

- Q.1** An experiment measures quantities a, b, c and then X is calculated from  $X = \frac{a^{1/2}b^2}{c^3}$ . If the percentage error in a, b and c are  $\pm 1\%$ ,  $\pm 3\%$ , and  $\pm 2\%$ , respectively, then the percentage error in X can be  
 (1) 12.5% (2) 7% (3) 1% (4) 4%

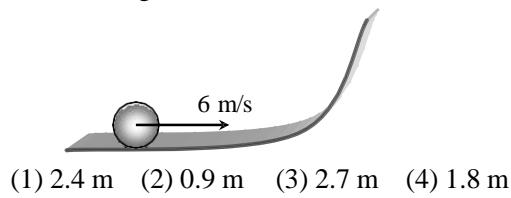
- Q.2** A bullet is fired from a gun. The force on the bullet is given by :

$$F = 600 - 2 \times 10^5 t$$

Where F is in newton and t in second. The force on the bullet becomes zero as soon as it leaves the barrel. What is the average impulse imparted to the bullet ?

- (1) 9 N-s (2) zero  
 (3) 0.9 N-s (4) 1.8 N-s

- Q.3** A disc of radius 0.1 m rolls without sliding on a horizontal surface with a velocity of 6 m/s. It then ascends a smooth continuous track as shown in figure. The height upto which it will ascend is- ( $g = 10 \text{ m/s}^2$ )



- (1) 2.4 m (2) 0.9 m (3) 2.7 m (4) 1.8 m

- Q.4** Water from a stream is falling on the blades of a turbine at the rate of 100 kg/sec. If the height of the stream is 100 m, then the power delivered to the turbine is -

- (1) 100 kW (2) 100 W  
 (3) 10 kW (4) 1 kW

- Q.5** A uniform chain has a mass m and length l. It is held on a frictionless table with one-sixth of its length hanging over the edge. The work done in just pulling the hanging part back on the table is -

- (1)  $\frac{mgl}{72}$  (2)  $\frac{mgl}{36}$  (3)  $\frac{mgl}{12}$  (4)  $\frac{mgl}{6}$

- Q.6** A bomb of 12 kg mass explodes into two pieces of masses 4 kg and 8 kg. The velocity of 8 kg mass is  $6 \text{ m s}^{-1}$ . The kinetic energy of the other mass is -

- (1) 48 J (2) 32 J (3) 24 J (4) 288 J

- Q.7** A particle of mass m moving with velocity v strikes a stationary particle of mass 2 m and sticks to it. The speed of the system will be -  
 (1)  $v/2$  (2)  $2v$  (3)  $v/3$  (4)  $3v$

- Q.8** An isolated particle of mass m is moving in the horizontal plane (x – y), along the x-axis, at a certain height above the ground. It suddenly explodes into two fragments of masses  $m/4$  and  $3m/4$ . An instant later, the smaller fragment is at  $y = +15 \text{ cm}$ . The larger fragment at this instant is at -

- (1)  $y = -5 \text{ cm}$  (2)  $y = +20 \text{ cm}$   
 (3)  $y = +5 \text{ cm}$  (4)  $y = -20 \text{ cm}$

- Q.9** What is the moment of inertia of a solid sphere of density  $\rho$  and radius R about its diameter ?

- (1)  $\frac{105}{176} R^5 \rho$  (2)  $\frac{105}{176} R^2 \rho$   
 (3)  $\frac{176}{105} R^5 \rho$  (4)  $\frac{176}{105} R^2 \rho$

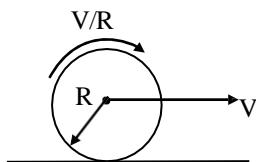
- Q.10** A uniform rod of length l and mass m is suspended from one of its ends and it makes n revolutions per second. What is its rotational energy ?

- (1)  $\frac{1}{3} \pi^2 n^2 m l^2$  (2)  $\frac{2}{3} \pi^2 n^2 m l^2$   
 (3)  $\frac{3}{2} \pi^2 n^2 m l^2$  (4)  $3\pi^2 n^2 m l^2$

- Q.11** The KE required to make a body move to infinity from the earth's surface is -

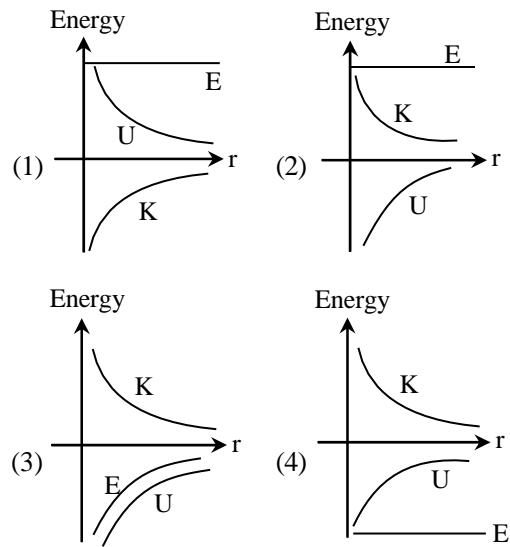
- (1) infinite (2)  $2 mgR$   
 (3)  $1/2 mgR$  (4)  $mgR$

- Q.12** A disc is performing pure rolling on a smooth stationary surface with constant angular velocity as shown in figure. At any instant, for the lower most point of the disc -



- (1) Velocity is  $v$ , acceleration is zero
- (2) Velocity is zero, acceleration is zero
- (3) Velocity is  $v$ , acceleration is  $\frac{v^2}{R}$
- (4) Velocity is zero, acceleration is nonzero

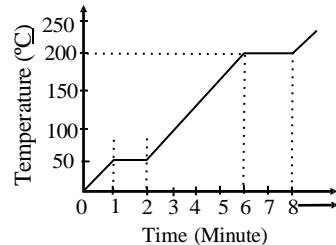
- Q.13** The correct graph representing the variation of total energy( $E$ ), kinetic energy( $K$ ) & potential energy ( $U$ ) of a satellite with its distance from the centre of earth is -



- Q.14** Two wires are made of the same material and have the same volume. However wire 1 has cross-sectional area  $A$  and wire 2 has cross-sectional area  $3A$ . If the length of wire 1 increases by  $\Delta x$  on applying force  $F$ , how much force is needed to stretch wire 2 by the same amount ?

