Physics

1) At what height from the surface of earth the gravitational potential and the value of g are $-5.4 \times 10^7 \, J\,Kg^{-2} \, and \, 6.0 \, ms^{-2}$ respectively? Take the radius of earth as 6400 km.

   1) 2000 km 2) 2600 km 3) 1600 km 4) 1400 km

2) If $g \propto \frac{1}{R^3}$ (instead of $\frac{1}{R^2}$)then the relation between time period of a satellite near earth's surface and radius R will be

   1) $T^2 \propto R^3$ 2) $T \propto R^2$ 3) $T^2 \propto R$ 4) $T \propto R$

3) A projectile is fired vertically upward from the surface of the earth with a velocity KV_e where V_e is the escape velocity and K<1. If R is the radius of the earth, the maximum height to which it will rise measured from the centre of the earth will be: (neglect air resistance)

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

4) A force F is applied on the wire of radius r and length L and change in the length of wire is l. If the same force F is applied on the wire of the same material and radius 2r and length 2L, then the change in length of the other wire is:

   1) l 2) 2l 3) $\frac{l}{2}$ 4) 4l

5) Two satellites are at heights h_1 , h_2. The ratio of their orbital angular speeds is

   1) $\left(\frac{h_1}{h_2}\right)^{3/2}$ 2) $\left(\frac{R+h_1}{R+h_2}\right)^{3/2}$ 3) $\left(\frac{R+h_2}{R+h_1}\right)^{3/2}$ 4) $\left(\frac{h_2}{h_1}\right)^{3/2}$

6) A planet of mass m is moving around the sun in an elliptical orbit of semi-major axis a.

1) The total mechanical energy of the planet is varying periodically with time

2) The total mechanical energy of the planet is constant and equal $-\frac{GmM_s}{2a}$, M_s is mass of sun

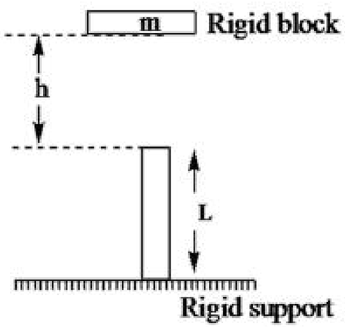
3) Total mechanical energy of the planet is constant and equal $-\frac{GmM_s}{a}$, M_s is mass of sun

4) Data is insufficient to arrive at a conclusion

7) The kinetic energy needed to project a body of mass m from the earth's surface to infinity is

1) $\frac{1}{4}mgR$ 2) $\frac{1}{2}mgR$ 3) mgR 4) 2 mgR

8) A rod of Young's modulus Y, area of cross-section A, stands vertical on a rigid support. A block strikes the rod and compresses it through a distance $x(x \ll L)$. If t be the time taken by the rod (from the instant when the block hits the rod) to regain its shape and m is very small, then choose the approximate relation



1) $4Y\,At^2 = mL\pi^2$
2) $2Y\,At^2 = mL\pi^2$
3) $Y\,At^2 = mL\pi^2$
4) $Y\,At^2 = 2mL\pi^2$

9) Consider the statements A and B, identify the correct answer given below

(A) : If the volume of a body remains unchanged when subjected to tensile strain, the value of poisson's ratio is 1/2

(B) : Phosper bronze has low Young's modulus and high rigidity modulus

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

10) Consider a planet moving in an elliptical orbit around the sun. The work done on the planet by the gravitational force of the sun

1) Is zero in any small part of the orbit
2) Is zero in some parts of the orbit
3) Is zero in one complete revolution
4) Is zero in no part of the motion

11) A satellite with kinetic energy E_k is revolving around the earth in a circular orbit. How much more kinetic energy should be given to it so that it may just escape into outer space?

1) E_k 2) $2E_k$ 3) $\frac{1}{2}E_k$ 4) $3E_k$

12) The position vectors of two particles of masses m_1 and m_2 are $\overrightarrow{r_1}$ and $\overrightarrow{r_2}$ respectively. Find the position vector of the point on the line joining of the particles at which resultant gravitational field intensity is zero.

