ROYAL ACADEMY- RAJKOT

RENEET PAPER - 23 **Marks : 720**

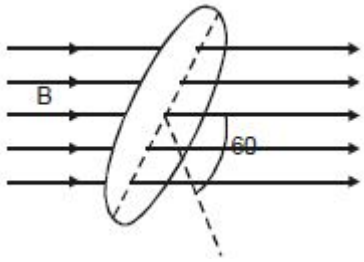
Sub. : PCB(EM) **Date: - 26.10.2024**

Physics - Section A (MCQ)

(1) The dimensions of magnetic flux are

(A) $MLT^{-2}A^{-2}$ (B) $ML^2T^{-2}A^{-2}$ (C) $ML^2T^{-1}A^{-2}$ (D) $ML^2T^{-2}A^{-1}$

(2) Fig represents an area $A = 0.5\,m^2$ situated in a uniform magnetic field (Figur) $B = 2.0\,weber/m^2$ and making an angle of 60^o with respect to magnetic field. The value of the magnetic flux through the area would be equal to.....$weber$



(A) 2 (B) $\sqrt{3}$ (C) $\sqrt{3}/2$ (D) 0.5

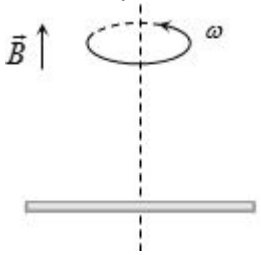
(3) The magnetic flux linked with a coil, in webers, is given by the equations $\phi = 3t^2 + 4t + 9$. Then the magnitude of induced $e.m.f.$ at $t = 2$ second will be.....$volt$

(A) 2 (B) 4 (C) 8 (D) 16

(4) The north pole of a magnet is brought near a metallic ring. The direction of the induced current in the ring will be

(A) Clockwise (B) Anticlockwise (C) Towards north (D) Towards south

(5) A conducting rod of length $2l$ is rotating with constant angular speed $omega$ about its perpendicular bisector. A uniform magnetic field $\vec{B}$ exists parallel to the axis of rotation. $Thee.m.f.$ induced between two ends of the rod is



(A) $B\ \omega$l2 (B) $\frac{1}{2}B\omega l^2$ (C) $\frac{1}{8}B\omega l^2$ (D) $Zero$

(6) A coil having 500 square loops each of side $10\,cm$ is placed normal to a magnetic flux which increases at the rate of 1.0 tesla/second. The induced $e.m.f.$ in volts is

(A) 0.1 (B) 0.5 (C) 1 (D) 5

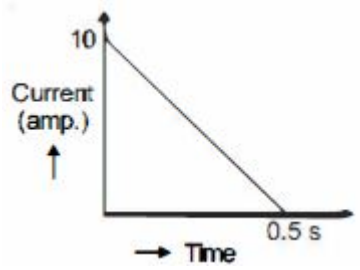
(7) In a circuit with a coil of resistance $2\,\Omega$, the magnetic flux changes from $2.0\,Wb$ to $10.0\,Wb$ in 0.2 second. The charge that flows in the coil during this time is.....$coulomb$

(A) 5 (B) 4 (C) 1 (D) 0.8

(8) A magnetic field of $2 \times 10^{-2}\ T$ acts at right angles to a coil of area $100\,cm^2$ with 50 turns. The average emf induced in the coil is $0.1\,V$, when it is removed from the field in time t. The value of t is.....sec

(A) 0.1 (B) 0.01 (C) 1 (D) 20

(9) In a coil of resistance $100\ \Omega$, a current is induced by changing the magnetic flux through it as shown in the figure. The magnitude of change in flux through the coil is.....Wb



(A) 200 (B) 225 (C) 250 (D) 275

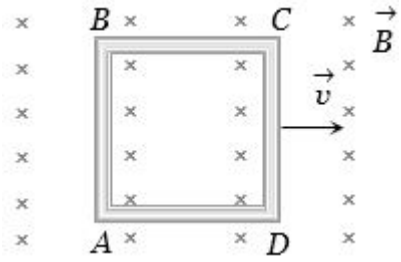
(10) A 800 turn coil of effective area 0.05 m^2 is kept perpendicular to a magnetic fleld 5×10^{-5} T. When the plane of the coil is rotated by 90° around any of tis coplanar axis in 0.1 s, the emf induced in the coll will be.....V

(A) 2 (B) 0.2 (C) 2×10^{-3} (D) 0.02

(11) An aeroplane in which the distance between the tips of wings is $50\ m$ is flying horizontally with a speed of $360\ km/hr$ over a place where the vertical components of earth magnetic field is $2.0 \times 10^{-4}\ weber/m^2$. The potential difference between the tips of wings would be.....V

(A) 0.1 (B) 0.2 (C) 1 (D) 0.01

(12) A conducting square loop of side L and resistance R moves in its plane with a uniform velocity v perpendicular to one of its sides. A magnetic induction B constant in time and space, pointing perpendicular and into the plane of the loop exists everywhere. The current induced in the loop is

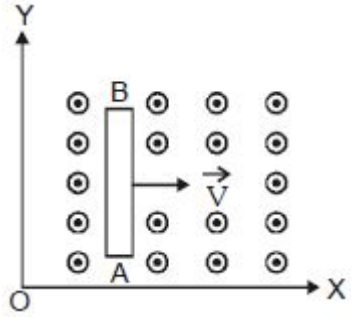


(A) $\frac{Blv}{R}$ clockwise (B) $\frac{Blv}{R}$ anticlockwise (C) $\frac{2Blv}{R}$ anticlockwise (D) Zero

(13) A metal rod of length $2\,m$ is rotating with an angular velocity of $100\,rad/sec$ in a plane perpendicular to a uniform magnetic field of $0.3\,T$. The potential difference between the ends of the rod is.....V

(A) 30 (B) 40 (C) 60 (D) 600

(14) A conducting rod AB moves parallel to $X-$ axis in a uniform magnetic field, pointing in the positive $X-$ direction. The end A of the rod gets



(A) positively charged (B) negatively charged

(C) neutral (D) first positively charged and then negatively charged

(15) An emf of $0.08\,V$ is induced in a metal rod of length $10\,cm$ held normal to a uniform magnetic field of $0.4\,T$, when moves with a velocity of .....ms^{-1}

(A) 2 (B) 3.2 (C) 0.5 (D) 20

(16) Two rigid bodies A and B rotate with rotational kinetic energies E_A and E_B respectively. The moments of inertia of A and B about the axis of rotation are I_A and I_B respectively. If $I_A = I_B/4$ and $E_A = 100\ E_B$ the ratio of angular momentum (L_A) of A to the angular momentum (L_B) of B is

(A) 25 (B) $5/4$ (C) 5 (D) $1/4$

(17) The position of a particle is given by : $\overrightarrow{r} = (\hat{i} + 2\hat{j} - \hat{k})$ and momentum $\overrightarrow{P} = (3\hat{i} + 4\hat{j} - 2\hat{k})$. The angular momentum is perpendicular to

(A) X - axis (B) Y - axis

(C) Z - axis (D) Line at equal angles to all the three axes

(18) A thin circular ring of mass M and radius r is rotating about its axis with a constant angular velocity ω. Two objects each of mass m are attached gently to the opposite ends of a diameter of the ring. The ring will now rotate with an angular velocity

(A) $\frac{\omega(M-2m)}{M+2m}$ (B) $\frac{\omega M}{M+2m}$ (C) $\frac{\omega M}{M+m}$ (D) $\frac{\omega(M+2m)}{M}$

(19) A uniform disc of mass M and radius R is rotating about a horizontal axis passing through its centre with angular velocity ω. A piece of mass m breaks from the disc and flies off vertically upwards. The angular speed of the disc will be

(A) $\frac{(M-2m)\omega}{(M-m)}$ (B) $\frac{(M+2m)\omega}{(M+m)}$ (C) $\frac{(M-2m)\omega}{(M+m)}$ (D) $\frac{(M+2m)\omega}{(M-m)}$

(20) When a mass is rotating in a plane about a fixed point, its angular momentum is directed along

(A) a line perpendicular to the plane of rotation (B) the radius

(C) the tangent to the orbit (D) the line making an angle of $45°$ to the plane of rotation

(21) Two discs of moment of inertia I_1 and I_2 and angular speeds ω_1 andω_2 are rotating along collinear axes passing through their centre of mass and perpendicular to their plane. If the two are made to rotate together along the same axis the rotational KE of system will be

(A) $\frac{I_1\omega_1+I_2\omega_2}{2(I_1+I_2)}$ (B) $\frac{(I_1+I_2)(\omega_1+\omega_2)^2}{2}$ (C) $\frac{(I_1\omega_1+I_2\omega_2)^2}{2(I_1+I_2)}$ (D) None of these