- (1)  $4F$
- (2)  $6F$
- (3)  $9F$
- (4)  $F$

- Q.15** A student takes 50 gm wax (specific heat = 0.6 kcal/kg °C) and heats it till it boils. The graph between temperature and time is as follows. Heat supplied to the wax per minute and boiling point are respectively -



- (1) 500 cal, 50°C
- (2) 1000 cal, 100°C
- (3) 1500 cal, 200°C
- (4) 2000 cal, 200°C

- Q.16** The adiabatic and isothermal volume elasticities  $B_\phi$  and  $B_\theta$  are related as :

- (1)  $\frac{B_\phi}{B_\theta} = \gamma$
- (2)  $\frac{B_\theta}{B_\phi} = \gamma$
- (3)  $B_\phi - B_\theta = \gamma$
- (4)  $B_\theta - B_\phi = \gamma$

- Q.17** The second law of thermodynamics implies -

- (1) whole of heat can be converted into mechanical energy
- (2) no heat engine can be 100% efficient
- (3) every heat engine has an efficiency of 100%
- (4) a refrigerator can reduce the temperature to absolute zero

- Q.18** Consider an equimolar mixture of monoatomic gas and diatomic gas. The heat required to increase the temperature of  $n$  moles of gas from  $T$  to  $2T$ , at constant pressure, is -

- (1)  $(3/2) nRT$
- (2)  $3nRT$
- (3)  $5nRT$
- (4)  $2nRT$

- Q.19** Two simple pendulums of lengths 1 meter and 16 meters respectively are both given small displacements in the same direction at the same instant. They will again be in phase after the shorter pendulum has completed  $n$  oscillations where  $n$  is -

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

**Q.20** The equation of a stationary wave is  $y = 0.8 \cos\left(\frac{\pi x}{20}\right) \sin 200\pi t$ , where  $x$  is in cm and  $t$  is in sec. The separation between consecutive nodes will be -

- (1) 20 cm      (2) 10 cm  
 (3) 40 cm      (4) 30 cm

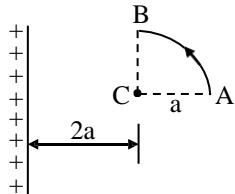
**Q.21** A string of length 0.4 m and mass  $10^{-2}$  kg is tightly clamped at its ends. The tension in the string is 1.6 N. Identical wave pulses are produced at one end at equal intervals of time,  $\Delta t$ . The minimum value of  $\Delta t$  which allows constructive interference between successive pulses is -

- (1) 0.05 s      (2) 0.10 s  
 (3) 0.20 s      (4) 0.40 s

**Q.22** The property of medium necessary for wave propagation is its -

- (1) Inertia      (2) Elasticity  
 (3) Low resistance      (4) All of above

**Q.23** The arc AB with the centre C and the infinitely long wire having linear charge density  $\lambda$  are lying in the same plane. The minimum amount of work to be done to move a point charge  $q_0$  from point A to B through a circular path AB of radius  $a$  is equal to -



- (1)  $\frac{-q_0\lambda}{2\pi\epsilon_0} \log\left(\frac{2}{3}\right)$   
 (2)  $\frac{-q_0\lambda}{2\pi\epsilon_0} \log\left(\frac{3}{2}\right)$   
 (3)  $\frac{q_0\lambda}{2\pi\epsilon_0} \log\left(\frac{2}{3}\right)$   
 (4)  $q_0\lambda/\sqrt{2\pi\epsilon_0}$

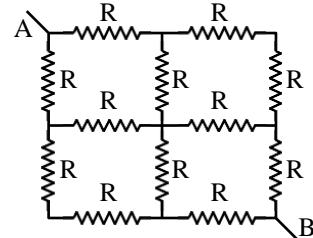
**Q.24** How many  $1 \mu\text{F}$  capacitors must be connected in parallel to store a charge of 1 C with a potential difference of 500 V across the capacitors ?

- (1) 1000      (2) 200  
 (3) 20      (4) 2000

**Q.25** Two electric bulbs 40 W, 200 V and 100 W, 200 V are connected in series. Then the maximum voltage that can be applied across the combination, without fusing either bulb (in V) is -

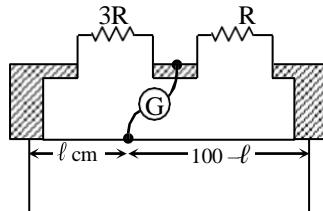
- (1) 280      (2) 400      (3) 300      (4) 200

**Q.26**  $R_{AB}$  is -



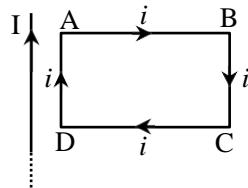
- (1)  $R$       (2)  $\frac{3}{2}R$       (3)  $2R$       (4)  $\frac{R}{2}$

**Q.27** Shown in the figure given below is a meter-bridge set up with null deflection in the galvanometer. The value of  $\ell$  is -



- (1) 75 cm      (2) 25 cm  
 (3) 50 cm      (4) 5 cm

**Q.28** A rectangular loop carrying a current  $i$  is situated near a long straight wire such that the wire is parallel to one of the sides of the loop and is in the plane of the loop. If a steady current  $I$  is established in the wire as shown in the figure, the loop will -

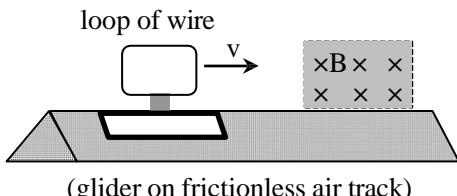


- (1) rotate about an axis parallel to the wire  
 (2) move away from the wire  
 (3) move towards the wire  
 (4) remain stationary

**Q.29** The distance between rails is 2 m, which is along south-north direction. Vertical component of the earth magnetic field is  $1.25 \times 10^{-4}$  tesla. If the speed of the train is 4 m/s, then induced emf across the axle is -

- (1)  $10^{-4}$  V                          (2)  $10^{-2}$  V  
 (3)  $10^{-1}$  V                            (4)  $10^{-3}$  V

**Q.30** A single, continuous loop of conducting wire is mounted on a glider, which travels on a frictionless air track with an initial velocity  $v$ . When the front edge of the loop enters the magnetic field  $B$  pointing into the page as shown



(glider on frictionless air track)

- (1) there is a clockwise current in the loop and the glider slows down  
 (2) there is a counterclockwise current in the loop and the glider slows down  
 (3) there is a clockwise current in the loop and the glider speeds up  
 (4) there is a counterclockwise current in the loop and the glider speeds up

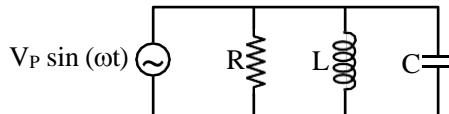
**Q.31** An object is approaching a fixed plane mirror with velocity 5 m/s making an angle of  $45^\circ$  with the normal. The speed of image with respect to mirror is -

- (1) 5 m/s                                (2)  $\frac{5}{\sqrt{2}}$  m/s  
 (3)  $5\sqrt{2}$  m/s                        (4) 10 m/s

**Q.32** Two coherent point sources  $s_1$  and  $s_2$  vibrating in phase emit light of wavelength  $\lambda$ . The separation between the sources is  $2\lambda$ . The smallest distance from  $s_2$  on a line passing through  $s_2$  and perpendicular to  $s_1s_2$ , where a minimum of intensity occurs is -

- (1)  $\frac{7\lambda}{12}$                               (2)  $\frac{15\lambda}{4}$                             (3)  $\frac{\lambda}{2}$                                 (4)  $\frac{3\lambda}{4}$

**Q.33** Consider the circuit below. A resistor  $R$ , inductor  $L$ , and capacitor  $C$  are connected in parallel across an alternating voltage source. Which statement(s) is (are) correct ?