1) $\frac{\sqrt{m_1}\overrightarrow{r_1}+\sqrt{m_2}\overrightarrow{r_2}}{\sqrt{m_1}+\sqrt{m_2}}$ 2) $\frac{\sqrt{m_1}\overrightarrow{r_2}+\sqrt{m_2}\overrightarrow{r_1}}{\sqrt{m_1}+\sqrt{m_2}}$ 3) $\frac{m_1\overrightarrow{r_2}+m_2\overrightarrow{r_1}}{m_1+m_2}$ 4) $\frac{m_2\overrightarrow{r_1}+m_1\overrightarrow{r_2}}{m_1+m_2}$

13) A uniform ring of mass m and radius a is placed directly above a uniform sphere of mass M and of equal to radius. The centre of the ring is at a distance 3a from the centre of the sphere. The gravitational force (F) exerted by the sphere on the ring is

1) $\frac{\sqrt{3}GMm}{8a^2}$ 2) $\frac{2GMm}{3a^2}$ 3) $\frac{7GMm}{\sqrt{2}a^2}$ 4) None of these

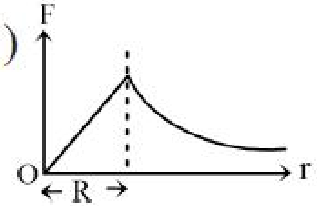
14) Two oppositely rotating satellite of same mass are launched in the same orbit around the earth. The collide idealistically. What is the ratio of gravitational potential energy before and after collision?

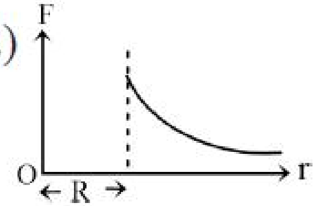
1) $-\frac{GM^2}{R}$ 2) $-\frac{2GM^2}{R}$ 3) $-\frac{2GM^2}{\pi R}$ 4) None of these

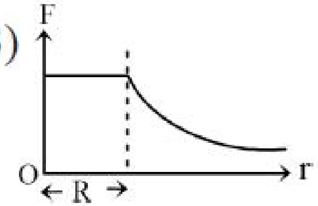
15) Four particles of masses m, 2m, 3m and 4m are placed at the corners of a square of side length a. The gravitational force on a particle of mass m placed at the centre of the square is:

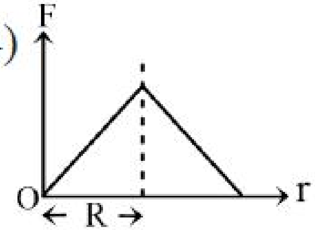
1) $4\sqrt{2}\frac{Gm^2}{a^2}$ 2) $\frac{3\sqrt{2}Gm^2}{a^2}$ 3) $\frac{2\sqrt{2}Gm^2}{a^2}$ 4) $\frac{\sqrt{2}Gm^2}{a^2}$

16) Which of the following plots represents the variation of the gravitational field on a particle with distance r due to a thin spherical shell of radius R? (r is measured from the centre of the spherical shell)

1) 

2) 

3) 

4) 

17) Given : R = radius of Earth and escape velocity from the surface of Earth = 11.2 $km\ s^{-1}$. What is the value of escape velocity at a height 3 R from the surface of Earth (approximately)?

1) 5.6 $km\ s^{-1}$ 2) 9.8 $km\ s^{-1}$ 3) 10 $km\ s^{-1}$ 4) 11.2 $km\ s^{-1}$

18) Young's modulus of a metal is 15 x 10^{11} pa. If its poisson's ratio is 0.4. The bulk modulus of the metal in pa is

1) 25×10^{11} 2) 2.5×10^{11} 3) 250×10^{11} 4) 0.25×10^{11}

19) Two spheres of masses m and M are suited in air and gravitational force between them is 'F'. The space around the mass is now filled with a liquid of specific gravity 3. The gravitational force now will be

1) $\frac{F}{9}$ 2) 3F 3) F 4) $\frac{F}{3}$

20) If the earth stops moving around its polar axis then what will be the effect on a body placed at the south axis?

