}$, $B = H_3O^{\oplus}$

(3) $A = RR'CH_2CN$, $B = NaOH$

(4) $A = RR'C\begin{matrix}CN \\ OH\end{matrix}$, $B = LiAlH_4$

Q.97 Which one of the following monomers gives the polymer neoprene on polymerization : -

(1) $CH_2 = CHCl$

(2) $CCl_2 = CCl_2$

(3) $CH_2=\overset{\overset{Cl}{|}}{C}-CH=CH_2$

(4) $CF_2 = CF_2$

Q.98 Glycolysis is : -

(1) Oxidation of glucose to glutamate

(2) Conversion of pyruvate to citrate

(3) Oxidation of glucose to pyruvate

(4) Conversion of glucose to haem

Q.99 Phospholipids are esters of glycerol with :-

(1) Three carboxylic acid residues

(2) Two carboxylic acid residues and one phosphate group

(3) One carboxylic acid residue and two phosphate groups

(4) Three phosphate groups

Q.100 Chargaff's rule states that in an organism : -

(1) Amount of adenine (A) is equal to that of thymine (T) and the amount of guanine (G) is equal to that of cytosine (C)

(2) Amount of adenine (A) is equal to that of guanine (G) and the amount of thymine (T) is equal to that of cytosine (C)

(3) Amount of adenine (A) is equal to that of cytosine (C) and the amount of thymine (T) is equal to that of guanine (G)

(4) Amounts of all bases are equal

Q.101 Cellular totipotency is demonstrated by :-

(1) Only gymnosperm cells

(2) All plant cells

(3) All eukaryotic cells

(4) Only bacterial cells

Q.102 Viruses are no more "alive" than isolated chromosomes because : -

(1) They require both RNA and DNA

(2) They both need food molecules

(3) They both require oxygen for respiration

(4) Both require the environment of a cell to replicate

Q.103 Given below are four matchings of an animal and its kind of respiratory organ :

A. Silver fish – trachea

B. Scorpion – book lung

C. Sea squirt – pharyngeal gills

D. Dolphin – skin

The correct matchings are : -

(1) A and D (2) A, B and C

(3) B and D (4) C and D

Q.104 Convergent evolution is illustrated by : -

(1) Rat and dog

(2) Bacterium and protozoan

(3) Starfish and cuttle fish

(4) Dogfish and whale

Q.105 Which one of the following sequences was proposed by Darwin and Wallace for organic evolution : -

(1) Overproduction, variations, constancy of population size, natural selection

(2) Variations, constancy of population size, overproduction, natural selection

(3) Overproduction, constancy of population size, variations, natural selection

(4) Variations, natural selection, overproduction, constancy of population size

Q.106 Random genetic drift in a population probably results from : -

(1) Highly genetically variable individuals

(2) Interbreeding within this population

(3) Constant low mutation rate

(4) Large population size

Q.107 Bundle of His is a network of : -

(1) Muscle fibres distributed throughout the heart walls

(2) Muscle fibres found only in the ventricle wall

(3) Nerve fibres distributed in ventricles

(4) Nerve fibres found throughout the heart

Q.108 During prolonged fasting, in what sequence are the following organic compounds used up by the body : -
(1) First carbohydrates, next fats and lastly proteins
(2) First fats, next carbohydrates and lastly proteins
(3) First carbohydrates, next proteins and lastly lipids
(4) First proteins, next lipids and lastly carbohydrates

Q.109 Which one of the following contains the largest quantity of extracellular material :-
(1) Striated muscle
(2) Aerolar tissue
(3) Stratified epithelium
(4) Myelinated nerve fibres

Q.110 If Henle's loop were absent from mammalian nephron, which of the following is to be expected : -
(1) There will be no urine formation
(2) There will be hardly any change in the quality and quantity of urine formed
(3) The urine will be more concentrated
(4) The urine will be more dilute

Q.111 Which group of vertebrates comprises the highest number of endangered species : -
(1) Mammals (2) Fishes
(3) Reptiles (4) Birds

Q.112 Fluoride pollutions mainly affects : -
(1) Brain (2) Heart
(3) Teeth (4) Kidney