- The addition of instantaneous current through each element give the instantaneous current provided by the driving source.
  - The addition of instantaneous voltages across each element give the instantaneous voltage of the driving source.
  - The voltage across  $C$  is  $90^\circ$  out of phase with the voltage across  $R$ .
  - The voltage across  $C$  is  $180^\circ$  out of phase with the voltage across  $L$ .
  - All energy is dissipated by the resistor.
- (1) Only I and V are correct  
 (2) Only II and V are correct  
 (3) Only I, IV and V are correct  
 (4) Only II, IV and V are correct

**Q.34** A compound microscope has magnifying power as 32 and magnifying power of eyepiece is 4, then the magnifying power of objective is -

- (1) 8                                        (2) 10  
 (3) 6                                        (4) 12

**Q.35** In a double-slit experiment, instead of taking slits of equal width, one slit is made twice as wide as the other. Then in the interference pattern -

- the intensities of both the maxima and the minima increase
- the intensity of the maxima increases and the minima has zero intensity
- the intensity of the maxima decrease and that of the minima increase
- the intensity of the maxima decrease and the minima has zero intensity

- Q.36** If momentum of particle is increased by 25% then % change in wave length is -  
 (1) decreased by 25% (2) increased by 25%  
 (3) decreased by 20% (4) increased by 20%

- Q.37** A deuteron is accelerated through a potential of 500 volt. The potential through which a singly ionised helium ion is to be accelerated for the same de-Broglie wavelength, will be -  
 (1) 125 V (2) 150 V (3) 250 V (4) 500 V

- Q.38** The number of red photons ( $\lambda = 663$  nm) that must strike a totally reflecting screen per second at normal incidence so that a force of 1N is exerted on the screen is -  
 (1)  $5 \times 10^{23}$  (2)  $5 \times 10^{24}$   
 (3)  $5 \times 10^{25}$  (4)  $5 \times 10^{26}$

- Q.39** A small particle of mass m moves in such a way that the potential energy  $u = \frac{1}{2} m^2 \omega^2 r^2$  where  $\omega$  is a constant and  $r$  is the distance of the particle from the origin. Assuming Bohr's model of quantization of angular momentum and circular orbits. The radius of  $n^{\text{th}}$  allowed orbit is proportional to -  
 (1)  $n^2$  (2)  $\sqrt{n}$  (3)  $n^{3/2}$  (4)  $\frac{1}{n}$

- Q.40** The initial activity of a certain radioactive isotope was measured as 16000 counts per minute. Given that the only activity measured was due to this isotope and that its activity after 12 hours was 2000 counts per minute, its half-life, in hours, is nearest to -  
 (1) 9.0 (2) 6.0  
 (3) 4.0 (4) 3.0

- Q.41** The current gain of a transistor in common base mode is 0.9. In order to change the emitter current by 5 mA, the required change in collector current will be -  
 (1) 4 mA (2) 4.5 mA  
 (3) 5.6 mA (4) 0 mA

- Q.42** Input waveforms A and B as shown in figure (i) are applied to the combination of gates as shown in figure (ii). Which of the waveforms shown in figure (iii) to (vi) correctly represents the output waveform ?

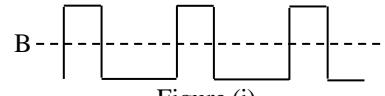
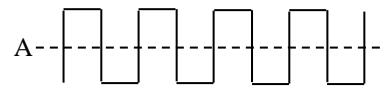


Figure (i)

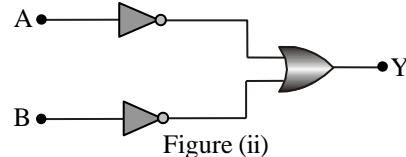


Figure (ii)

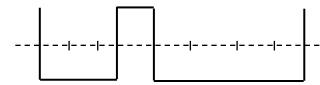


Figure (iii)

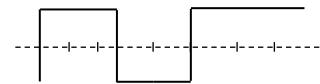


Figure (iv)

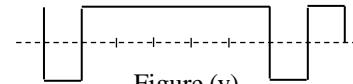


Figure (v)

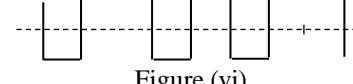


Figure (vi)

- (1) Figure (iii) (2) Figure (iv)  
 (3) Figure (v) (4) Figure (vi)

- Q.43** Final image formed by compound microscope is-

- (1) Virtual, Inverted (2) Real, Inverted  
 (3) Real, Erect (4) None of these

- Q.44** Gravitational acceleration at the depth of  $\frac{R}{2}$  is-

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

- Q.45** Moment of inertia of solid cylinder about the axis passing from the center of mass and perpendicular to the length is-

- (1)  $\frac{MR^2}{4} + \frac{ML^2}{12}$  (2)  $\frac{MR^2}{2} + \frac{ML^2}{12}$   
 (3)  $\frac{MR^2}{4}$  (4)  $\frac{ML^2}{12}$

**Q.46** If 80 g of X combines with  $1.5 \times 10^{23}$  atoms of Y to form  $X_2Y$  without any of either element remaining, what is the atomic weight of X ?

- (1)  $8.0 \times 10$       (2)  $2.0 \times 10$   
(3)  $1.6 \times 10^2$       (4)  $1.2 \times 10^2$

**Q.47** How many electrons are present in  $2 \times 10^{-3}$  mol of  ${}_{8}^{18}\text{O}^{2-}$  ?

- (1)  $1.2 \times 10^{21}$       (2)  $9.6 \times 10^{21}$   
(3)  $1.2 \times 10^{22}$       (4)  $1.9 \times 10^{22}$

**Q.48** The ratio of time periods ( $T_1/T_2$ ) in second orbit of hydrogen to third orbit of  $\text{He}^+$  ion is:

- (1)  $8/27$       (2)  $32/27$   
(3)  $27/32$       (4)  $24/36$

**Q.49** Three isotopes of an element have mass numbers,  $M$ ,  $(M + 1)$  and  $(M + 2)$ . If the average mass number is  $(M + 0.5)$  then which of the following ratios may be accepted for  $M$ ,  $(M + 1)$ ,  $(M + 2)$  in that order ?