1) Remain same 2) Increase 3) Decrease but not zero 4) Decrease zero

21) A mass m on the surface of the earth is shifted to a target equal to the radius of the Earth. If R is the radius and M is the mass of the earth, the work done in this process is:

1) $\frac{mgR}{2}$ 2) mgR 3) 2mgR 4) $\frac{mgR}{4}$

22) The potential energy of a body is given by $U = A - Bx^2$ (where x is the displacement). The magnitude of force acting on the particle is

1) Constant 2) Proportional to x 3) Proportional to x^2 4) Inversely proportional to x

23) Graph between the applied force and the change in length of a wire within elastic limit is a

1) Straight line with negative slope 2) Straight line with zero slope 3) Straight line with positive slope 4) None of the above

24) The Young's modulus of steel is twice that of brass. Two wires of the same length and of the same area of cross-section, one of steel and another of brass are suspended from the same roof. If we want the lower ends of the wires to be at the same level, then the weights added to the steel and brass wires must be in the ratio of:

1) 1:1 2) 1:2 3) 2:1 4) 4:1

25) The intensity of the gravitational field at a point situated at a distance of 8000 km from the centre of the earth is 6 N/kg. The gravitational potential at that point is (in Joule/kg)

1) 8×10^6 2) 2.4×10^3 3) 4.8×10^7 4) 6.4×10^{14}

26) A satellite is seen after every 6 hours over the equator. It is known that it rotates opposite to that of earth's direction. The angular velocity (in radians per hour) of the satellite about the centre of the earth will be

1) $\frac{\pi}{2}$ 2) $\frac{\pi}{3}$ 3) $\frac{\pi}{4}$ 4) $\frac{\pi}{8}$

27) Two stars each of mass M and radius R are approaching each other for a head-on collision. They start approaching each when their separation is $r >> R$. If their speeds at this separation are negligible, the speed v with which they collide would be:

1) $v = \sqrt{GM\left(\frac{1}{R} - \frac{1}{r}\right)}$ 2) $v = \sqrt{GM\left(\frac{1}{2R} - \frac{1}{r}\right)}$ 3) $v = \sqrt{GM\left(\frac{1}{R} + \frac{1}{r}\right)}$ 4) $v = \sqrt{GM\left(\frac{1}{2R} + \frac{1}{r}\right)}$

28) The planet with radii R_1, R_2 have densities ρ_1, ρ_2. Their atmospheric pressures are P_1, P_2 respectively. The ratio of masses of their atmospheres, neglecting variation of g within the limits of the atmosphere is

1) $P_1 R_2 \rho_1 / P_2 R_1 \rho_2$ 2) $P_1 R_2 \rho_2 / P_2 R_1 \rho_1$ 3) $P_1 R_1 \rho_1 / P_2 R_2 \rho_2$ 4) $P_1 R_1 \rho_2 / P_2 R_2 \rho_1$

29) The mass of a satellite is M/81 and radius is R/4 where M and R are the mass and radius of the planet. The distance between the surfaces of the planet and its satellite will be at least greater than

1) 1.25 R 2) 12.5 R 3) 10.5 R 4) 5 R

30) Two metal wires 'P' and 'Q' of same length and material are stretched by same load. Their masses are in the ratio $m_1 : m_2$ The ratio of elongations of wire 'P' to that of 'Q' is

1) $m_1^2 : m_2^2$ 2) $m_2^2 : m_1^2$ 3) $m_2 : m_1$ 4) $m_1 : m_2$

31) Mass M is divided into two parts xM and (1 - x)M. For a given separation, the value of x for which the gravitational attraction between the two pieces becomes maximum is

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

32) The pressure of a medium is changed from $1.01 \times 10^5\ Pa\ \ to\ \ 1.165 \times 10^5\ Pa$ and change in volume is 10% keeping temperature constant. The Bulk modulus of the medium is

1) $204.8 \times 10^5\ Pa$ 2) $102.4 \times 10^5\ Pa$ 3) $51.2 \times 10^5\ Pa$ 4) $1.55 \times 10^5\ Pa$

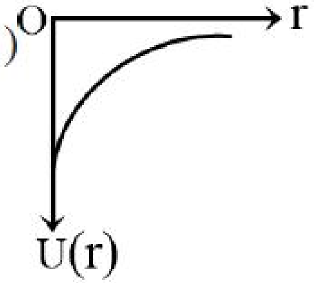
33) A stone is dropped from a height equal to nR, where R is the radius of Earth, from the surface of the Earth. The velocity of the stone on reaching the surface of the Earth is: (neglect air resistance)

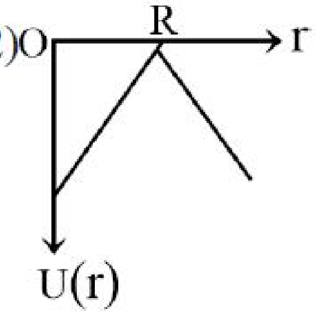
1) $\sqrt{\frac{2g(n+1)R}{n}}$ 2) $\sqrt{\frac{2gR}{n+1}}$ 3) $\sqrt{\frac{2gnR}{n+1}}$ 4) $\sqrt{2gnR}$