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

(A) $\frac{K^2}{R^2}$ (B) $\frac{K^2}{K^2+R^2}$ (C) $\frac{R^2}{K^2+R^2}$ (D) $\frac{K^2+R^2}{R^2}$

(23) The ratio of rotational and translatory kinetic energies of a sphere is

(A) $\frac{2}{9}$ (B) $\frac{2}{7}$ (C) $\frac{2}{5}$ (D) $\frac{7}{2}$

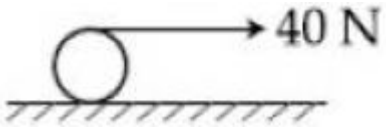
(24) A flywheel has moment of inertia $4\ kg - m^2$ and has kinetic energy of $200\ J$. Calculate the number of revolutions it makes before coming to rest if a constant opposing couple of $5\ N - m$ is applied to the flywheel ..... rev

(A) 12.8 (B) 24 (C) 6.4 (D) 16

(25) A body is rolling without slipping on a horizontal plane. If the rotational energy of the body is 40% of the total kinetic energy, then the body might be

(A) Cylinder (B) Hollow sphere (C) Solid cylinder (D) ring

(26) A string is wound around a hollow cylinder of mass $5\,kg$ and radius $0.5\,m$. If the string is now pulled with a horizontal force of $40\,N$, and the cylinder is rolling without slipping on a horizontal surface (see figure), then the angular acceleration of the cylinder will be ..... rad/s^2 .(Neglect the mass and thickness of the string)



(A) 20 (B) 16 (C) 12 (D) 10

(27) A solid cylinder and a hollow cylinder, both of the same mass and same external diameter are released from the same height at the same time on a inclined plane. Both roll down without slipping. Which one will reach the bottom first?

(A) Solid cylinder (B) Hollow cylinder

(C) Both together (D) Both together only when angle of inclination of plane is 45^o

(28) 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

(A) $\sqrt{\frac{3}{4}gh}$ (B) $\sqrt{\frac{4}{3}gh}$ (C) $\sqrt{4\,gh}$ (D) $\sqrt{2\,gh}$

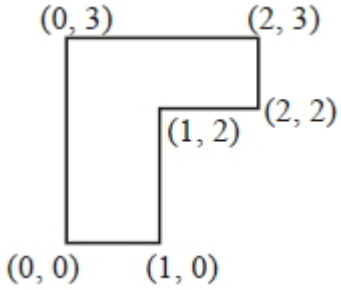
(29) The ratio of the accelerations for a solid sphere (mass m and radius R) rolling down an incline of angle θ without slipping and slipping down the incline without rolling is

(A) $5:7$ (B) $2:3$ (C) $2:5$ (D) $7:5$

(30) A solld cylinder of mass 2 kg and radius 50 cm rolls up an inclined plane of angle inclination $30°$. The centre of mass of cyllnder has speed of 4 m/s. The distance travelled by the cyllinder on the incline surface will be .....m

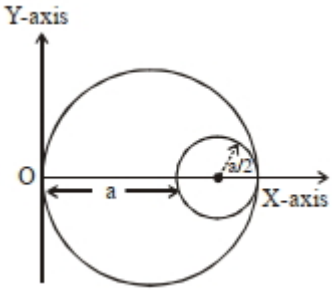
(A) 2.2 (B) 1.6 (C) 1.2 (D) 2.4

(31) The coordinates of centre of mass of a uniform flag shaped lamina (thin flat plate) of mass $4\ kg$. (The coordinates of the same are shown in figure) are



(A) $(1.25\text{ m}, 1.50\text{ m})$ (B) $(1\text{ m}, 1.75\text{ m})$ (C) $(0.75\text{ m}, 0.75\text{ m})$ (D) $(0.75\text{ m}, 1.75\text{ m})$

(32) A circular hole of radius $\left(\frac{a}{2}\right)$ is cut out of a circular disc of radius $'a'$ as shown in figure. The centroid of the remaining circular portion with respect to point $'O'$ will be :



(A) $\frac{1}{6}a$ (B) $\frac{10}{11}a$ (C) $\frac{5}{6}a$ (D) $\frac{2}{3}a$

(33) What is the moment of inertia of a square sheet of side l and mass per unit area μ about an axis passing through the centre and perpendicular to its plane

(A) $\frac{\mu l^2}{12}$ (B) $\frac{\mu l^2}{6}$ (C) $\frac{\mu l^4}{12}$ (D) $\frac{\mu l^4}{6}$

(34) From a disc of radius R and mass M, a circular hole of diameter R, whose rim passes through the centre is cut. What is the moment of inertia of the remaining part of the disc about a perpendicular axis, passing through the centre?

(A) $\frac{13MR^2}{32}$ (B) $\frac{11MR^2}{32}$ (C) $\frac{9MR^2}{32}$ (D) $\frac{15MR^2}{32}$

(35) A metre scale is balanced on a knife edge at its centre. When two coins, each of mass $10\,g$ are put one on the top of the other at the $10.0\,cm$ mark the scale is found to be balanced at $40.0\,cm$ mark. The mass of the metre scale is found to be $x \times 10^{-2}\ kg$. The value of x is

(A) 9 (B) 6 (C) 60 (D) 7

Physics - Section B (MCQ)

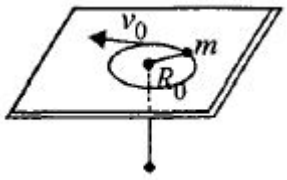
(36) A particle of mass $m = 5$ is moving with a uniform speed $v = 3\sqrt{2}$ in the XOY plane along the line $Y = X + 4$. The magnitude of the angular momentum of the particle about the origin is .....

(A) 0 (B) 60 (C) 7.5 (D) $40\sqrt{2}$

(37) A thin uniform circular disc of mass M and radius R is rotating in a horizontal plane about an axis passing through its centre and perpendicular to its plane with an angular velocity ω. Another disc of same dimension but of mass $M/4$ is placed gently on the first disc coaxially. The angular velocity of the system now is

(A) $2\omega/5$ (B) $2\omega/\sqrt{5}$ (C) $4\omega/5$ (D) $4\omega/\sqrt{5}$

(38) A mass m moves in a circle on a smooth horizontal plane with velocity v_0 at a radius R_0 . The mass is attached to a string which passes through a smooth hole in the plane as shown.The tension in the string is increased gradually and finally m moves in a circle of radius $\frac{R_0}{2}$. The final value of the kinetic energy is



(A) mv_0^2 (B) $\frac{1}{4}\,mv_0^2$ (C) $2mv_0^2$ (D) $\frac{1}{2}\,mv_0^2$

(39) The speed of a homogeneous solid sphere after rolling down an inclined plane of vertical height h, from rest without sliding, is

(A) $\sqrt{\frac{10}{7}gh}$ (B) $\sqrt{gh}$ (C) $\sqrt{\frac{6}{5}gh}$ (D) $\sqrt{\frac{4}{3}gh}$

(40) The angular momentum of a rigid body of mass m about an axis is n times the linear momentum (P) of the body. Total kinetic energy of the rigid body is

(A) $\frac{P^2\left[1+n^2\right]}{2m}$ (B) $\frac{n^2P^2}{2m}$ (C) $n^2P^2 \times 2m$ (D) $\frac{P^2}{2}\left(\frac{n^2}{I}+\frac{1}{m}\right)$

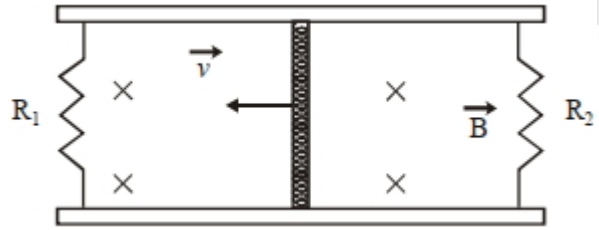
(41) A uniform solid cylindrical roller of mass $'m'$ is being pulled on a horizontal surface with force F parallel to the surface and applied at its centre. If the acceleration of the cylinder is $'a'$ and it is rolling without slipping then the value of $'F'$ is

(A) ma (B) $\frac{5}{3}\,ma$ (C) $\frac{3}{2}\,ma$ (D) $2\,ma$

(42) The centre of a wheel rolling on a plane surface moves with a speed v_0. A particle on the rim of the wheel at the same level as the centre will be moving at a speed $\sqrt{x}\,v_0$. Then the value of x is ..... .