Q.113 Two opposite forces operate in the growth and development of every population. One of them relates to the ability to reproduce at a given rate. The force opposing it is called : -
(1) Morbidity
(2) Fecundity
(3) Biotic potential
(4) Environmental resistance

Q.114 Which one of the following bacteria has found extensive use in genetic engineering work in plants : -
(1) *Clostridium septicum*
(2) *Xanthomonas citri*
(3) *Bacillus coagulens*
(4) *Agrobacterium tumefaciens*

Q.115 Test tube baby means a baby born when
(1) It is developed in a test tube
(2) It is developed through tissue culture method
(3) The ovum is fertilised externally and thereafter implanted in the uterus
(4) It develops from a non-fertilized egg

Q.116 In which one of the following do the two names refer to one and the same thing : -
(1) Kreb's cycle and Calvin cycle
(2) Tricarboxylic acid cycle and citric acid cycle
(3) Citric acid cycle and Calvin cycle
(4) Tricarboxylic acid cycle and urea cycle

Q.117 Down's syndrome is caused by an extra copy of chromosome number 21. What percentage of offspring produced by an affected mother and a normal father would be affected by this disorder :-
(1) 100% (2) 75%
(3) 50% (4) 25%

Q.118 Maximum application of animal cell culture technology today is in the production of : -
(1) Insulin
(2) Interfereons
(3) Vaccines
(4) Edible proteins

Q.119 *Escherichia coli* is used as an indicator organism to determine pollution of water with ;-
(1) Heavy metals
(2) Faecal matter
(3) Industrial effluents
(4) Pollen of aquatic plants

Q.120 Which one of the following pairs correctly matches a hormone with a disease resulting from its deficiency : -
(1) Relaxin – Gigantism
(2) Prolactin – Cretinsim
(3) Parathyroid hormone – Tetany
(4) Insulin – Diabetes insipidus

Q.121 Carcinoma refers to : -
(1) Malignant tumours of the connective tissue
(2) Malignant tumours of the skin or mucous membrane
(3) Malignant tumours of the colon
(4) Benign tumours of the connective tissue

Q.122 Which endangered animal is the source of the world's finest, lightest, warmest and most expensive wool-the shahtoosh : -
(1) Nilgai (2) Cheetal
(3) Kashmiri goat (4) Chiru

Q.123 Which one of the following is a matching pair of an animal and a certain phenomenon it exhibits :
(1) Pheretima – Sexual dimorphism
(2) Musca – Complete metamorphosis
(3) Chameleon – Mimicry
(4) Taenia – Polymorphism

Q.124 Short-lived immunity acquired from mother to foetus across placenta or through mother's milk to the infant is categorised as :-
(1) Active immunity
(2) Passive immunity
(3) Cellular immunity
(4) Innate non-specific immunity

Q.125 In recent years, DNA sequences (nucleotide sequence) of mt-DNA and Y chromosomes were considered for the study of human evolution, because : -
(1) They are small, and therefore, easy to study
(2) They are uniparental in origin and do not take part in recombination
(3) Their structure is known in greater detail
(4) They can be studied from the samples of fossil remains

Q.126 What is true about T-lymphocytes in mammals : -
(1) There are three main types-cytotoxic T-cells, helper T-cells and suppressor T-cells
(2) These originate in lymphoid tissues
(3) They scavenge damaged cells and cellular debris
(4) These are produced in thyroid

Q.127 Industrial melanism is an example of : -
(1) Drug resistance
(2) Darkening of skin due to smoke from industries
(3) Protective resemblance with the surroundings
(4) Defensive adaptation of skin against ultraviolet radiations

Q.128 In a random mating population in equilibrium, which of the following brings about a change in gene frequency in a non-directional manner : -
(1) Mutations (2) Random drift
(3) Selection (4) Migration

Q.129 Darwin in his 'Natural Selection Theory' did not believe in any role of which one of the following in organic evolution : -
(1)Parasites and predators as natural enemies
(2) Survival of the fittest
(3) Struggle for existence
(4) Discontinuous variations

Q.130 Which one of the following describes correctly the homologous structures : -
(1) Organs with anatomical similarities, but performing different functions
(2) Organs with anatomical dissimilarities but performing same function
(3) Organs that have no function now, but had an important function in ancestors
(4) Organs appearing only in embryonic stage and disappearing later in the adult