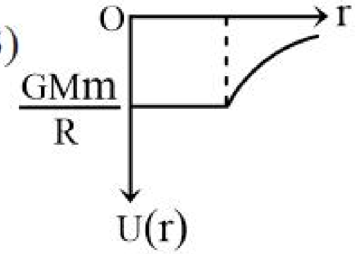
34) The ratio of diameters of two wires of the same material is n:1. The length of each wire is 4 m. On applying the same load, the increase in the length of the thin is (n>1)

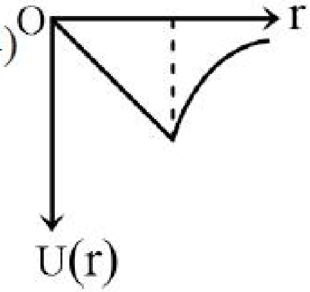
1) n^2 times 2) n times 3) 2n times 4) (2n+1) times

35) A shell of mass M and radius R has a point mass m placed at a distance r from its centre. The gravitational potential energy U(r) vs r will be :

1) 

2) 

3) 

4) 

36) An infinite number of point masses, each of one kg are fixed on the +ve X axis at 1 m, 2 m, 4 m, 8 m and so on from the origin. The magnitude of the gravitational field at origin due to this distribution of point masses is:

1) 2 G 2) $\frac{4G}{3}$ 3) $\frac{3G}{4}$ 4) ∞

37) A smooth uniform string of natural length L_0, cross-sectional area A and Young's modulus Y is pulled along its length by a force F on a horizontal smooth surface. The elastic potential energy stored in the string is

1) $\frac{2F^2L_0}{AY}$ 2) $\frac{F^2L_0}{3AY}$ 3) $\frac{F^2L_0}{2AY}$ 4) $\frac{F^2L_0}{6AY}$

38) A spacecraft of mass M is in a circular orbit at a height of h above the surface of the Earth of radius R. If the time period of revolution of the spacecraft is T, the centripetal acceleration of the spacecraft is:

1) $\frac{4\pi^2R}{T^2}$ 2) $\frac{\pi^2(R+h)}{4T^2}$ 3) $\frac{2\pi^2(R+h)}{T^2}$ 4) $\frac{4\pi^2(R+h)}{T^2}$

39) An ideal gas is taken in a process at constant temperature 20°C from initial pressure $= 1.015 \times 10^5 Pa$ to final pressure $= 1.165 \times 10^5 Pa$, in which volume decreases by 10%. The bulk modulus is:

1) $1.5 \times 10^{-5} Pa$ 2) $1.5 \times 10^6 Pa$ 3) $1.5 \times 10^5 Pa$ 4) $1.6 \times 10^{-6} Pa$

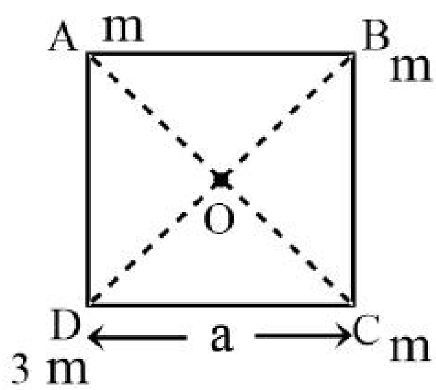
40) The lower face of a lead slab of length 500 mm, breadth 400 mm and height 40 mm bottom is kept fixed and a force of 10^5 N is applied on the upper face parallel to it. If the displacement of the upper face relative to the lower face is 4×10^{-3} mm, the rigidity modulus of lead is:

1) $5 \times 10^9 Nm^{-2}$ 2) $5 \times 10^8 Nm^{-2}$ 3) $5 \times 10^{10} Nm^{-2}$ 4) $5 \times 10^6 Nm^{-2}$

41) A satellite is launched into a circular orbit of radius R around the earth. A second satellite is launched into an orbit of radius 1.01R. The period of the second satellite is larger than that of the first one by approximately:

1) 0.5% 2) 1.0% 3) 1.5% 4) 3.0%

42) Four particles of masses m, m, m and 3m are fixed at the four corners A, B, C, D of a square of side length 'a' and centre at O, as shown. Find the resultant gravitational field intensity at O.