(A) 9 (B) 2 (C) 4 (D) 81

(43) A conducting bar of length L is free to slide on two parallel conducting rails as shown in the figure Two resistors R_1 and R_2 are connected across the ends of the rails. There is a uniform magnetic field $\vec{B}$ pointing into the page. An external agent pulls the bar to the left at a constant speed v
The correct statement about the directions of induced currents I_1 and I_2 flowing through R_1 and R_2 respectively is



(A) Both I_1 and I_2 are in anticlockwise direction

(B) Both I_1 and I_2 are in clockwise direction

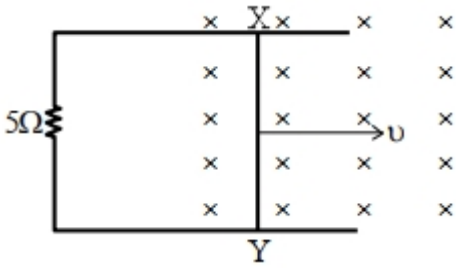
(C) I_1 is in clockwise direction and I_2 is in anticlockwise direction

(D) I_1 is in anticlockwise direction and I_2 is in clockwise direction

(44) The induced emf can be produced in a coil by
A. moving the coil with uniform speed inside magnetic field
B. moving the coil with non-uniform speed inside uniform magnetic field
C. rotating the coil inside the uniform magnetic field
D. changing the area of the coil inside the uniform magnetic field
Choose the correct answer from the options given below:

(A) B and D only (B) B and C only (C) A and C only (D) C and D only

(45) A $1\,m$ long metal rod XY completes the circuit as shown in figure. The plane of the circuit is perpendicular to the magnetic field of flux density $0.15\,T$. If the resistance of the circuit is $5\,\Omega$, the force needed to move the rod in direction, as indicated, with a constant speed of $4\,m/s$ will be ..... $10^{-3}\,N$

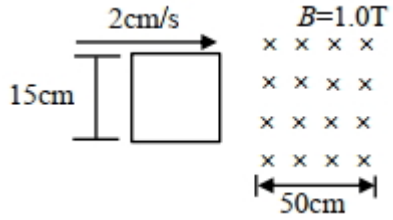


(A) 9 (B) 45 (C) 16 (D) 18

(46) A rectangular loop of length 2.5 m and width 2 m is placed at $60°$ to a magnetic field of 4 T. The loop is removed from the field in 10 sec. The average emf induced in the loop during this time is

(A) -2 V (B) $+2$ V (C) $+1$V (D) -1 V

(47) A square loop of side 15 cm being moved towards right at a constant speed of 2 cm/s as shown in figure. The front edge enters the 50 cm wide magnetic field at $t = 0$. The value of induced emf in the loop at $t = 10$ s will be :



(A) 0.3mV (B) 4.5mV (C) zero (D) 3mV

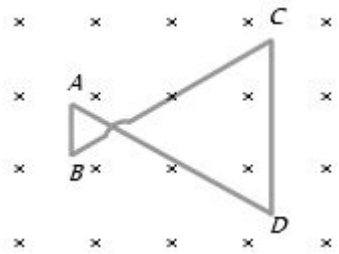
(48) The magnetic flux through a coil perpendicular to its plane is varying according to the relation $\phi = (5t^3 + 4t^2 + 2t - 5)\ Weber$. If the resistant of the coil is $5\ ohm$, then the induced current through the coil at $t = 2\ sec$ will be .... A

(A) 15.6 (B) 16.6 (C) 17.6 (D) 18.6

(49) A coil has 200 turns and area of $70cm^2$. The magnetic field perpendicular to the plane of the coil is $0.3Wb/m^2$and takes 0.1 sec to rotate through 180^o. The value of the induced $e.m.f.$ will be.....V

(A) 84 (B) 8.4 (C) 42 (D) 4.2

(50) A conducting wire frame is placed in a magnetic field which is directed into the paper. The magnetic field is increasing at a constant rate. The directions of induced current in wires AB and CD are



(A) B to A and D to C (B) A to B and C to D (C) A to B and D to C (D) B to A and C to D

Chemistry - Section A (MCQ)

(51) HNO_2 acts both as reductant and oxidant, while HNO_3 acts only as oxidant. It is due to their

(A) Solubility ability

(B) Maximum oxidation number

(C) Minimum oxidation number

(D) Minimum number of valence electrons

(52) Which of the following is a redox reaction

(A) $NaCl + KNO_3 \rightarrow NaNO_3 + KCl$

(B) $CaC_2O_4 + 2HCl \rightarrow CaCl_2 + H_2C_2O_4$

(C) $Mg(OH)_2 + 2NH_4Cl \rightarrow MgCl_2 + 2NH_4OH$

(D) $Zn + 2AgCN \rightarrow 2Ag + Zn(CN)_2$

(53) In the balanced chemical reaction,$IO_3^- + a\ I^- + b\ H^+ \rightarrow c\ H_2O + d\ I_2$ a, b, c and d respectively correspond to

(A) $5, 6, 3, 3$ (B) $5, 3, 6, 3$

(C) $3, 5, 3, 6$ (D) $5, 6, 5, 5$

(54) Which one of the following cannot function as an oxidising agent ?

(A) I^- (B) $S(s)$

(C) $NO_3^-\ (aq)$ (D) $Cr_2O_7^{2-}$

(55) Which of the following species can function both as oxidizing as well as reducing agent ?

(A) Cl^- (B) ClO_4^-

(C) ClO^- (D) MnO_4^-

(56) For the reaction $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$ under certain conditions of temperature and partial pressure of the reactants, the rate of formation of NH_3 is $0.001\,kg\,h^{-1}$. The rate of conversion of H_2 under the same conditions is

(A) $1.82 \times 10^{-4}\,kg/hr$ (B) $0.0015\,kg/hr$

(C) $1.52 \times 10^{4} kg/hr$ (D) $1.82 \times 10^{-14} kg/hr$

(57) For a first order reaction $A \rightarrow B$ the reaction rate at reactant concentration of $0.01\,M$ is found to be $2.0 \times 10^{-5} mol\ L^{-1} s^{1}$. The half life period of the reaction is ..... sec

(A) 220 (B) 30

(C) 300 (D) 347

(58) For the reaction $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$, the rate of reaction is expressed as

(A) $-\frac{\Delta[I_2]}{\Delta t} = -\frac{\Delta[H_2]}{\Delta t} = \frac{1}{2}\frac{\Delta[HI]}{\Delta t}$

(B) $\frac{\Delta[I_2]}{\Delta t} = \frac{\Delta[H_2]}{\Delta t} = \frac{\Delta[HI]}{2\Delta t}$

(C) $\frac{\Delta[H_2]}{\Delta t} = \frac{1}{2}\frac{\Delta[I_2]}{\Delta t} = -\frac{\Delta[HI]}{\Delta t}$

(D) None of these

(59) The rate law for the reaction$RCl + NaOH(aq) \rightarrow ROH + NaCl$ is given by Rate $= K_1[RCl]$. The rate of the reaction will be

(A) Doubled on doubling the concentration of sodium hydroxide

(B) Halved on reducing the concentration of alkyl halide to one half

(C) Decreased on increasing the temperature of the reaction

(D) Unaffected by increasing the temperature of the reaction

(60) The data for the reaction $A + B \rightarrow C$ isThe rate law corresponds to the above data is

Exp.	$[A]_0$	$[B]_0$	Initial rate
(1)	0.012	0.035	0.10
(2)	0.024	0.070	0.80
(3)	0.024	0.035	0.10
(4)	0.012	0.070	0.80

(A) Rate $= k\,[B]^3$ (B) Rate $= k\,[B]^4$

(C) Rate $= k\,[A]\,[B]^3$ (D) Rate $= k\,[A]^2\,[B]^2$

(61) For the reaction taking place on water, the order of reaction is

$H_2 + Cl_2 \xrightarrow{\text{Sunlight}} 2HCl$

(A) 1 (B) 2

(C) 3 (D) 0

(62) For the reaction system $2NO(g) + O_2(g) \rightarrow 2NO_2(g)$ volume is suddenly produced to half its value by increasing the pressure on it. If the reaction is of first order with respect to O_2 and second order with respect to NO, the rate of reaction will

(A) Diminish to one fourth of its initial value

(B) Diminish to one eighth of its initial value

(C) Increase to eight times of its initial value

(D) Increase to four times of its initial value

(63) In a zero-order reaction, for every $10\,^oC$ rise of temperature, the rate is doubled. If the temperature is increased from $10\,^oC$ to $100\,^oC$, the rate of the reaction will become ..... times

(A) 256 (B) 512

(C) 64 (D) 128

(64) Decomposition of X exhibits a rate constant for $0.05\,\mu g/year$. How many years are required for the decomposition of $5\,\mu g$ of X into $2.5\,\mu g$?