Q.131 Ommatidia serve the purpose of photoreception in : -
(1) Cockroach (2) Frog
(3) Humans (4) Sunflower

Q.132 During its life-cycle, *Fasciola hepatica* (liver fluke) infects its intermediate host and primary host at the following larval stage respectively :
(1) Redia and miracidium
(2) Cercaria and redia
(3) Metacercaria and cercaria
(4) Miracidium and metacercaria

Q.133 Sycon belongs to a group of animals, which are best described as : -
(1) Unicellular or acellular
(2) Multicellular without any tissue organization
(3) Multicellular with a gastrovascular system
(4) Multicellular having tissue organization, but no body cavity

Q.134 During translation initiation in prokaryotes, a GTP molecule is needed in : -
(1) Formation of formyl-met-tRNA
(2) Binding of 30S subunit of ribosome with mRNA
(3) Association of 30 S-mRNA with formyl-met-tRNA
(4) Association of 50 S subunit of ribosome with initiation complex

Q.135 In the genetic code dictionary, how many codons are used to code for all the 20 essential amino acids : -
(1) 20 (2) 64 (3) 61 (4) 60

Q.136 Which of the following discoveries resulted in a Nobel Prize : -
(1) X-rays induce sex-linked recessive lethal mutations
(2) Cytoplasmic inheritance
(3) Recombination of linked genes
(4) Genetic engineering

Q.137 The linkage map of X-chromosome of fruitfly has 66 units, with yellow body gene (y) at one end and bobbed hair (b) gene at the other end. The recombination frequency between these two genes (y and b) should be : -

(1) 60% (2) > 50%

(3) ≤ 50% (4) 100%

Q.138 Genes for cytoplasmic male sterility in plants are generally located in : -

(1) Chloroplast genome

(2) Mitochondrial genome

(3) Nuclear-genome

(4) Cytosol

Q.139 Systemic heart refers to : -

(1) The heart that contracts under stimulation from nervous system

(2) Left auricle and left ventricle in higher vertebrates

(3) Entire heart in lower vertebrates

(4) The two ventricles together in humans

Q.140 What used to be described as Nissel granules in a nerve cell are now identified as : -

(1) Cell metabolites (2) Fat granules

(3) Ribosomes (4) Mitochondria

Q.141 Chromosomes in a bacterial cell can be 1–3 in number and : -

(1) Are always circular

(2) Are always linear

(3) Can be either circular or linear, but never both within the same cell

(4) Can be circular as well as linear within the same cell

Q.142 Two crosses between the same pair of genotypes or phenotypes in which the sources of the gametes are reversed in one cross, is known as : -

(1) Test cross (2) Reciprocal cross

(3) Dihybrid cross (4) Reverse cross

Q.143 What does "lac" refer to in what we call the lac operon : -

(1) Lactose (2) Lactase

(3) Lac insect (4) The number 1,00,000

Q.144 The genes controlling the seven pea characters studied by Mendel are now known to be located on how many different chromosomes : -

(1) Seven (2) Six

(3) Five (4) Four

Q.145 Which one of the following traits of garden pea studied by Mendel was a recessive feature : -

(1) Axial flower position

(2) Green seed colour

(3) Green pod colour

(4) Round seed shape

Q.146 Which one of the following conditions though harmful in itself, is also a potential saviour from a mosquito borne infectious disease :

(1) Thalassaemia

(2) Sickle cell anaemia

(3) Pernicius anaemia

(4) Leukemia

Q.147 Pattern baldness, moustaches and beard in human males are examples of : -

(1) Sex linked traits

(2) Sex limited traits

(3) Sex differentiating traits

(4) Sex-determining traits

Q.148 Degeneration of a genetic code is attributed to the : -

(1) First member of a codon

(2) Second member of a codon

(3) Entire codon

(4) Third member of a codon

Q.149 When a cluster of genes show linkage behaviour they : -

(1) Do not show a chromosome map

(2) Show recombination during meiosis

(3) Do not show independent assortment

(4) Induce cell division

Q.150 During embryonic development, the establishment of polarity along anterior/posterior, dorsal/ventral or medial/lateral axis is called : -