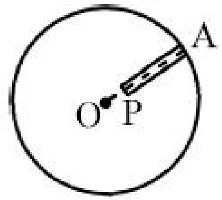


1) $\frac{4Gm}{a^2}$ along the direction$\overrightarrow{OD}$ 2) Zero 3) $\frac{12Gm}{a^2}$ along the direction $\overrightarrow{OB}$ 4) $\frac{2Gm}{a^2}$ along the direction $\overrightarrow{OB}$

43) The angular velocity of the earth with which it has to rotate so that the acceleration due to gravity on 60° latitude becomes zero is

1) $3\sqrt{\frac{g_p}{R}}$ 2) $4\sqrt{\frac{g_p}{R}}$ 3) $\sqrt{\frac{g_p}{R}}$ 4) $2.\sqrt{\frac{g_p}{R}}$

44) A planet of radius R has an acceleration due to gravity of g_s on its surface. A deep smooth tunnel is dug on this planet, radially inward, to reach a point P located at a distance of R/2 from the centre of the planet. Assume that the planet has uniform density. The kinetic energy required to be given to a small body of mass m, projected radially outward from P, so that it gains a maximum altitude equal to thrice the radius of the planet from its surface, is equal to:



1) $\frac{63}{16}mg_sR$ 2) $\frac{3}{8}mg_sR$ 3) $\frac{9}{8}mg_sR$ 4) $\frac{21}{16}mg_sR$

45) A uniform solid sphere of radius R exerts a force F on a point mass m placed at its surface. If a spherical cavity is made of radius R/2 coinciding to the point where m is placed, what will be the force exerted now?

1) F 2) 2F 3) F/2 4) F/4

1) 2	2) 2	3) 2	4) 3	5) 3	6) 2	7) 3	8) 3	9) 3
10) 3	11) 1	12) 2	13) 1	14) 1	15) 1	16) 2	17) 1	18) 1
19) 3	20) 1	21) 1	22) 2	23) 3	24) 3	25) 3	26) 3	27) 2
28) 4	29) 1	30) 3	31) 1	32) 4	33) 3	34) 1	35) 3	36) 2
37) 4	38) 4	39) 3	40) 1	41) 3	42) 1	43) 4	44) 3	45) 3

1) $V = \frac{GM}{R+h}$

$\frac{V}{g} = R + h$

$g = \frac{GM}{(R+h)^2}$

$\frac{5.4 \times 10^7}{6} = R + h$

$\Rightarrow 9 \times 10^6 = R + h$

$h = 2600\ km$

2) Gravitational force provides the required centripetal force

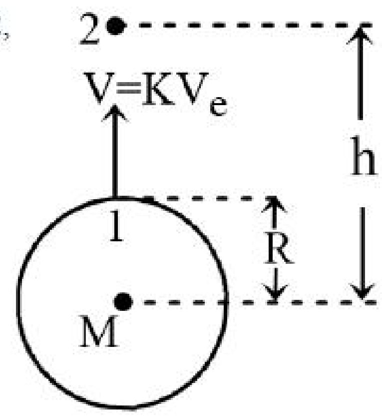
$m\omega^2 R = \frac{GMm}{R^3} \Rightarrow \frac{4\pi^2}{T^2} = \frac{GM}{R^4} \Rightarrow T \propto R^2$

3) Applying conservation of Mechanical energy between points 1 and 2,

we get $K_1 + V_1 = K_2 + V_2$

$\frac{1}{2}m(KV_e)^2 - \frac{GMm}{R} = 0 - \frac{GMm}{h}$

By solving we get $h = \frac{R}{1-K^2}$



4) $e \propto \frac{L}{r^2}$

$\frac{e_1}{e_2} = \frac{L}{2L}\left(\frac{2r}{r}\right)^2$

$e_2 = \frac{e_1}{2}$

$l_2 = \frac{l}{2}$

5) $T^2\, \alpha\, R^3$

$\left(\frac{2\pi}{\omega}\right)^2 \alpha\, R^3$

$\frac{2\pi}{\omega}\, \alpha\, R^{\frac{3}{2}} \Rightarrow \omega\, \alpha\, \frac{1}{R^{\frac{3}{2}}}$

$\frac{\omega_1}{\omega_2} = \left(\frac{R_2}{R_1}\right)^{\frac{3}{2}}$

$\frac{\omega_1}{\omega_2} = \left(\frac{R+h_2}{R+h_1}\right)^{\frac{3}{2}}$

6) A planet of mass m moving around the sun in an elliptical orbit of semi major axis a.