(A) 50 (B) 25

(C) 20 (D) 40

(65) $A \rightarrow B$

The above reaction is of zero order. Half life of this reaction is $50\,min$. The time taken for the concentration of A to reduce to one-fourth of its initial value is ..... min(Nearest integer)

(A) 74 (B) 75

(C) 72 (D) 73

(66) In a first order reaction the concentration of reactant decreases from $800\,mol/dm^3$ to $50\,mol/dm^3$ is 2×10^2 sec. The rate constant of reaction in sec^{-1} is

(A) 2×10^4 (B) 3.45×10^{-5}

(C) 1.386×10^{-2} (D) 2×10^{-4}

(67) A first order reaction which is 30% complete in 30 minutes has a half-life period of ..... min .

(A) 24.2 (B) 58.2

(C) 102.2 (D) 120.2

(68) For a first order reaction, the half-life period is independent of

(A) Initial concentration

(B) Cube root of initial concentration

(C) First power of final concentration

(D) Square root of final concentration

(69) In a first order reaction, the concentration of the reactant, decreases from $0.8\,M$ to $0.4\,M$ in 15 minutes. The time taken for the concentration to change from $0.1\,M$ to $0.025\,M$ is ..... min .

(A) 7.5 (B) 15

(C) 30 (D) 60

(70) $t_{\frac{1}{4}}$ can be taken as the time taken for the concentration of a reactant to drop to $\frac{3}{4}$ of its initial value. If the rate constant for a first order reaction is K, the $t_{\frac{1}{4}}$ can be written as

(A) $0.10/K$ (B) $0.29/K$

(C) $0.69/K$ (D) $0.75/K$

(71) The integrated rate equation is $Rt = \log\ C_0 - \log C_t$. The straight line graph is obtained by plotting

(A) time v/s $\log C_t$ (B) $\frac{1}{\text{time}}$ v/s C_t

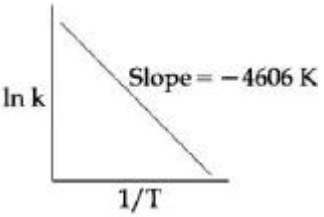
(C) time v/s C_t (D) $\frac{1}{\text{time}}$ v/s $\frac{1}{C_t}$

(72) The half-life period of a first order reaction is $15\,minutes$. The amount of substance left after one hour will be

(A) $\frac{1}{4}$ of the original amount (B) $\frac{1}{8}$ of the original amount

(C) $\frac{1}{16}$ of the original amount (D) $\frac{1}{32}$ of the original amount

(73) For a certain reaction consider the plot of lnk versus $1/T$ given in the figure. If the rate constant of this reaction at $400\,K$ is $10^{-5}\,s^{-1}$, then the rate constant at $500\,K$ is



(A) $10^{-6}\,s^{-1}$ (B) $2 \times 10^{-4}\,s^{-1}$

(C) $10^{-4}\,s^{-1}$ (D) $4 \times 10^{-4}\,s^{-1}$

(74) For a first order gas phase reaction : $A_{(g)} \rightarrow 2B_{(g)} + C_{(g)}$

P_0 be initial pressure of A and P_t the total pressure at time 't'. Integrated rate equation is :

(A) $\frac{2.303}{t} \log\left(\frac{P_0}{P_0 - P_t}\right)$ (B) $\frac{2.303}{t} \log\left(\frac{2P_0}{3P_0 - P_t}\right)$

(C) $\frac{2.303}{t} \log\left(\frac{P_0}{2P_0 - P_t}\right)$ (D) $\frac{2.303}{t} \log\left(\frac{2P_0}{2P_0 - P_t}\right)$

(75) Time required for 99.9% completion of a first order reaction is . . . . . time the time required for completion of 90% reaction.(nearest integer).

(A) 5 (B) 4

(C) 3 (D) 8

(76) Reaction of $t-$butyl bromide with sodium methoxide produces

(A) Isobutane (B) Isobutylene

(C) Sodium $t-$ butoxide (D) $t-$ butyl methyl ether

(77) $2-$ bromopentane is heated with potassium ethoxide in ethanol. The major product obtained is

(A) Pentene -1 (B) cis pentene -2

(C) trans pentene- 2 (D) 2 -ethoxypentane

(78) Match List I with List II

$1-$ Bromopropane is reacted with reagents in List I to give product in List II

List$I-$ Reagent	List$II-$Product
$A\ KOH($ alc)	I Nitrile
$B\ KCN$ (alc)	II Ester
$C\ AgNO_2$	III Alkene
$D\ H_3CCOOAg$	IV Nitroalkane

(A) $A-IV, B-III, C-II, D-I$

(B) $A-III, B-I, C-IV, D-II$

(C) $A-I, B-II, C-III, D-IV$

(D) $A-I, B-III, C-IV, D-II$

(79) The correct statement regarding nucleophilic substitution reaction in a chiral alkyl halide is ;

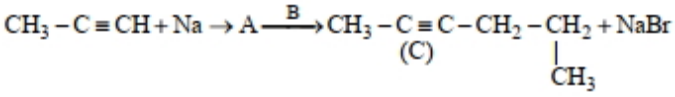
(A) Retention occurs in S_N1 reaction and inversion occurs in S_N2 reaction.

(B) Racemisation occurs in S_Nl reaction and retention occurs in S_N2 reaction.

(C) Racemisation occurs in both S_N1 and S_N2 reactions.

(D) Racemisation occurs in S_N1 reaction and inversion occurs in S_N2 reaction.

(80) Compound A formed in the following reaction reacts with B gives the product C. Find out A and B.



(A) $A = CH_5 - C \equiv \overline{CNa}^+, B = CH_5 - CH_2 - CH_2 - Br$

(B) $A = CH_3 - CH = CH_2,\ B = CH_3 - CH_2 - CH_2 - Br$

(C) $A = CH_3 - CH_2 - CH_3,\ B = CH_3 - C \equiv CH$

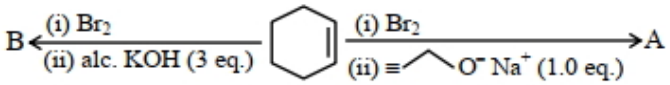
(D) $A = CH_3 - C \equiv \overline{CN}^+, B = CH_3 - CH_2 - CH_3$

(81) When phenyl magnesium bromide reacts with t butanol, the product would be

(A) Benzene (B) Phenol

(C) $t-$ butyl benzene (D) $t-$ butyl phenyl ether

(82) The major products from the following reaction sequence are product A and product B. The total sum of π electrons in product A and product B are . . . . . .(nearest integer)



(A) 5 (B) 6

(C) 7 (D) 8

(83) Diazo-coupling is useful to prepare some

(A) Pesticides (B) Proteins

(C) Dyes (D) Vitamins

(84) When chloroform reacts with ethyl amine in presence of alcoholic KOH, the compound formed is

(A) Ethyl cyanide (B) Ethyl isocyanide

(C) Formic acid (D) An amide

(85) Reaction of nitrous acid with aliphatic primary amine in the cold gives

(A) A diazonium salt (B) An alcohol

(C) A nitrite (D) A dye

Chemistry - Section B (MCQ)

(86) Among the following, the strongest base is

(A) $C_6H_5NH_2$ (B) $p-NO_2C_6H_4NH_2$

(C) $m-NO_2-C_6H_4NH_2$ (D) $C_6H_5CH_2NH_2$

(87) The correct order of increasing basic nature for the bases NH_3, CH_3NH_2 and $(CH_3)_2NH$ is

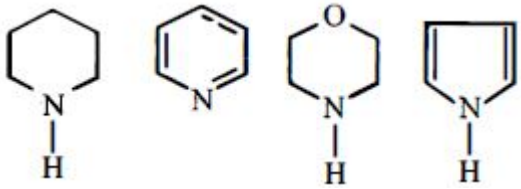
(A) $CH_3NH_2 < NH_3 < (CH_3)_2NH$

(B) $(CH_3)_2NH < NH_3 < CH_3NH_2$

(C) $NH_3 < CH_3NH_2 < (CH_3)_2NH$

(D) $CH_3NH_2 < (CH_3)_2NH < NH_3$

(88) In the following compounds the order of basicity is as follows



(A) $IV > III > II > I$ (B) $III > I > II > IV$

(C) $II > III > I > IV$ (D) $I > III > II > IV$

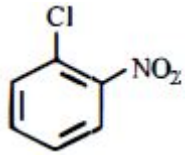
(89) $C_2H_5Br \xrightarrow{AgCN} X \xrightarrow[Zn-Hg/HCl]{\text{Reduction}} Y$, Here Y is

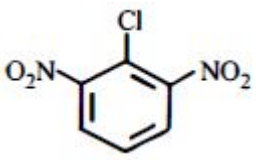
(A) Ethyl methyl amine (B) $n-$ propylamine

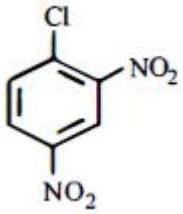
(C) Isopropylamine (D) Ethylamine

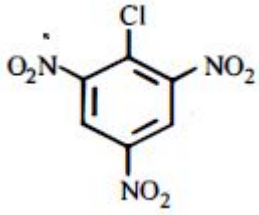
(90) A major component of Borsch reagent is obtained by reacting hydrazine hydrate

with which of the following ?