(1) Organizer phenomena

(2) Axis formation

(3) Anamorphosis

(4) Pattern formation

Q.151 During transcription, the DNA site at which RNA polymerase binds is called : -

(1) Promoter (2) Regulator

(3) Receptor (4) Enhancer

Q.152 Christmas disease is another name for : -

(1) Haemophilia B (2) Hepatitis B

(3) Down's syndrome (4) Sleeping sickness

Q.153 In Drosophila, the sex is determined by : -
(1) The ratio of number of X-chromosomes to the sets of autosomes
(2) X and Y chromosomes
(3) The ratio of pairs of X-chromosomes to the pairs of autosomes
(4) Whether the egg is fertilized or develops parthenogenetically

Q.154 Which one of the following pairs is not correctly matched : -
(1) Vitamin C – Scurvy
(2) Vitamin B_2 – Pellagra
(3) Vitamin B_{12} – Pernicious anaemia
(4) Vitamin B_6 – Beri-beri

Q.155 What would happen if in a gene encoding a polypeptide of 50 amino acids, 25^{th} codon (UAU) is mutated to UAA : -
(1) A polypeptide of 25 amino acids will be formed
(2) Two polypeptides of 24 and 25 amino acids will be formed
(3) A polypeptide of 49 amino acids will be formed
(4) A polypeptide of 25 amino acids will be formed

Q.156 During anaerobic digestion of organic waste, such as in producing biogas, which one of the following is left undergraded : -
(1) Lipids (2) Lignin
(3) Hemi-cellulose (4) Cellulose

Q.157 Which one of the following concerns photophosphorylation : -
(1) ADP + AMP $\xrightarrow{\text{Lightenergy}}$ ATP
(2) ADP + Inorganic PO_4 $\xrightarrow{\text{Lightenergy}}$ ATP
(3) ADP + Inorganic PO_4 $\longrightarrow$ ATP
(4) AMP + Inorganic PO_4 $\xrightarrow{\text{Lightenergy}}$ ATP

Q.158 The major role of minor elements inside living organisms is to act as : -
(1) co-factors of enzymes
(2) Building blocks of important amino acids
(3) Constituent of hormones
(4) Binder of cell structure

Q.159 Which element is located at the centre of the porphyrin ring in chlorophyll : -
(1) Calcium (2) Magnesium
(3) Potassium (4) Manganese

Q.160 The major portion of the dry weight of plants comprises of : -
(1) Nitrogen, phosphorus and potassium
(2) Calcium, magnesium and sulphur
(3) Carbon, nitrogen and hydrogen
(4) Carbon, hydrogen and oxygen

Q.161 Which one of the following mineral elements plays an important role in biological nitrogen fixation : -
(1) Copper (2) Manganese
(3) Zinc (4) Molybdenum

Q.162 Stomata of CAM plants : -
(1) Are always open
(2) Open during the day and close at night
(3) Open during the night and close during the day
(4) Never open

Q.163 In a flowering plant, archesporium gives rise to : -
(1) Only the wall of the sporangium
(2) Both wall and the sporogenous cells
(3) Wall and the tapetum
(4) Only tapetum and sporogenous cells

Q.164 Differentiation of shoot is controlled by : -
(1) High auxin : cytokinin ratio
(2) High cytokinin : auxin ratio
(3) High gibberellin : auxin ratio
(4) High gibberellin : cytokinin ratio

Q.165 The cells of the quiescent centre are characterised by : -
(1) Having dense cytoplasm and prominent nuclei
(2) Having light cytoplasm and small nuclei
(3) Dividing regularly to add to the corpus
(4) Dividing regularly to add to tunica

Q.166 In sugarcane plant $^{14}CO_2$ is fixed in malic acid, in which the enzyme that fixes CO_2 is :-
(1) Ribulose biphosphate carboxylase
(2) Phosphoenol pyruvic acid carboxylase
(3) Ribulose phosphate kinase
(4) Fructose phosphatase

Q.167 Stomata of a plant open due to : -
(1) Influx of potassium ions
(2) Efflux of potassium ions
(3) Influx of hydrogen ions
(4) Influx of calcium ions

Q.168 Plants deficient of element zinc, show its effect on the biosynthesis of plant growth hormone -
(1) Auxin (2) Cytokinin
(3) Ethylene (4) Abscissic acid