- (1)  $1 : 1 : 1$       (2)  $4 : 1 : 1$   
(3)  $3 : 2 : 1$       (4)  $2 : 1 : 1$

**Q.50** Which of the following electron transitions in hydrogen atom will require largest amount of energy ?

- (1) from  $n = 1$  to  $n = 2$   
(2) from  $n = 2$  to  $n = 3$   
(3) from  $n = \infty$  to  $n = 1$   
(4) from  $n = 3$  to  $n = 5$

**Q.51** A boiled egg shows a/an ..... in entropy -

- (1) Increase      (2) Decrease  
(3) No change      (4) None of these

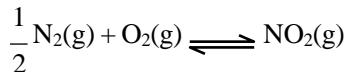
**Q.52** 2 mole of an ideal gas at  $27^\circ\text{C}$  expands isothermally & reversibly from a volume of 4 litre to 40 litre. the work done by the gas is -

- (1)  $W = -28.72 \text{ kJ}$   
(2)  $W = -11.488 \text{ kJ}$   
(3)  $W = -5.736 \text{ kJ}$   
(4)  $W = 4.988 \text{ kJ}$

**Q.53**

**Reaction**

**K**

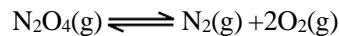


$K_1$



$K_2$

Using above equations, write down expression for K of the following reaction:



(1)  $K_1 K_2$       (2)  $\frac{K_2^2}{K_1}$

(3)  $\frac{1}{K_2^2 K_1}$       (4)  $\frac{1}{K_2^2 K_1^2}$

**Q.54**

The solubility product of  $\text{AgI}$  at  $25^\circ\text{C}$  is  $1.0 \times 10^{-16} \text{ mol}^2 \text{ L}^{-2}$ . The solubility of  $\text{AgI}$  in  $10^{-4} \text{ M}$  solution of  $\text{KI}$  at  $25^\circ\text{C}$  is (in  $\text{mol L}^{-1}$ )

- (1)  $1.0 \times 10^{-10}$       (2)  $1.0 \times 10^{-8}$   
(3)  $1.0 \times 10^{-16}$       (4)  $1.0 \times 10^{-12}$

**Q.55**

The solubility product of  $\text{AgCl}$  is  $1.8 \times 10^{-10}$ , Precipitation of  $\text{AgCl}$  will occur only when equal volumes of which of the following solution are mixed?

- (1)  $10^{-4} \text{ M Ag}^+$  and  $10^{-4} \text{ M Cl}^-$   
(2)  $10^{-7} \text{ M Ag}^+$  and  $10^{-7} \text{ M Cl}^-$   
(3)  $10^{-5} \text{ M Ag}^+$  and  $10^{-5} \text{ M Cl}^-$   
(4)  $10^{-10} \text{ M Ag}^+$  and  $10^{-10} \text{ M Cl}^-$

**Q.56**

The oxidation numbers of C in  $\text{CH}_4$ ,  $\text{CH}_3\text{Cl}$ ,  $\text{CH}_2\text{Cl}_2$ ,  $\text{CHCl}_3$  and  $\text{CCl}_4$  are respectively :

- (1) +4, +2, 0, -2, -4  
(2) +2, +4, 0, -4, -2  
(3) -4, -2, 0, +2, +4  
(4) -2, -4, 0, +4, +2

**Q.57**

In a face centered cubic lattice, a unit cell is shared equally by how many unit cell ?

- (1) 2      (2) 4      (3) 6      (4) 8

**Q.58**

Relationship between osmotic pressure at  $273 \text{ K}$  when 1% glucose ( $\pi_1$ ), 1% urea ( $\pi_2$ ), 1% sucrose ( $\pi_3$ ) are dissolved in 1 litre of water :

- (1)  $\pi_1 > \pi_2 > \pi_3$       (2)  $\pi_2 > \pi_1 > \pi_3$   
(3)  $\pi_3 > \pi_1 > \pi_2$       (4)  $\pi_1 = \pi_2 = \pi_3$

- Q.59** Two liquids A and B have  $P_A^0 : P_B^0 = 1 : 3$  at a certain temperature. If the mole fraction ratio of  $x_A : x_B = 1 : 3$ , the mole fraction of A in vapour in equilibrium with the solution at a given temperature is -  
 (1) 0.1    (2) 0.2    (3) 0.5    (4) 1.0

- Q.60** The molar conductivities of KCl, NaCl and KNO<sub>3</sub> are 152, 128 and 111 S cm<sup>2</sup>mol<sup>-1</sup> respectively. What is the molar conductivity of NaNO<sub>3</sub>?  
 (1) 101 S cm<sup>2</sup> mol<sup>-1</sup>    (2) 87 S cm<sup>2</sup> mol<sup>-1</sup>  
 (3) -101 S cm<sup>2</sup> mol<sup>-1</sup>    (4) -391 S cm<sup>2</sup> mol<sup>-1</sup>

- Q.61** Given  $E^\circ_{Cr^{3+}/Cr} = -0.72$  V,  $E^\circ_{Fe^{2+}/Fe} = -0.42$  V  
 The potential for the cell  
 $Cr | Cr^{3+} (0.1\text{ M}) \parallel Fe^{2+} (0.01\text{ M}) | Fe$  is  
 (1) 0.339 V    (2) -0.339 V  
 (3) -0.26 V    (4) 0.26 V

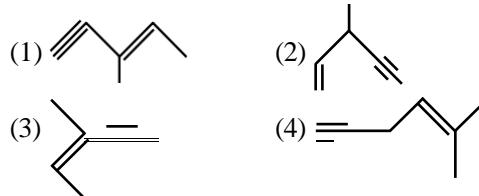
- Q.62** For the reaction,  $4A + B \longrightarrow 2C + 2D$ , the statement not correct is :  
 (1) The rate of disappearance of B is one fourth the rate of disappearance of A  
 (2) The rate of appearance of C is half the rate of disappearance of B  
 (3) The rate of formation of D is half the rate of consumption of A  
 (4) The rates of formation of C and D are equal

- Q.63** The rate of first order reaction, A  $\longrightarrow$  Products, is  $7.5 \times 10^{-4}$  mol litre<sup>-1</sup> sec<sup>-1</sup>. If the concentration of A is 0.5 mol litre<sup>-1</sup> the rate constant is :  
 (1)  $3.75 \times 10^{-4}$  sec<sup>-1</sup>    (2)  $2.5 \times 10^{-5}$  sec<sup>-1</sup>  
 (3)  $1.5 \times 10^{-3}$  sec<sup>-1</sup>    (4)  $8.0 \times 10^{-4}$  sec<sup>-1</sup>