(A) 

(B) 

(C) 

(D) 

(91) Which compound does not form iodoform with alkali and iodine

(A) Acetone (B) Ethanol

(C) Diethyl ketone (D) Isopropyl alcohol

(92) What happens when CCl_4 is treated with $AgNO_3$

(A) NO_2 will be evolved

(B) A white ppt. of $AgCl$ will be formed

(C) CCl_4 will dissolve in $AgNO_3$

(D) Nothing will happen

(93) Chloropicrin is obtained by the reaction of

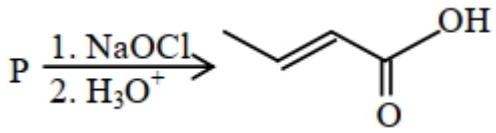
(A) Chlorine on picric acid

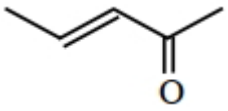
(B) Nitric acid on chloroform

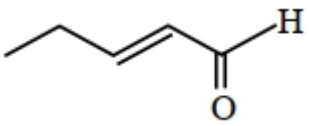
(C) Steam on carbon tetrachloride

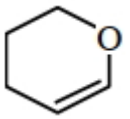
(D) Nitric acid on chlorobenzene

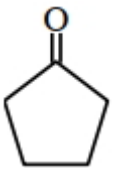
(94) The structure of the starting compound P used in the reaction given below is :



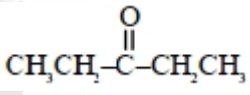
(A) 

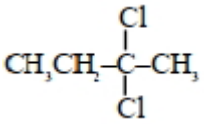
(B) 

(C) 

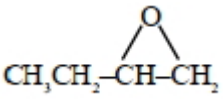
(D) 

(95) Which of the following compound can give positive iodoform test when treated with aqueous KOH solution followed by potassium hypoiodite.

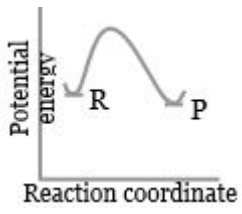
(A) null 

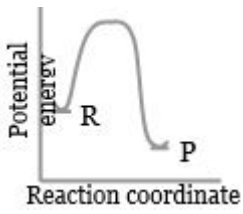
(B) null 

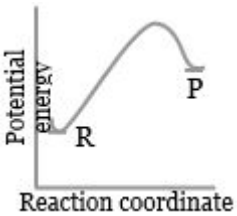
(C) $CH_3CH_2CH_2CHO$

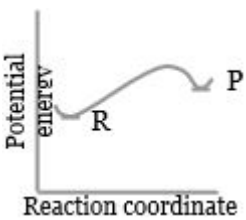
(D) null 

(96) An endothermic reaction with high activation energy for the forward reaction is given by the diagram:

(A) 

(B) 

(C) 

(D) 

(97) Consider an endothermic reaction $X \rightarrow Y$ with the activation energies E_b and E_f for the backward and forward reactions, respectively, in general

(A) $E_b < E_f$

(B) $E_b > E_f$

(C) $E_b = E_f$

(D) There is no definite relation between E_b and E_f

(98) 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

(A) log k vs $\frac{1}{\log T}$ (B) k vs T

(C) k vs $\frac{1}{\log T}$ (D) log k vs $\frac{1}{T}$

(99) The addition of a catalyst during a chemical reaction alters which of the following quantities?

(A) Enthalpy (B) Activation energy

(C) Entropy (D) Internal energy

(100) The activation energy of a reaction can be determined from the slope of which of the following graphs ?

(A) ln k vs. $\frac{1}{T}$ (B) $\frac{T}{\ln}$ vs. $\frac{1}{T}$

(C) ln k vs. T (D) $\frac{\ln k}{T}$ vs. T

Biology - Section A (MCQ)

(101) A temporary endocrine gland formed after ovulation in ovary is
(A) Corpus callosum (B) Corpus albicans (C) Corpus leuteum (D) Corpus uteri

(102) The hormone glucagon
(A) Has the opposite effect as that of insulin (B) Is produced in the beta cells of pancreas
(C) Converts glucose into glycogen (D) Is used in the treatment of diabetes mellitus

(103) Who formed NADPH2 ?
(A) PS-I (B) PS-II (C) None – cyclic Photophosphorylation (D) A & C both

(104) The last or terminal cytochrome in respiratory chain is
(A) $Cyt\ b$ (B) $Cyt\ a_3$ (C) $Cyt\ a$ (D) $Cyt\ c$

(105) Gonadotrophic hormones are produced in the
(A) Posterior part of thyroid (B) Adrenal cortex
(C) Adenohypophysis of pituitary (D) Interstitial cells of testis

(106) Match the following columns.

$Column-I$	$Column-II$
$A.F.W.went$	$1.Kinetin$
$B.E.Kurosawa$	$2.Gibberellinacid$
$C.SkoogandMiller$	$3.Auxin$
$D.Cousin$	$4.Ethylene$

$A-B-C-D$
(A) $1-2-3-4$ (B) $3-2-1-4$ (C) $4-3-2-1$ (D) $3-2-4-1$

(107) When 1 molecules of pyruvic acid passes through the process of Krebs cycle,. . . ..a... molecules of CO_2 are released and at ...b... different stages $2H^+$ and ...c... electrons are released.
$a-b-c$
(A) $6-10-4$ (B) $5-3-2$ (C) $3-3-6$ (D) $3-5-2$

(108) Which hormone stimulates two organ to secrete juice ?
(A) Thyroxine (B) Gastrin (C) Secretin (D) Colycystokinin

(109) Blood is formed of
(A) Plasma and bone marrow cells (B) Plasma and white and red blood cells
(C) Plasma and white blood cells (D) Plasma and red blood cells

(110) In humans a duration of cardiac cycle is for..... seconds?
(A) 0.70 (B) 0.72 (C) 0.80 (D) 0.90

(111) Systolic pressure in adult human is
(A) $120\,mm\,Hg$ (B) $120/80\,mm\,Hg$ (C) $150/120\,mm\,Hg$ (D) $80\,mm\,Hg$

(112) Choose correct option.

Column -I	Column -II
(p) Sponges	(I) Through tracheal tubes
(q) Insects	(II) Through lungs
(r) Molluscs	(III) Vascularized gills
(s) Reptiles	(IV) Simple diffusion over their entire body surface
	(V) by their moist cuticle

$p-q-r-s$

(A) $I-III-IV-V$ (B) $IV-I-III-II$ (C) $II-III-IV-I$ (D) $I-II-III-IV$

(113) Given below are two statements:
Statement I:The primary CO_2 acceptor in C_4 plants is phosphoenolpyruvate and is found in the mesophyll cells.
Statement II :Mesophyll cells of C_4 plants lack RuBisCo enzyme.
In the light of the above statements, choose the correct answer from the options given below:

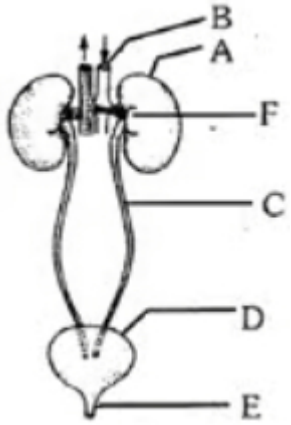
(A) Both Statement I and Statement II are incorrect

(B) Statement I is correct but Statement II is incorrect

(C) Statement I is incorrect but Statement II is correct

(D) Both Statement I and Statement II are correct

(114) In the diagram of excretory system of human beings given below, different parts have been indicated by alphabets; choose the answer in which these alphabets have been correctly matched with the parts which they represent



(A) A = Kidney, B = Abdominal aorta, C = Ureters, D = Urinary bladder, E = Urethra, F = Renal pelvis

(B) A = Kidney, B = Abdominal aorta, C = Urethra, D = Urinary bladder, E = Ureters, F = Renal pelvis

(C) A = Kidney, B = Renal pelvis, C = Urethra, D = Urinary bladder, E = Ureters, F = Abdominal aorta

(D) A = Kidney, B = Abdominal aorta, C = Urethra, D = Urinary bladder, E = Renal pelvis, F = Ureters

(115) The urine of a man is very dilute and the quantity of urine is too much and dehydration has started in his body and he is very thirsty by the cause of

(A) Hypersecretion of ADH (B) Hyposecretion of ADH (C) (a) and (b) both (D) None of the above

(116) Glomerulus is formed by

(A) Branch from renal vein

(B) Branch from renal artery

(C) Uriniferous tubule

(D) Coiling of proximal part of uriniferous tubule

(117) CO_2 binding capacity is higher in ..... & who has higher binding capacity in RuBisCO

(A) RuBisCO, CO_2 (B) RuBisCO, O_2 (C) PEPcase, CO_2 (D) PEPcase, O_2

(118) Which of the following two hormones have antagonistic effects

(A) Parathormone and calcitonin

(B) FSH and LH

(C) Oestrogen and progesterone

(D) ADH and melatonin

(119) How many H_2O requried for 6 $NADPH_2$ formation ?