Q.169 Which one of the following is wrong in relation to photorespiration : -
(1) It occurs in chloroplasts
(2) It occurs in daytime only
(3) It is a characteristic of C_4 plants
(4) It is a characteristic of C_3 plants

Q.170 In which one of the following nitrogen is not a constituent : -
(1) Idioblast (2) Bacteriochlorophyll
(3) Invertase (4) Pepsin

Q.171 Diffuse porous wood is characteristics of those plants which are growing in : -
(1) Alpine region
(2) Cold winter regions
(3) Temperate climate
(4) Tropics

Q.172 The apical meristem of the root is present
(1) Only in radicals
(2) Only in tap roots
(3) Only in adventitious roots
(4) In all the roots

Q.173 Biosystematics aims at : -
(1) The classification of organisms based on broad morphological characters
(2) Delimiting various taxa of organism and establishing their relationships
(3) The classification of organisms based on their evolutionary history and establishing their phylogeny on the totality of various parameters from all fields of studies
(4) Identification and arrangement of organisms on the basis of cytological characteristics

Q.174 Juicy hair-like structures observed in the lemon fruit develop from : -
(1) Exocarp
(2) Mesocarp
(3) Endocarp
(4) Mesocarp and endocarp

Q.175 Which fractions of the visible spectrum of solar radiations are primarily absorbed by carotenoids of the higher plants : -
(1) Blue and green (2) Green and red
(3) Red and violet (4) Violet and blue

Q.176 *Nicotiana sylvestris* flowers only during long days and *N. tabacum* flowers only during short days. If raised in the laboratory under different photoperiods, they can be induced to flower at the same time and can be cross-fertilized to produce self-fertile offspring. What is the best reason for considering *N. sylvestris* and *N. tabacum* to be separate species : -
(1) They cannot interbreed in nature
(2) They are reproductively distinct
(3) They are physiologically distinct
(4) They are morphologically distinct

Q.177 In which kingdom would you classify the archaea and nitrogen-fixing organism, if the five-kingdom system of classification is used :
(1) Plantae (2) Fungi
(3) Protista (4) Monera

Q.178 Which of the following plants are used as green manure in crop fields and in sandy soils : -
(1) *Crotalaria juncea* and *Alhagi camelorum*
(2) *Calotropis procera* and *Phyllanthus niruri*
(3) *Saccharum munja* and *Lantana camara*
(4)*Dichanthium annulatum* and *Azolla nilotica*

Q.179 Which one pair of examples will correctly represent the grouping Spermatophyta according to one of the schemes of classifying plants : -
(1) Acacia, Sugarcane (2) Pinus, Cycas
(3) Rhizopus, Triticum (4) Ginkgo, Pisum

Q.180 Plants reproducing by spores such as mosses and ferns are grouped under the general term : -
(1) Cryptogams (2) Bryophytes
(3) Sporophytes (4) Thallophytes

Q.181 The chief advantage of encystment to an Amoeba is : -
(1) The ability to survive during adverse physical conditions
(2) The ability to live for some time without ingesting food
(3) Protection from parasites and predators
(4) The chance to get rid of accumulated waste products

Q.182 Bartholin's glands are situated : -
(1) On the sides of the head of some amphibians
(2) At the reduced tail end of birds
(3) On either side of vagina in humans
(4) On either side of vas deferens in humans

Q.183 Chlorenchyma found in : -
(1) Cytoplasm of *Chlorella*
(2) Mycelium of a green mould such as *Aspergillus*
(3) Spore capsule of a moss
(4) Pollen tube of *Pinus*

Q.184 Boron in green plants assists in : -
(1) Activation of enzymes
(2) Acting of enzyme cofactor
(3) Photosynthesis
(4) Sugar transport

Q.185 Which one of the following is categorised under living fossils : -
(1) *Pinus* (2) *Cycas*
(3) *Selaginella* (4) *Metasequoia*

Q.186 ELISA is used to detect viruses where the key reagent is : -
(1) Alkaline phosphatase
(2) Catalase
(3) DNA probe
(4) RNase