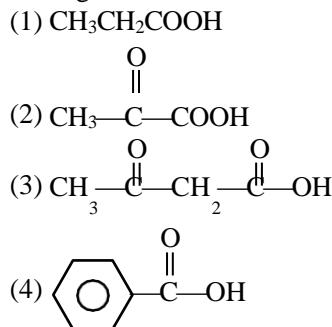
- Q.64** Gold numbers of protective colloids A, B, C and D are 0.50, 0.01, 0.10 and 0.005, respectively. The correct order of their protective powers is  
 (1) C < B < D < A    (2) A < C < B < D  
 (3) B < D < A < C    (4) D < A < C < B

- Q.65** The reactivity of alkyl halides for SN<sup>2</sup> reaction is :  
 (1)  $1^\circ > 2^\circ > 3^\circ$     (2)  $3^\circ > 2^\circ > 1^\circ$   
 (3)  $2^\circ > 3^\circ > 1^\circ$     (4)  $1^\circ > 3^\circ > 2^\circ$

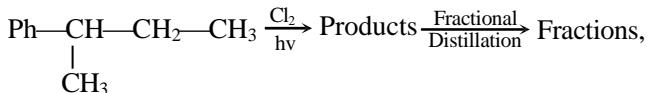
- Q.66** Which would produce chiral molecule after hydrogenation with Lindlar catalyst ?



- Q.67** Which of the following carboxylic acids undergoes decarboxylation most easily on heating?

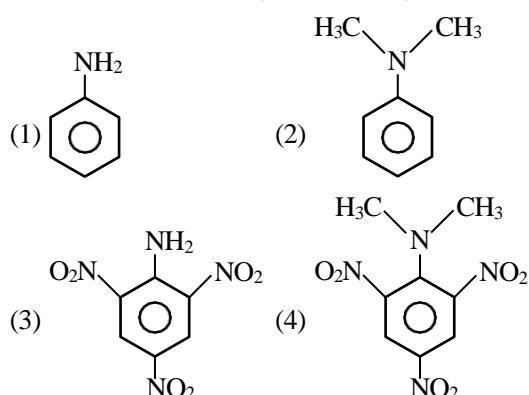


**Q.68**

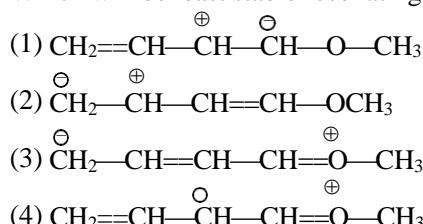


No. of products and no. of fractions are respectively :  
 (1) 6, 5    (2) 6, 4    (3) 5, 4    (4) 6, 3

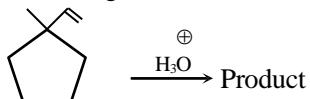
- Q.69** Which of the following is the strongest base?



- Q.70** Which will be least stable resonating structure?



**Q.71** In the following reaction



The major product is :

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

**Q.72**

Identify final product 'Y' :

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

**Q.73** Cinnamic acid from benzaldehyde would be prepared by which of the following reaction?

- (1) Perkin reaction  
 (2) Reformatsky reaction  
 (3) Knoevenagel condensation  
 (4) All of these

**Q.74** react most readily with :

- (1)  $\text{H}_2\text{N}-\text{NH}_2$   
 (2)  $\text{H}_2\text{N}-\text{NH}-\text{C}(=\text{O})-\text{NH}_2$   
 (3)  $\text{Ph}-\text{NH}-\text{NH}_2$   
 (4)  $\text{H}_2\text{N}-\text{OH}$

**Q.75** Which of the following compounds does not liberate  $\text{N}_2$  on treatment with  $\text{HNO}_2$  ?

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

**Q.76** An organic compound (A) on reduction gives a compound (B) which on reaction with  $\text{CHCl}_3$  and  $\text{NaOH}$  form (C). The compound (C) on catalytic reduction gives N-methylaniline. The compound (A) is :

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

**Q.77** Which of the following gives an optically inactive aldaric acid on oxidation with dilute  $\text{HNO}_3$  acid ?

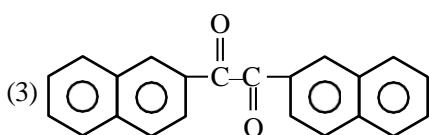
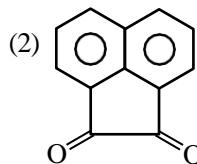
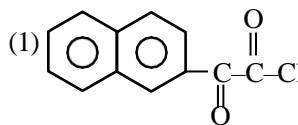
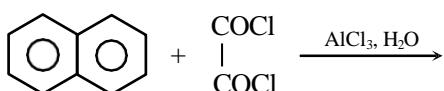
- (1)   
 (2)   
 (3)   
 (4)

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

**Q.78** Biuret test is used for the detection of :

- (1) sugar (2) proteins (3) fats (4) starch

- Q.79** The major product formed in the given reaction is :



(4) none of the above

- Q.80** Arrange the elements F, Na, Fe, Cl, Ne in increasing order of ionization energy

- (1)  $\text{Na} < \text{Fe} < \text{Cl} < \text{F} < \text{Ne}$
- (2)  $\text{Ne} > \text{F} > \text{Cl} > \text{Fe} > \text{Na}$
- (3)  $\text{Fe} > \text{Cl} > \text{F} > \text{Ne} > \text{Na}$
- (4)  $\text{F} > \text{Na} > \text{Ne} > \text{Cl} > \text{F}$

- Q.81** Which of the following forms a stable oxidation states?

- (1)  $\text{Ce}^{3+}, \text{Yb}^{4+}$
- (2)  $\text{Eu}^{2+}, \text{Tb}^{4+}$
- (3)  $\text{Lu}^{3+}, \text{Gd}^{2+}$
- (4)  $\text{Pr}^{5+}, \text{Nd}^{2+}$

- Q.82** In the gaseous phase phosphorus pentachloride exists in the form of  $\text{PCl}_5$  units. The hybridization of constituent units in the solid state of phosphorus pentachloride is

- (1)  $\text{sp}^3\text{d}$
- (2)  $\text{sp}^3, \text{sp}^3\text{d}$
- (3)  $\text{sp}^2, \text{sp}^3\text{d}^2$
- (4)  $\text{sp}^3, \text{sp}^3\text{d}^2$

- Q.83** Which of the following is correct order of bond angle ?