(A) 12 (B) 3 (C) 9 (D) None of these

(120) In electron transport chain, which of following is a small and act as a mobile carrier for

electron transfer?

(A) Cytochrome A (B) Cytochrome a (C) Cytochrome a_3 (D) Cytochrome C

(121) Select the incorrect sentence for respiration.

(A) Diffusion of gases across alveolar membrane

(B) Transport of gases by the tissue

(C) Diffusion of O_2 and CO_2 between blood tissues

(D) Utilization of O_2 by the cells for catabolic reaction and resultant release of CO_2

(122) You are given a tissue with its potential for differentiation in an artifical culture. Which of the following pairs of hormones would you add to the medium to secure shoots as well as roots?

(A) IAA and gibberelin (B) Auxin and cytokinin

(C) Auxin and abscisic acid (D) Gibberelin & abscisic acid

(123) The thoracic chamber is formed of .....

(A) Ribs and sternum (B) Ribs and vertebral column

(C) Sternum and Piapharm (D) Verterbral column, sternum, ribs and diaphram.

(124) Match the following:

Column -I	Column -II
1. Cell body	p. Transmit impulses towords the cell body
2. Dendrites	q. Transmit impulses away from the cell body
3. Synaptic vesicles	r. Contain Cytoplasm and granular bodies
	s. Neurotransmitters

(A) $(1-p),(2-q),(3-r)$ (B) $(1-p),(2-q),(3-s)$ (C) $(1-r),(2-p),(3-s)$ (D) $(1-r),(2-q),(3-p)$

(125) In ETS, electron combines to

(A) Cytochrome (B) H_2 (C) O_2 (D) H_2O

(126) When a CO_2 molecule enters in Calvin cycle at that time 3 molecules of ..... and 2 molecules of ..... are required.

(A) $CO_2, NADPH$ (B) $ATP, NADPH$ (C) PGA, NAD (D) CO_2, NH_3

(127) How many ATP molecules can be produced through oxidative phosphorylation of $2NADH_2$ and $3FADH_2$?

(A) 15 (B) 24 (C) 6 (D) 12

(128) In case the islets of Langerhans stop functioning which hormone will be in short supply and what will be its effect

(A) Insulin-Blood glucose level will rise (B) Adrenaline-Heart beat will increase

(C) Thyroxin-Growth will be retarded (D) Cortine-Tetany will develop

(129) Asthma is a respiration disease concerned with

(A) Infection in alveolar wall (B) Inflammation of brochi and brochioles

(C) Proliferation of fibrous tissue (D) Infection in lungs

(130) Select the correct events that occur during inspiration.

(a) Contraction of diaphragm
(b) Contraction of external inter-costal muscles
(c) Pulmonary volume decreases
(d) Intra pulmonary pressure increases

(A) only (d) (B) (a) and (b) (C) (c) and (d) (D) (a), (b) and (d)

(131) Choose the correct pair

Stages	ATP produced through ETS
A. Glycolysis	1. 6
B. formation of Acetyl Co. A For Pyruvic acid	2. 3
C. Kreb's cycle	3. 11

$A - B - C$

(A) $1 - 2 - 3$ (B) $2 - 1 - 3$ (C) $3 - 2 - 1$ (D) $3 - 1 - 2$

(132) A pregnant female delivers a baby who suffers from stunted growth, mental retardation, low intelligence quotient and abnormal skin.This is the result of

(A) cancer of the thyroid gland (B) oversecretion of pars distalis

(C) deficiency of iodine in diet (D) low secretion of growth hormone.

(133) The total Lung Capacity (TLC) is the total volume of air accomodated in the lungs at the end of a forced inspiration. This includes

(A) RV (Residual Volume); ERV (Expiratory Reserve Volume); TV (Tidal Volume); and IRV (Inspiratory Reserve Volume)

(B) RV; IC (Inspiratory Capacity); EC (Expiratory Capacity); and ERV

(C) $RV; ERV; IC$ and EC

(D) $RV; ERV; VC$ (Vital Capacity) and FRC (Functional Residual Capacity)

(134) Pancreas secretes

(A) Digestive enzymes (B) Insulin (C) Glucagon (D) All the above

(135) What is the characteristic of metanephric kidney

(A) Hypotonic urine production (B) Excess secretion of uric acid

(C) Loop of Henle (D) Hormone production

(136) $A-$ The TCA cycle starts with the condensation of Acetyl group with OAA and water to yieldcitric acid

$R-$ Kreb's cycle occurs in cytoplasm of cell

(A) A and R both are correct. (B) A and R both are incorrect.

(C) A is correct and R is incorrect. (D) A is incorrect and R is correct.

(137) Which one controls the secretion of estrogen

(A) hCG (B) Progesteron (C) LH (D) FSH

(138) Which of these statements is incorrect?

(A) Glycolysis operates as long as it is supplied with NAD that can pick up hydrogen atoms.

(B) Enzymes of $TCAcycle$ are present in mitochondrial matrix.

(C) Oxidative phosphorylation takes place in outer mitochondrial membrane.

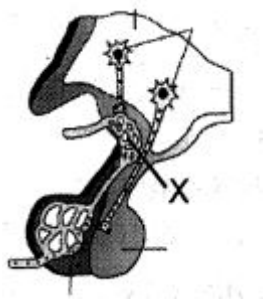
(D) Glycolysis occurs in cytosoal

(139) ..... support the process of red blood cells formation.

(A) Vasoprssin hormone (B) Adrenaline hormone

(C) Noradrenaline hormone (D) Thyroid hormone.

(140) Identify X from figure.



(A) Portal circulation (B) Posterior circulation (C) Hypothalamic neurons (D) Anteater pituitary

(141) Select the correct option on the basis of following sentences

(I) Hypothalamus is the basal part of diencephalon

(II) It regulates a wide spectrum of body function

(III) Two type of hormones are produced by hypothalamus.

(IV) Gonadotropins is hypothalamic hormone.

(A) Only I (B) Only I and II (C) I, II and III (D) I, II, III and IV

(142) Select the incorrect pair :

(A) Protein hormones : Insulin, glucagon, pituitary hormone (B) Steroids : hypothalamic hormone

(C) lodothynonines : Thyroid hormones (D) Amino acid derivatives : Epinephrine

(143) $A-$ The pituitary gland is located in bony cavity called sella tursica and is attached to hypothalanus by a stalk

$R-$ Adenohypophysis consists of two portions, pars distalis and pars intermedia

(A) A and R both are correct. (B) A and R both are incorrect.

(C) A is correct and R is incorrect. (D) A is incorrect and R is correct.

(144) $A-$ Secretin acts on gall bladder and stimulates the secretion of pancreatic enzymes and bile juice respectively

$R-CCK$ acts on pancreas and stimulates the secretion of pancreatic enzymes.

(A) A and R both are correct. (B) A and R both are incorrect.

(C) A is correct and R is incorrect. (D) A is incorrect and R is correct.

(145) Choose incorrect sentence.

(A) The corticoids, which are involved in carbohydrate metabolism are called glucocorticoids

(B) Corticoids, which regulate the water balancing and electrolytes in our body are called mineralocorticoids

(C) Cortisol stimulates the RBC production

(D) Cortisol is the main mineralocorticoid

(146) $A-$ Thyroid gland secretes a protein hormone called thyrocalcitonin (TCT) Which regulates the blood calcium levels

$R-TCT$ is a hypercalcemic hormone

(A) A and R both are correct. (B) A and R both are incorrect.

(C) A is correct and R is incorrect. (D) A is incorrect and R is correct.

(147) Choose incorrect sentence

(A) Small amounts of androgenic steroids are secreted by the adrenal medulla

(B) Androgens act on the central neural system and influence the male sexual behavior.