Q.187 Tobacco mosaic virus is a tubular filament of size : -
(1) 300 × 10 nm (2) 300 × 5 nm
(3) 300 × 20 nm (4) 700 × 30 nm

Q.188 Mycorrhiza is an example of :-
(1) Symbiotic relationship
(2) Ectoparasitism
(3) Endoparasitism
(4) Decomposers

Q.189 In alcohol fermentation : -
(1) Triose phosphate is the electron donor while acetaldehyde is the electron acceptor
(2) Triose phosphate is the electron donor while pyruvic acid is the electron acceptor
(3) There is no electron donor
(4) Oxygen is the electron acceptor

Q.190 Phenetic classification is based on : -
(1) The ancestral lineage of existing organisms
(2) Observable characteristics of existing organisms
(3) Dendrograms based on DNA characteristics
(4) Sexual characteristics

Q.191 Sexual reproduction in *Spirogyra* is an advanced feature because it shows : -
(1) Different size of motile sex organs
(2) Same size of motile sex organs
(3) Morphologically different sex organs
(4) Physiologically differentiated sex organs

Q.192 Which one of the following statements about viruses is correct : -
(1) Viruses possess their own metabolic system
(2) All viruses contain both RNA and DNA
(3) Viruses are obligate parasites
(4) Nucleic acid of viruses is known as capsid

Q.193 Which one of the following pairs of plants are not seed producers : -
(1) *Fern* and *Funaria*
(2) *Funaria* and *Ficus*
(3) *Ficus* and *Chlamydomonas*
(4) *Punica* and *Pinus*

Q.194 Species are considered as :-
(1) Real basic units of classification
(2) The lowest units of classification
(3) Artificial concept of human mind which cannot be defined in absolute terms
(4) Real units of classification devised by taxonomists

Q.195 Which one of the following triplet codes, is correctly matched with its specificity for an amino acid in protein synthesis or as 'start' or 'stop' codon : -
(1) UCG – Start (2) UUU – Stop
(3) UGU – Leucine (4) UAC – Tyrosine

Q.196 Coconut milk factor is : -
(1) An auxin (2) A gibberellin
(3) Abscissic acid (4) Cytokinin

Q.197 Gray spots of oat are caused by deficiency of : -
(1) Cu (2) Zn (3) Mn (4) Fe

Q.198 Genetic Map is one that : -
(1) Establishes sites of the genes on a chromosome
(2) Establishes the various stages in gene evolution
(3) Shows the stages during the cell division
(4) Shows the distribution of various species in a region

Q.199 The aleurone layer in maize grain is specially rich in :-
(1) Proteins (2) Starch
(3) Lipids (4) Auxins

Q.200 The term "antibiotic" was coined by : -
(1) Edward Jenner (2) Louis Pasteur
(3) Selman waksman (4) Alexander Fleming

ANSWER KEY (AIPMT-2003)

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

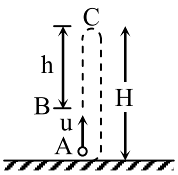
HINTS & SOLUTIONS

1. Let time of flight be T then $T = \frac{u}{g}$

Let h be the distance covered during last 't' second of its ascent

Velocity at point B = $v_B = u - g(T - t)$

$= u - g\left(\frac{u}{g} - t\right) = gt$



$\Rightarrow h = v_B t - \frac{1}{2}gt^2 \Rightarrow h = gt^2 - \frac{1}{2}gt^2 = \frac{1}{2}gt^2$

2. Here $\frac{dv}{dt}$ = constant = a (say)

Use $v^2 = u^2 + 2as$ where

$s = 2 \times 2\pi r = 80$ m, $u = 0$, $v = 80$ m/s

3. Use law of conservation of angular momentum.

$Mr^2\omega = (Mr^2 + 4mr^2)\omega' \Rightarrow \omega' = \frac{M\omega}{M + 4m}$

4. $m_1v_1 = m_2v_2$ $(P_1 = P_2)$;

$$\frac{E_1}{E_2} = \frac{\frac{1}{2}m_1v_1^2}{\frac{1}{2}m_2v_2^2} = \frac{\frac{P_1^2}{2m_1}}{\frac{P_2^2}{2m_2}} = \frac{m_2}{m_1}$$