Total mechanical energy = PE + KE

$$= \frac{-GMm}{r} + \frac{GMm}{2r}$$

$$= \frac{-GMm}{2r} \quad (r = a)$$

$$= \frac{-GMm}{2a} = \text{Constant}$$

$\therefore$ The total mechanical energy of the planet is constant and equal $\frac{-GM_sm}{2a}$, M_s is mass of sun.

7)

$$KE = -PE$$

$$= -\left(\frac{-GMm}{R}\right)$$

$$= \frac{gR^{\cancel{2}}M}{\cancel{R}}$$

$$= MgR$$

8) Increase in elastic PE = decrease in gravitational PE

$$\frac{1}{2}kt^2 = mg\left(h + x\right)$$

$$\frac{1}{2}\ \frac{YAt^2}{L} = mgh$$

$$\therefore YAt^2 = 2mghL \qquad (\because g \approx \pi^2)$$

9) When a body subjected to tensile stress, length increases cross section decreases, but total volume remains same phosper bronze has high Young's modulus and low rigidity modulus.

10) Work done by conservative force for a complete loop = zero

11) Binding energy = – kinetic energy

And if this amount of energy (E_k) given to satellite then it will escape into outer space

12) $d = \frac{r}{1+\sqrt{\frac{m_2}{m_1}}}$; d is distance from m_1

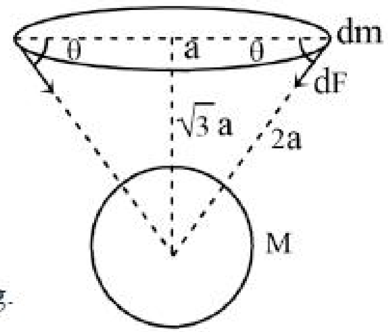
Position Vector $= \vec{r}_1 + d$

$= \vec{r}_1 + \frac{(\vec{r}_2 - \vec{r}_1)}{\sqrt{m_1}+\sqrt{m_2}}\sqrt{m_{11}}$

$= \frac{\vec{r}_1\sqrt{m_1}+\vec{r}_1\sqrt{m_2}+\vec{r}_2\sqrt{m_1}-\vec{r}_1\sqrt{m_{11}}}{\sqrt{m_1}+\sqrt{m_2}}$

$= \frac{\vec{r}_1\sqrt{m_2}+\vec{r}_2\sqrt{m_1}}{\sqrt{m_1}+\sqrt{m_2}}$

13) Net force on ring $=\sum (dF \ \sin\theta)$ or



$\int dF \ \sin\theta$

$= \sum \frac{GM(dm)}{(2a)^2} \times \frac{\sqrt{3}}{2}$

$= \frac{\sqrt{3}GM}{8a^2}\sum (dm)$

But $\sum (dm) = m$, the mass of whole ring.

Net force $= \frac{\sqrt{3}GMm}{8a^2}$

14) $V = \frac{-GMM}{R}$

$V = -\frac{GM^2}{R}$

15) Force of attraction $F = \frac{Gmm}{x^2}$

Force at P due to particle $A = \frac{Gmm}{x^2} = F$

Force at p due to particle $B = \frac{G2mm}{x^2} = 2F$

Force at P due to particle $C = \frac{G3mm}{x^2} = 3F$

Force at P due to particle $D = \frac{G4mm}{x^2} = 4F$

Net Force $= 2\sqrt{2}F = 2\sqrt{2}\frac{Gmm}{x^2} = 2\sqrt{2}\frac{Gm^2}{\left(\frac{a}{\sqrt{2}}\right)^2} = 4\sqrt{2}\frac{Gm^2}{a^2}$

16) Out side of hollow sphere Gravitational field $= \frac{GM}{x^2} \Rightarrow E \alpha \frac{1}{x^2}$

Inside of Hollow sphere, $E = 0$

17) $h = \frac{v^2 R}{{v_e}^2 - v^2}$

$3\cancel{R} = \frac{v^2 \cancel{R}}{{v_e}^2 - v^2}$

$3{v_e}^2 - 3v^2 = v^2$

$3{v_e}^2 = 4v^2$

$\frac{3{v_e}^2}{4} = v^2$

$v = \frac{\sqrt{3}v_e}{2}$

$v = \frac{\sqrt{3} \times 11.2}{2} = \frac{1.732 \times \overset{5.6}{\cancel{11.2}}}{\cancel{2}}$

$v = 5.6\, kms^{-1}$ (Approximate)

18) $Y = 3B\,(1 - 2\sigma) \Rightarrow B = \frac{Y}{3(1-2\sigma)}$

$B = \frac{15 \times 10^{11}}{3(1-2(0.4))} = 25 \times 10^{11} Pa$

19) Gravitational force of attraction between two masses.