(C) The estrogen is synthesised and secreted mainly by the growing ovarian follicles

(D) Catecholamines stimulate the breakdown of lipids and proteins

(148) It simulates the development and differentiations, of $T-$ lymphocytes which provide cell mediated immunity

(A) Hormones of gland which located lateral side

(B) Hormones of gland which located between both lungs

(C) Hormones of gland which located in bony cavity

(D) Hormones produced from interstitial cells

(149) Select the correct statement.

(A) Insulin is associated with hyperglycemia.

(B) Glucocorticoids stimulate gluconeogenesis.

(C) Glucagon is associated with hypoglycemia.

(D) Insulin acts on pancreatic cells and adipocytes.

(150) Match the following concerning the activity function and the phytohormone involved.

Column I	Column II
(a) Fruit ripener	(i) Abscisic acid
(b) Herbicide	(ii) 2, 4 - D
(c) Bolting agent	(iii) GA_3
(d) Stress hormone	(iv) Ethephon

Select the correct option from following

(A) $(a)-(iv),(b)-(ii),(c)-(i),(d)-(iii)$

(B) $(a)-(ii),(b)-(iii),(c)-(iv),(d)-(i)$

(C) $(a)-(iii),(b)-(iv),(c)-(ii),(d)-(i)$

(D) $(a)-(iv),(b)-(iii),(c)-(ii),(d)-(i)$

(151) In tissue culture experiments, leaf mesophyll cells are put in a culture medium to form callus. This phenomenon may be called as

(A) Senescence (B) Differentiation (C) Dedifferentiation (D) Development

(152) Auxin is used by gardeners to prepare weed-free lawns. But no damage is caused to grass as auxin

(A) promotes abscission of mature leaves only.

(B) does not affect mature monocotyledonous plants.

(C) can help in cell division in grasses, to produce growth.

(D) promotes apical dominance.

(153) Choose correct one.

(A) In dicotyledonous and gymnosperms, the lateral meristems, vascular cambium and cork cambium appear earlier first in life.

(B) Growth is expressed as increase in cell number and in size of the cell.

(C) Growth can be defined as reversible permanent increase in size of an organ its parts or ever of an individual cell.

(D) Cells in a watermelon may increase in size upto $17,500$ times.

(154) What are the characteristics of the cells present in the root apex and shoot apex ?

$a.$ Constantly dividing cells.
$b.$ Cell walls are primary in nature.
$c.$ New cell wall deposition.
$d.$ Increased vacuolation.
$e.$ Possess large conspicuous nuclei.

(A) a,b,c (B) a,b,d (C) c,d,e (D) a,b,e

(155) It takes very long time for pineapple plants to produce flowers. Which combination of hormones
can be applied to artificially induce flowering in pineapple plants throughout the year to increase yield?

(A) Auxin and Ethylene

(B) Gibberellin and Cytokinin

(C) Gibberellin and Abscisic acid

(D) Cytokinin and Abscisic acid

(156) Match the following (Condition for growth)

P	Q
1. Nutrients (Macro and Micro)	a. Medium for enzymatic activities
2. Oxygen	b. Synthesis of protoplasm and act as a source of energy
3. Water	c. Releasing metabolic energy for growth activities

(A) $1-b, 2-a, 3-c$ (B) $1-c, 2-b, 3-a$ (C) $1-a, 2-b, 3-c$ (D) $1-b, 2-c, 3-a$

(157) Which effects are of gibberellins ?
- (a) It help overcome the apical dominance
- (b) Delay senescence, Thus the fruits can be left on the tree longer so as
- (c) Increase in length of axis
- (d) It is used to speed up the maltingprocess in brewing industries
- (e) It induces parthenocarpy
- (f) Promotes female flowers in cucumbers

(A) a, e, f (B) b, e, f (C) d, b, c (D) a, c, d

(158) Choose the incorrect statement.

(A) PGR has diverse physiological effects on plants.

(B) PGR may act synergically or antagonistically

(C) Two PGR can have same effect.

(D) $PGRs$ are divided into three groups based on their functions in a living plant body.

(159) What is correct for emphysema ?

(A) Occurs due to only bacteria infection.

(B) One of the major causes is cigarette smoking.

(C) Peoples working in stone breaking industries are most affected.

(D) Inflammation of bronchi and bronchioles.

(160) What is false for inspiration process?

(A) Inspiration can occur if the pressure within the lungs (intra - pulmonary pressure) is less than the atmospheric pressure.

(B) There is a positive pressure in the lungs with respect to atmosphere.

(C) Intra pulmonary pressure is lower than atmospheric pressure.

(D) Inspiration is initiated by the contraction of diaphragm.

(161) Match the items given in Column I with those in Column II and select the correct option given below:

Column I	Column II
(a)Tidal volume	(i) $2500-3000\,mL$
(b)Inspiratory Reserve volume	(ii) $1100-1200\,mL$
(c)Expiratory Reserve volume	(iii) $500-550\,mL$
(d) Residual volume	(iv) $1000-1100\,mL$

(A) $a-iv, b-iii, c-ii, d-i$ (B) $a-iii, b-i, c-iv, d-ii$

(C) $a-i, b-iv, c-ii, d-iii$ (D) $a-iii, b-ii, c-i, d-iv$

(162) Tidal Volume and Expiratory Reserve Volume of an athlete is 500 mL and 1000 mL respectively. What will be his Expiratory Capacity if the Residual Volume is 1200 mL? .....mL

(A) 1500 (B) 1700 (C) 2200 (D) 2700

(163) Identify the wrong statement with reference to transport of oxygen.

(A) Low pCO_2 in alveoli favours the formation of oxyhaemoglobin.

(B) Binding of oxygen with haemoglobin is mainly related to partial pressure of O_2.

(C) Partial pressure of CO_2 can interfere with O_2 binding with haemoglobin.

(D) Higher H^+ conc. in alveoli favours the formation of oxyhaemoglobin.

(164) Match the following columns and select the correct option

Column I	Column II
(a) Pneumotaxic Centre	(i) Alveoli
(b) O_2 Dissociation curve	(ii) Pons region of brain
(c) Carbonic Anhydrase	$(iii$ Haemoglobin
(d) Primary site of exchange of gases	(iv) $R.B.C.$

(A) $(a)-(iv), (b)-(i), (c)-(iii), (d)-(ii)$ (B) $(a)-(i), (b)-(iii), (c)-(ii), (d)-(iv)$

(C) $(a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)$ (D) $(a)-(iii), (b)-(ii), (c)-(iv), (d)-(i)$

(165) Identify the step in tricarboxylic acid cycle, which does not involve oxidation of substrate.

(A) Succinic acid $\rightarrow$ Malic acid (B) Succinyl-$CoA \rightarrow$ Succinic acid

(C) Isocitrate $\rightarrow$ α-ketoglutaric acid (D) Malic acid $\rightarrow$ Oxaloacetic acid

(166) Choose correct sentences for glycolysis.

(1) Glycolysis occurs in the cytoplasm of the cell.
(2) During this one molecule of glucose is converted into two molecules of pyruvic acid.
(3) O_2 is not used in this phase.
(4) This phase is known as TCA.

(A) $2, 3, 4$ (B) $1, 2, 4$ (C) $1, 2, 3$ (D) $1, 3, 4$

(167) In 5 Krebs cycle $\alpha-$ Kitoglutaric acid is converted into malic acid during this phase how many $NADH, FADH_2$ and ATP are formed?

(A) $2\ NADH, 1\ FADH_2, 1\ ATP$ (B) $1\ NADH, 1\ FADH_2,\ ATP$

(C) $5\ NADH, 5\ FADH_2, 5\ ATP$ (D) $3\ NADH, 1\ FADH, 3\ ATP$

(168) GSB & PSB do .....

(A) Oxigenic photosynthesis (B) Anoxigenic Photosynthesis

(C) Chemosynthetic (D) Both B & C

(169) $A-$ ATPase is a multienzyme complex containing two parts F_0 and F_1
$R-$ The F_1 headpiece is a peripheral membrane protein complex and contains the site for synthesis of ATP from ADP.

(A) A and R both are correct. (B) A and R both are incorrect.

(C) A is correct and R is incorrect. (D) A is incorrect and R is correct.

(170) Number of ATP molecules synthesized through oxidative phosphorylation during aerobic respiration of 3 pyruvic acids molecules are

(A) 56 (B) 42 (C) 102 (D) 108

(171) Which of the following is not correct for C_4- plants ?

(A) They have kranz anatomy in their leaves.