5. $mgh = \frac{1}{2}mv^2(1 + K^2/R^2)$

$\Rightarrow v = \sqrt{\frac{2gh}{(1 + K^2/R^2)}}$

6. $U = \frac{1}{2}K(2)^2$; $U' = \frac{1}{2}K(10)^2 = 25U$

7. Height of jump on the planet B

$= \frac{g_A}{g_B} \times$ height of jump on the planets A

($\because$ mgh = constant)

8. $T_{max} = 25$ g; $ma = T_{max} - mg$

$\Rightarrow a = \frac{g}{4} = \frac{10}{4} = 2.5$ m/s^2

9. Reading of weighing scale = m(g + a)

= 80 (10 + 5) = 1200 N

10. T.K.E. = $\frac{1}{2}mv^2(1 + K^2/R^2)$

R.K.E. = $\frac{1}{2}mv^2(K^2/R^2)$

11. $\left(\vec{A} + \vec{B}\right).\left(\vec{A} - \vec{B}\right) = 0$

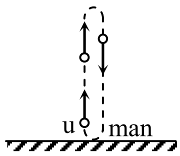
$\Rightarrow A^2 - \vec{A}.\vec{B} + \vec{B}.\vec{A} - B^2 = 0$

$\Rightarrow A = B$ $\quad (\because \vec{A}.\vec{B} = \vec{B}.\vec{A})$

12. Gravitational force does not depend on medium.

In this case time of flight of a ball $\geq 2 \times 2 = 4$ sec.

$\because$ Time of flight = $\frac{2u}{g} \ge 4$



$\Rightarrow u \ge 2g \Rightarrow u \ge$ 19.6 m/s $\quad (\because g = 9.8\ m/s^2)$

14. Use $\frac{1}{f} = (\mu - 1)\,(1/R_1 - 1/R_2)$,

Here $\mu = \frac{\mu_{\text{convex lens}}}{\mu_{\text{liquid}}} = 1 \quad \therefore f = \infty$

15. Source is stationary $\Rightarrow \lambda$ = constant

& $f' = \frac{v + v_s}{v} f = \left(1 + \frac{v_s}{v}\right) f = \left(1 + \frac{1}{5}\right) f = 1.2f$

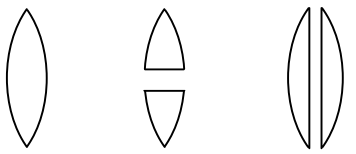
16. $K\ell$ = constant $\Rightarrow K' = 4K$

& $T = 2\pi\sqrt{\frac{m}{K}} \Rightarrow T' = \frac{T}{2}$

17. PE in SHM = $\frac{1}{2}Kx^2$[equation of parabola]

18. In forced vibration, the resonance wave becomes very sharp when damping force is small (i.e. negligible)

19.



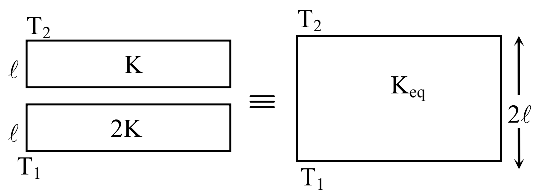
$f \qquad f' = f \qquad f'' = 2f$

20. A general body emits radiations of longer wavelength than absorbed radiations.

$\underbrace{\text{UV VIBGYOR}}_{\text{absorbed radiations}} \quad \underbrace{\text{IR}}_{\text{emitted radiations}} \quad \to \lambda$

21. Use $\eta = 1 - \frac{T_2}{T_1} = \frac{W}{Q}$

22.



$\frac{2\ell}{K_{eq}(A)} = \frac{\ell}{2KA} + \frac{\ell}{KA}$

(series connection $R = R_1 + R_2$)

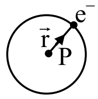
$\Rightarrow K_{eq} = \frac{4}{3}K$

23. $PE = \frac{1}{2}Kx^2 = \frac{1}{2}K\left(\frac{a}{2}\right)^2 = \frac{E}{4}$

24. Electric flux through any face

$= \frac{\text{Total flux}}{\text{number of faces}} = \frac{(q/E_0)}{6}$

25.