- (1)  $\text{NH}_3 > \text{PH}_3 > \text{NF}_3$
- (2)  $\text{NF}_3 > \text{NH}_3 > \text{PH}_3$
- (3)  $\text{NH}_3 > \text{NF}_3 > \text{PH}_3$
- (4)  $\text{PH}_3 > \text{NH}_3 > \text{NF}_3$

- Q.84** The d-orbital involved in the hybridization of centre atom in  $\text{XeOF}_2$  molecule is

- (1)  $\text{d}_{z^2}$
- (2)  $\text{d}_{x^2-y^2}$  and  $\text{d}_z^2$
- (3)  $\text{d}_{xy}$
- (4)  $\text{d}_{yz}$

- Q.85** Hybridisation of Be in the solid form of  $\text{BeCl}_2$  is

- (1)  $\text{sp}$
- (2)  $\text{sp}^2$
- (3)  $\text{sp}^3$
- (4)  $\text{dsp}^2$

- Q.86** The dissolution of  $\text{Al}(\text{OH})_3$  by a solution of  $\text{NaOH}$  results in the formation of

- (1)  $[\text{Al}(\text{H}_2\text{O})_4(\text{OH})_2]^+$
- (2)  $[\text{Al}(\text{H}_2\text{O})_3(\text{OH})_3]$
- (3)  $[\text{Al}(\text{H}_2\text{O})_2(\text{OH})_4]^-$
- (4)  $[\text{Al}(\text{H}_2\text{O})_6(\text{OH})_3]$

- Q.87** Which of the following contains three centre and two electron bonds?

- (1)  $(\text{BeH}_2)_2$
- (2)  $\text{LiAlH}_4$
- (3)  $(\text{BeCl}_2)_2$
- (4)  $\text{Li}_2\text{C}_2$

- Q.88** In solid state  $\text{N}_2\text{O}_5$  exists as

- (1)  $[\text{NO}_3]^- [\text{NO}_2]^+$
- (2)  $[\text{NO}_2]^- [\text{NO}_3]^+$
- (3)  $[\text{N}_2\text{O}_4]^{2+} \text{O}^{2-}$
- (4)  $[\text{NO}_3] [\text{NO}_2]$

- Q.89** Which of the following has highest conductivity?

- (1)  $\text{K}_2[\text{PtCl}_6]$
- (2)  $\text{K}_4[\text{Fe}(\text{CN})_6]$
- (3)  $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$
- (4)  $[\text{Co}(\text{NH}_3)_3(\text{NO}_2)_3]$

- Q.90** The coordination number of Cr in  $\text{K}_3[\text{Cr}(\text{C}_2\text{O}_4)_3]$  is

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

- Q.91** Between ectoderm and endoderm an undifferentiated layer mesoglea is not present in -  
 (1) Coelenterata      (2) Ctenophora  
 (3) Platyhelminthese (4) Both (1) & (2)
- Q.92** Water canal system of sponges is helpful in -  
 (1) Food gathering  
 (2) Respiratory exchange  
 (3) Removal of waste  
 (4) All of above
- Q.93** In metagenesis -  
 (1) Polyps produce medusae asexually and medusae produces polyp asexually  
 (2) Polyps produce medusae sexually and medusae produce polyp asexually.  
 (3) Polyps produce medusae asexually and medusae produce polyp sexually  
 (4) Polyp produce medusae sexually and medasae produce polyp sexually.
- Q.94** Choose correct statement –  
 (1) Cartilagenous fish have to swim constantly to avoid sinking due to absence of air bladder  
 (2) In amphibia and fish tympanum represents ear  
 (3) Cyclostome's body have scale and paired fins.  
 (4) Bony fish have placoid scale
- Q.95** Cnidoblasts are use for -  
 (1) Anchorage  
 (2) Defense  
 (3) Capturing Prey  
 (4) All of above
- Q.96** Development through many larval stages is character of -  
 (1) Nemathelminthese (2) Plathyhelminthese  
 (3) Arthropoda        (4) Echinodermata
- Q.97** Pelvic fins bears clasper in males of  
 (1) Osteichthyse      (2) Mammals  
 (3) Cyclostomata      (4) Chondrichthyse
- Q.98** Only gland present at base of tail in Birds -  
 (1) Oil gland           (2) Sweat gland  
 (3) Mammary gland    (4) Salivary gland
- Q.99** Haploids are able to express both recessive and dominant allele/mutations because there are -  
 (1) Many alleles for each gene  
 (2) Only two allele in a gene  
 (3) Only one allele for each gene in the individual  
 (4) Two alleles for each gene
- Q.100** 1.38 milimeter DNA is present in E. coli. How many base pair will be present in it -  
 (1)  $4 \times 10^6$  bp      (2)  $4 \times 10^7$  bp  
 (3)  $4 \times 10^8$  bp      (4)  $4 \times 10^5$  bp
- Q.101** The following ratio is generally constant for a given species -  
 (1)  $\frac{A+C}{T+G}$                   (2)  $\frac{G+C}{A+T}$   
 $T+C$                                    $A+G$   
 (3)  $\frac{A}{G+A}$                           (4)  $\frac{C}{C+T}$
- Q.102** In 1900 AD, three biologists independently rediscovered Mendel's principles. They were -  
 (1) Sutton, Morgan and Bridges  
 (2) Bateson, Punnett and Bridges  
 (3) Avery, MacLeod and McCarty  
 (4) de Vries, Correns and Tschermak
- Q.103** If a cross is made between AA and aa, the nature of F<sub>1</sub> progeny will be -  
 (1) Genotypically aa, phenotypically A  
 (2) Genotypically Aa, phenotypically a  
 (3) Genotypically AA, phenotypically a  
 (4) Genotypically Aa, phenotypically A
- Q.104** Mendel did not propose -  
 (1) Dominance  
 (2) Segregation  
 (3) Incomplete dominance  
 (4) Independent assortment
- Q.105** When a hybrid pea plant for yellow round seeds (Yy Rr) is self pollinated, the phenotypic ratio in the next generation would be -  
 (1) 9 : 7  
 (2) 1 : 2 : 2 : 1 : 4 : 1 : 2 : 2 : 1  
 (3) 12 : 3  
 (4) 9 : 3 : 3 : 1

**Q.106** The *Bt* toxin is not toxic to human beings because -

- (1) The pro *Bt* toxin activation requires temperature above human body temperature
- (2) The *Bt* toxin recognizes only insect-specific targets
- (3) The *Bt* toxin formation from pre *Bt* toxin requires pH lower than that present in human stomach
- (4) Conversion of pro *Bt* toxin to *Bt* toxin takes place only in highly alkaline conditions

**Q.107** Transgenic plants are the ones -

- (1) Produced after protoplast fusion in artificial medium
- (2) Grown in artificial medium after hybridization in the field
- (3) Produced by a somatic embryo in artificial medium
- (4) Generated by introducing foreign DNA into a cell and regenerating a plant from that cell

**Q.108** Fill up the blanks.

At present, about \_\_\_\_\_ recombinant therapeutics have been approved for human-use the world over. In India \_\_\_\_\_ of these are presently being marketed.