(B) Primary CO_2 acceptor is phosphoenol pyruvate

(C) Bundle sheet cells are rich in an enzyme PEP case but lack RuBisco

(D) Malic acid or aspartic acid is formed in mesophyll cell

(172) $I-$ It is the characteristic of C_4- plants
$II-$ It is the characteristic of C_3- plants
$III-$ It occurs in chloroplast
$IV-$ It occurs in day time
$V-$ It occurs in night
Select the correct option in relation, to photorespiration
Correct Sentences $-$ Incorrect Sentences

(A) $(I, IV) - (II, III, V)$ (B) $(II, III, IV) - (I, V)$ (C) $(I, II, III) - (IV, V)$ (D) $(IV, V) - (I, II, III)$

(173) $A-$ In the photo respiratory pathway there is synthesis of ATP or $NADPH$
$R-$ In C_4 plants photorespiration dose note occur.

(A) A and R both are correct. (B) A and R both are incorrect.

(C) A is correct, R is incorrect. (D) A is incorrect, R is correct.

(174) C_4 pathway is advantageous over C_3 pathway in plants. because it

(A) Occurs in relatively low co_2 concentration (B) Uses more amount of water

(C) Occurs in relatively low O_2 concentration (D) Is less efficient in energy utilisation

(175) How many cyclic & Non – cyclic photophosphorylation required for 1 sucrose molecule formation ?

(A) 6 Cyclic & 6 Non – cyclic (B) 12 Cyclic & 6 Non – cyclic

(C) 12 Cyclic & 12 Non – cyclic (D) 6 Cyclic & 12 Non – cyclic

(176) In some of the nephrons, the loop of henle is very long and runs deep into the medulla. These nephrons are called

(A) Malpighian tubules (B) Cortical nephrons (C) Juyxta medullary nephrons (D) Vasa recta

(177) ..... cells of Bowman's capsule called . . . . are arranged in an intricate manner so as to leave some minute spaces called slit pores.

(A) Endothelium, podocytes (B) Epithelium, podocytes

(C) Basement membrane, $JGA-$ cells (D) Epithelium $JGA-$ cells

(178) An adult, human excretes, on average, ...liters of urine per day. On an average, ... of urea is excreted out per day.

(A) $1 - 15\, liter, 30 - 25\, gm$ (B) $1 - 5\, liter, 25 - 30\, gm$

(C) $1 - 1.5\, liter, 25 - 30\, gm$ (D) $1 - 1.5\, liter, 20 - 25\, gm$

(179) The increase in osmolarity from outer to inner medullary interstitium is maintained due to :
(i) Close proximity between Henle's loop and vasa recta
(ii) Counter current mechanism

(iii) Selective secretion of HCO_3^- and hydrogen ions in PCT
(iv) Higher blood pressure in glomerular capillaries

(A) (i) and (ii) (B) Only (ii) (C) (iii) and (iv) (D) $(i), (ii)$ and (iii)

(180) Select the correct statement

(A) Reduction in Glomerular Filtration Rate activates JG cells to release renin.

(B) Atrial Natriuretic Factor increases the blood pressure.

(C) Angiotensin II is a powerful vasodilator.

(D) Counter current pattern of blood flow is not observed in vasa recta.

(181) Which of the following statements are correct?

A. An excessive loss of body fluid from the body switches off osmoreceptors.
B. ADH facilitates water reabsorption to prevent diuresis.
C. ANF causes vasodilation.
D. ADH causes increase in blood pressure.
E. ADH is responsible for decrease in GFR.
Choose the correct answer from the options given below:

(A) C, D and E only (B) A and B only (C) B, C and D only (D) A, B and E only

(182) ..... is absent or highly reduced in cortical nephrons

(A) Henle's loop. (B) Vasa recta (C) Collecting duct (D) PCT

(183) Uremia is the occurrence of

(A) Blood in urine (B) Excess of urea in blood

(C) Excess of sugar in blood (D) Deficiency of sugar

(184) $A-$ Malfunctioning of kidneys can lead to accumulation of urea in blood, a condition called ureamia.
$R-$ Blood drained from a convenient artery is pumped into dialyzing unit after adding anti heparin.

(A) Both A and R are true (B) Both A and R are false (C) A is false, R is true (D) A is true, R is false

(185) Choose incorrect sentence.

(I) Malpighian corpuscles, PCT and DCT the nephron are situated in medulla of the kidney
(II) The loop of henle dips into medulla.
(III) In juxta medullary nephrons, the loop of henle is too short and extends very little into the medulla.
(IV) Vasa recta is absent or highly reduced in cortical nephrons.

(A) I, II (B) II, IV (C) I, III (D) III, IV

(186) Mechanism of uric acid excretion in a nephron is

(A) Osmosis (B) Diffusion (C) Secretion (D) Ultrafiltration

(187) In micturition

(A) Urethra relaxes (B) Ureter contracts (C) Ureter relaxes (D) Urethra contracts

(188) Which is mismatched

(A) Bowman's capsule - Glomerular filteration (B) PCT -Absorption of Na^+ and K^+

(C) DCT -Absorption of glucose (D) None of these

(189) Which is true statements ?

(A) The skull region articulates with the superior region of the vertebral column with the help of two occipital condyles.

(B) Number of thoracic vertebra are 7.

(C) Palatine bone has seen from outer surface.

(D) Lacrimal had not seen from outer layer.

(190) Given characters are showed in .....

– They are located in the inner wall of alimentary canal.

– They do not show any striation.
– They are non-striated and spindle shaped.
– They are involuntary and innervated by autonomous nervous system

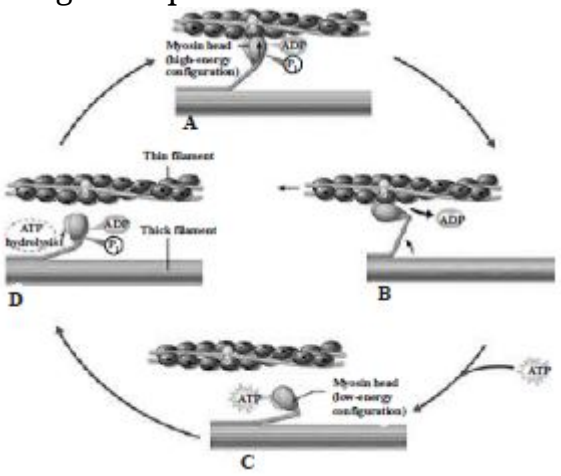
(A) Skeletal muscles (B) Cardiac muscles (C) Voluntary muscles (D) Visceral muscles

(191) $A-$ Actin filaments occurs in two forms, the polymeric $'G'$ actin and monomer $F-$ actin.
$R-$ Tropomyosin is a rod - shaped fibrous protein. Tropomyosin forms two helical strands, which are wrapped around the $G-$ actin.

(A) A and R both are correct. (B) A and R both are incorrect.

(C) A is correct and R is incorrect. (D) A is incorrect and R is correct.

(192) The given figure represents the cross bridge cycle in skeletal muscle. What does the step B in the figure represents ?



(A) Attachment of myosin head to actin forming cross bridge.

(B) Release of phosphate. Myosin changes shape to pull actin

(C) Attachment of new ATP to myosin head. The cross bridge detaches

(D) Splitting of ATP into ADP and Pi. Myosin cocks into its high energy conformation.

(193) An acromian process is characteristically found in the

(A) pelvic girdle of human (B) pectoral girdle of human

(C) skull of frog (D) sperm of mammals

(194) Stimulation of a muscle fiber by a motor neuron occurs at:

(A) the neuromuscular junction (B) the transverse tubules

(C) the myofibril (D) the sacroplasmic reticulum

(195) ..... form the hard protective outer covering for the brain

(A) Cranial bones and facial bones (B) Only cranial bones

(C) Only facial bones (D) Hyoid bone

(196) Macrophasges and leucocytes exhibit

(A) Cilliary movement (B) Flagellar movement (C) Amoeboid movement (D) Gliding movement

(197) Delete odd one (interm of relationship)

(A) Scapula (B) Humerus (C) Radius, ulna (D) lleum

(198) Which sentence is not true for muscle contraction ?

(A) During stimulation when muscle contract, the length of filaments (thin and thick) does not change but merely slide over one another.

(B) During stimulation $Z-$ line two of sarcomere comes close to each other.

(C) On stimulation there is no any change in light band.

(D) All of the above

(199) Read the following statements carefully and select the correct option.
I. The medulla is connected to the spinal cord.

II. Medulla contains controlling centers for respiration, cardiovascular reflexes and gastric secretion.
III. Cerebellum has very convoluted surface in order to provide the additional space for more neurons.

(A) Only I (B) Only I and III (C) Only III (D) I, II, III

(200) Resting membrane potential is maintained by

(A) Hormone (B) Neurotransmitter (C) lon pumps (D) None of these