Coulomb force = $\frac{Ke^2}{r^2}(-\hat{r})$

$= -\frac{Ke^2}{r^3}\vec{r}$

26. $B = \mu_0 ni$; $n' = \frac{n}{2}$; $i' = 2i \Rightarrow B' = B$

27. Here $\vec{F} \perp \vec{v} \Rightarrow |\vec{v}|$ = constant

28. Use $T = 2\pi\sqrt{\frac{I}{MB}}$

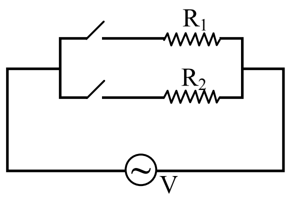
$\because I \propto$ mass $\Rightarrow T' = 2\pi\sqrt{\frac{4I}{MB}} = 2T$

29. If rated voltage = supply voltage then use

$\frac{1}{P} = \frac{1}{P_1} + \frac{1}{P_2}$ (series connection) &

$P = P_1 + P_2$ (parallel connection)

30.



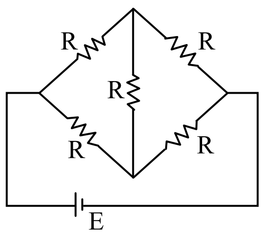
$Q = \frac{V^2}{R_1} \times t_1 = \frac{V^2}{R_2} \times t_2 = \frac{V^2}{R} \times t$

$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} \Rightarrow \frac{Q}{V^2 t} = \frac{Q}{V^2 t_1} + \frac{Q}{V^2 t_2}$

$\Rightarrow \frac{1}{t} = \frac{1}{t_1} + \frac{1}{t_2} \Rightarrow t = \frac{t_1 t_2}{t_1 + t_2}$

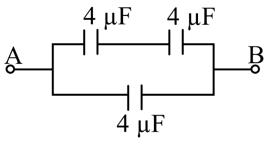
$= \frac{10 \times 40}{10 + 40} = 8$ min.

31.



Resistance seen by the battery = equivalent resistance b/w A & B = R

32.



$C_{AB} = (2 + 4)\mu F = 6\mu F$

33. Solar energy $\rightarrow$ fusion of protons into helium.

34. Fuse wire must have high resistance (per unit length) & low melting point.

35. $\dfrac{\text{Volume of atom}}{\text{volume of nucleus}} \sim \left(\dfrac{10^{-10}}{10^{-15}}\right)^3 = 10^{15}$

36. For a point source $I \propto \dfrac{1}{r^2}$

37. $N = N_0 e^{-\lambda t} \Rightarrow m = m_0 e^{-\lambda t} = m_0 e^{-\lambda(2/\lambda)}$

$= \dfrac{10}{e^2} = 1.35$ gm.

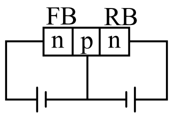
38. $r_n = 0.529\ \text{Å} \left(\dfrac{n^2}{Z}\right)$

39. Reverse bais increases the potential barrier.

40. $\left(\dfrac{e}{m}\right)_{\text{electron}} >> \left(\dfrac{e}{m}\right)_{\text{proton}}$

$\left[\because \left(\dfrac{e}{m}\right)_{\text{proton}} = \dfrac{1}{1837}\left(\dfrac{e}{m}\right)_{\text{electron}}\right]$

42.



In active region emitter base p-n junction is in FB & base collector p-n junction is in RB.

43. Curie law $\chi_m \propto \dfrac{1}{T}$

44. A diamagnetic material in a magnetic field moves from stronger to the weaker part of the field.

45. In FWR; ripple freq. = 2 × source Freq.

46. Barrier potential of a p-n junction diode does not depend on diode design.

47. $BE = \Delta m \times 931$

$= [2(1.0087 + 1.0073) - 4.0015] \times 931$

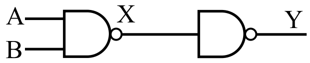
$= 28.4$ MeV

48. $A \geq Z$ [Equality sign $\rightarrow$ hydrogen nuclei]

49. Emission of electron (e^-) + antineutrino (γ^-)

$\Rightarrow$ β-decay.

50.



$X = \overline{A.B}$; $Y = \overline{X} = \overline{\overline{A.B}} = A \cdot B$

$\Rightarrow$ AND gate.