- (1) 30, 12
- (2) 40, 20
- (3) 109, 32
- (4) 111, 9

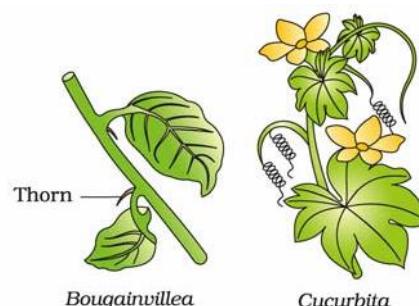
**Q.109** Which one of the following sequences was proposed by Darwin and Wallace for organic evolution ?

- (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.110** "Use and disuse" theory was proposed by -

- (1) Lamarck
- (2) Darwin
- (3) Hugo de Vries
- (4) Malthus

**Q.111** Given figure provides evidence for evolution represents



- (1) Homologues
- (2) Convergent evolution
- (3) Competition
- (4) Both (1) & (2)

**Q.112** Which of the following statement does not favour the mutation theory -

- (1) It is saltatory process
- (2) They are ultimate source of variation.
- (3) Mutation fluctuates around the normal traits and is directional
- (4) Create genetic variation

**Q.113** Growth hormone of pituitary is more effective in -

- (1) Presence of thyroxine
- (2) Absence of thyroxine
- (3) Absence of Insulin
- (4) Presence of adrenaline

**Q.114** Gorilla like man with large head and hands and protruding Jaws is produced due to

- (1) Over-secretion of thyroxine
- (2) Over-secretion of growth hormone
- (3) Excess of vitamin C in diet
- (4) Excess secretion of TSH

**Q.115** If cerebellum of man gets damaged, his movement become

- (1) Shaky & speech become defective
- (2) Unbalanced, walk uncontrolled, defective speech & intention tremor
- (3) Jerky & defective speech
- (4) Jerky & walked uncontrolled

**Q.116** When the medulla oblongata is compressed, then what happen?

- (1) Immediately die
- (2) Die after few hrs.
- (3) Live at 1 hrs & after it may die
- (4) No effect

**Q.117** The cardiac pacemaker in a patient fails to function normally. The doctor find that an artificial pacemaker is to be grafted in him. It is likely that it will be grafted at the site of  
(1) Purkinje system  
(2) Sinuatrial node  
(3) Atrioventricular node  
(4) Atrioventricular bundle

**Q.118** If spleen of Human is removed from body then  
(1) will die  
(2) Number of blood platelets will increase  
(3) Number of blood platelets will decrease  
(4) There will be no effect on the number of blood platelets

**Q.119** Arrange the following in the order of increasing volume:  
A. Tidal volume  
B. Residual volume  
C. Inspiratory reserve volume  
D. Vital capacity  
(1) A < B < C < D      (2) A < C < B < D  
(3) A < D < C < B      (4) A < D < B < C

**Q.120** Which of the following is not found in renal cortex:  
A. Henle's loop  
B. Vasa recta  
C. Glomerulus  
D. Bowman capsule  
(1) A, B and C      (2) A and B  
(3) B and D      (4) A and C

**Q.121** Which of the following is incorrect match?  
(1) Neutrophils - Phagocytic cells which destroy the foreign organisms entering the body  
(2) Basophils - Secrete histamine, serotonin and heparin  
(3) Eosinophils - resist infections and are also associated with allergic reactions  
(4) Monocytes - Called as PMNL and are transformed into macrophages

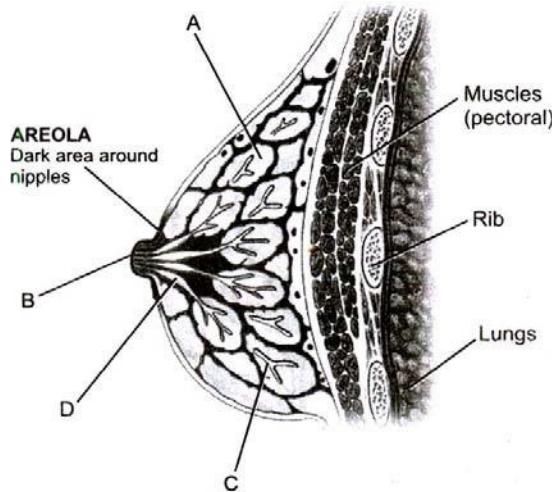
**Q.122** Which of following statements are true ?  
A. Fatty acid and glycerol being insoluble cannot be absorbed into the blood  
B. Fatty acid and glycerol incorporated into small droplets called micells  
C. Chylomicrone are transported into lacteal in the villi  
D. Lacteal ultimately release the absorbed substances into the liver  
(1) A, B and C options are correct  
(2) A and B both options are correct  
(3) B and D both options are correct  
(4) A and C both options are correct

**Q.123** Carbon dioxide generated in the tissues is carried in venous blood primarily as  
(1) Dissolved gas in plasma  
(2) Carbamino haemoglobin  
(3) Sodium bicarbonate in venous blood  
(4) Potassium bicarbonate in venous blood

**Q.124** Which one of the following statements with regard to embryonic developments in humans is correct ?  
(1) Cleavage divisions bring about considerable increase in the mass of protoplasm  
(2) In the second cleavage division, one of the two blastomeres usually divides a little sooner than the second  
(3) With more cleavage divisions, the resultant blastomeres become larger and larger  
(4) Cleavage division results in a hollow ball of cells called morula

**Q.125** Head of sperm consists of -  
(1) nucleus  
(2) acrosome  
(3) mitochondria  
(4) acrosome and nucleus

**Q.126** The correct labels for structures A to D are ?



- (1) A-Ampulla, B-milk duct, C-lobule, D-nipple  
(2) A-Lobule, B-milk duct, C-ampulla, D-nipple  
(3) A-Lobule, B-nipple, C-ampulla, D-milk duct  
(4) A-Ampulla, B-lobule, C-milk duct, D-nipple





- Q.155** ER often shows ribosome attaches to its -  
(1) Luminal surface  
(2) Extraluminal surface  
(3) 1 & 2 both  
(4) None of the above

**Q.156** Which of the following is enucleated cell -  
(1) RBC of frog                   (2) Sieve tube element  
(3) 1 & 2 both                   (4) RBC of crocodile

**Q.157** Facilitated diffusion can be differentiated from active transport except -  
(1) Energy does not required  
(2) Show saturation effect  
(3) Accumulation of molecule  
(4) (1) & (3) both

**Q.158** Chromosome decondensation, crossing over, synapsis formation, nucleolus disappear, chromosome separation, astral ray formation, centriole duplication. How many of these are observed in prophase of meiosis-1 and mitosis both  
(1) Three   (2) Four   (3) Two   (4) Five

**Q.159** Which of the following steps during glycolysis is associated with utilization of ATP ?  
(1) Glucose → Glucose-6-phosphate  
(2) Fructose-6-phosphate → Fructose-1, 6-biphosphate  
(3) PEP → Pyruvic acid  
(4) Both (1) and (2)

**Q.160** Respiratory quotient may be represented as -  
(1) O<sub>2</sub> taken in / CO<sub>2</sub> evolved  
(2) CO<sub>2</sub> evolved / O<sub>2</sub> taken in  
(3) O<sub>2</sub> taken in / H<sub>2</sub>O evolved  
(4) CO<sub>2</sub> taken in / H<sub>2</sub>O evolved

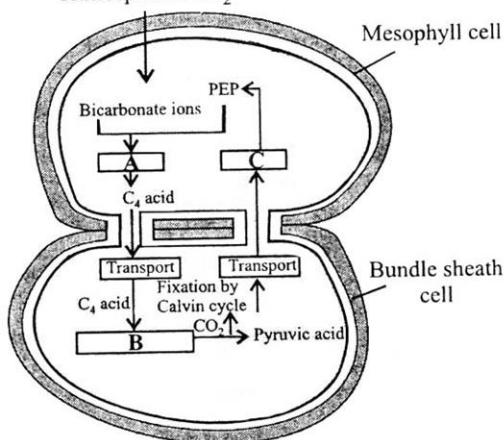
**Q.161** The reaction that is responsible for the fixation of CO<sub>2</sub> is catalysed by which of the following enzymes in plants ?  
(1) RuBP carboxylase  
(2) PEP carboxylase  
(3) RuBP carboxylase and PEP carboxylase  
(4) PGA synthase

**Q.162** Glucose synthesis occurs during which stage of C<sub>3</sub> cycle ?  
(1) Carboxylation                   (2) Oxygenation  
(3) Glycolytic reversal           (4) Regeneration

**Q.163** Leghaemoglobin is required in the process of -  
(1) Nitrification                   (2) Reductive amination  
(3) Ammonification               (4) Diazotropy

- Q.164** In apoplast pathway, water moves exclusively through the -  
(1) plasmodesmata  
(2) cell walls  
(3) intercellular spaces  
(4) both (2) and (3)

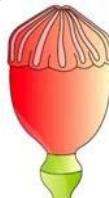
- Q.165** Given figure represents C<sub>4</sub> pathway select the suitable options for A, B and C -



- | A                   | B               | C            |
|---------------------|-----------------|--------------|
| (1) Decarboxylation | Reduction       | Regeneration |
| (2) Fixation        | Transmination   | Regeneration |
| (3) Carboxylation   | Decarboxylation | Reduction    |
| (4) Fixation        | Decarboxylation | Regeneration |

- Q.166** Pollens have two prominent walls which are ....A.... and .....B..... Here A and B refers to -  
(1) A-Intine                  B-Protein coat  
(2) A-Exine                  B-Intine  
(3) A-Sporopollenin          B-Intine  
(4) A-Sporopollenin          B-Exine

- Q.167** Identify the type of ovary in diagram -



- (1) Multicarpally apocarpous
  - (2) Multicarpally syncarpous
  - (3) Multicarpally pistillate
  - (4) Monocarpally apocarpous

- Q.168** Transfer of pollen grains from the anther to stigma of another flower of same plant is called -  
(1) geitonogamy      (2) chasmogamy  
(3) xenogamy      (4) cleistogamy

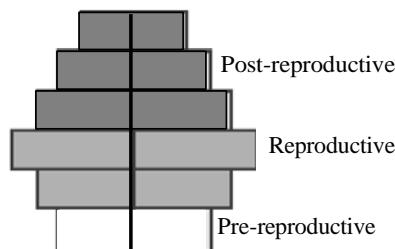
- Q.169** For a gene if AA = male plant, BB = female plant. Find out the genotype of endosperm and embryo -  
 (1) AAB, BBA      (2) AAB, AB  
 (3) ABB, AB      (4) BBA, AAB

- Q.170** Perisperm is -  
 (1) Remnants of nucellus  
 (2) Remnants of embryo  
 (3) Remnants of endosperm  
 (4) None of these

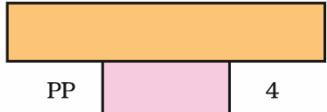
- Q.171** Choose the feature not associated with organisms found in tropical deserts -  
 (1) Small body size  
 (2) Large surface area relative to their volume  
 (3) Large body extremities  
 (4) Small surface area relative to their volume

- Q.172** Which of the following is an important adaptation of animals to cold climate -  
 (1) Thin layer of body fat  
 (2) Aestivation  
 (3) Decreased tendency to shiver  
 (4) Reduced surface area to volume ratio

- Q.173** What type of human population is represented by the adjacent pyramid ?



- (1) Expanding population  
 (2) Declining population  
 (3) Stable population  
 (4) None

- Q.174** PC  21  
 PP  4

- The given pyramid represents -  
 (1) Pyramid of energy in lake ecosystem  
 (2) Pyramid of number in lake ecosystem  
 (3) Pyramid of biomass in grassland ecosystem  
 (4) Pyramid of biomass in lake ecosystem

- Q.175** What do primary producers have available to convert into biomass ?  
 (1) 10% of secondary productivity  
 (2) Energy used for respiration  
 (3) Gross primary productivity  
 (4) Net primary productivity

- Q.176** According to forestry commission report 1997 the total forest cover of India :  
 (1) 11%    (2) 19.5%    (3) 17%    (4) 18.7%

- Q.177** Which one of the following pairs of organisms are exotic species introduced in India ?  
 (1) Nile perch, Ficus religiosa  
 (2) Ficus religiosa, Lantana camara  
 (3) Lantana camara, Water hyacinth  
 (4) Water hyacinth, Prosopis cineraria

- Q.178** Beside CH<sub>4</sub> and CO<sub>2</sub> other green house gas from agriculture area :

- (1) SO<sub>2</sub>    (2) NH<sub>3</sub>    (3) NO<sub>2</sub>    (4) CFC

- Q.179** Photosynthetically active radiation (PAR) represents the following range of wave length  
 (1) 450-950 nm    (2) 340-450 nm  
 (3) 400-700 nm    (4) 500-600 nm

- Q.180** Biomagnification refers to increase in concentration of the toxicant at successive trophic levels, this happens because -

- (1) A toxic substance accumulated by an organism cannot be metabolised  
 (2) A toxic substance accumulated by an organism cannot be excreted  
 (3) A toxic substance passed on to the next higher trophic level  
 (4) All of the above