$F = G\frac{m_1\ m_2}{r^2}$

and is independent of the medium between the bodies.

20) At poles 'g' value is not effected by rotation of earth.

21) $W = U_f - U_i$

$W = \frac{-GMm}{2R} + \frac{GMm}{R}$

$= \frac{GMm}{2R} = \frac{mgR}{2}$

22) $U = A - bx^2$

$F = -\frac{dU}{dx} = 2\,Bx$

$F \propto x$

23) Within the elastic limit, applied force is proportional to change in length $(elongation)$. Hence, the graph is a straight line having a positive slope, passing through the origin.

24) $Y = \frac{F\ell}{A\Delta\ell} \Rightarrow \Delta\ell = \frac{F\ell}{AY}$

$(\Delta\ell)_{steel} = (\Delta\ell)_{Brans}$

$\Rightarrow \frac{W_s\ell}{AY_s} = \frac{W_B\ell}{AY_B}$

$\Rightarrow \frac{W_s}{W_B} = \frac{Y_s}{Y_B} = 2:1$

25) $r = 8000\,km = 8 \times 10^6\,m$,

$\overline{\in} = 6\,N/kg$

$\frac{GM}{R^2} = 6 \Rightarrow M = \frac{6R^2}{G} \rightarrow (1)$

$\Rightarrow V = \frac{-GM}{R} = \frac{-\cancel{G}}{\cancel{R}} \times \frac{6R^{\cancel{2}}}{\cancel{G}}$

$= -6R = -6 \times 8 \times 10^6$

$= -48 \times 10^6$

$= -4.8 \times 10^7$

$= 4.8 \times 10^7$ (Magnitude)

26) Angular velocity of earth = $\frac{2\pi}{24} = \frac{\pi}{12}$

relative velocity of satellite = $\omega + \frac{\pi}{12}$

$\left(\omega + \frac{\pi}{12}\right)6 = 2\pi$

$A.V = \frac{2\pi}{24} = \frac{\pi}{12}$

$r.V = \omega + \frac{\pi}{2}$

27) here reduced mass of two stars is taken = $\frac{M_1 M_2}{M_1 + M_2} = \frac{M}{2}$

According to law of conservation of energy

$$\frac{-GM^{\cancel{2}}}{r} = \frac{-GM^{\cancel{2}}}{2R} + \frac{1}{\cancel{2}}\frac{M}{\cancel{2}}\overset{\cancel{2}}{\cancel{4}}\,v^2$$

$$V^2 = GM\left(\frac{1}{2R} - \frac{1}{r}\right)$$

$$V = \sqrt{GM\left(\frac{1}{2R} - \frac{1}{r}\right)}$$

28) $g = \frac{4}{3}\pi RGD$

$p = \frac{F}{A} = \frac{mg}{A} = \frac{m \times \frac{4}{3}\pi RG\rho}{A}$

$$= \frac{m \times \dfrac{4}{3}\pi R_1 G d_1}{4\pi R_1^2}$$

$$\Rightarrow \frac{P_1}{P_2} = \frac{\dfrac{m_1 d_1}{R_1}}{\dfrac{m_2 d_2}{R_2}}$$

29) $d > R + \frac{R}{4}$

$d > 1.25R$

30) $m_1 : m_2$

$$Y = \frac{Fl}{A\Delta l}$$

$$\Delta l = \frac{Fl}{YA}$$

$m = \rho V = \rho \times A \times l$

$A \propto m$

$$\frac{\Delta l_1}{\Delta l_2} = \frac{A_2}{A_1} = \frac{m_2}{m_1}$$

31) $F \propto xm \times (1 - x)m = xm^2(1 - x)$

For maximum force $\frac{dF}{dx} = 0$

$$\Rightarrow \frac{dF}{dx} = m^2 - 2xm^2 = 0 \Rightarrow x = 1/2$$

32) $K = \frac{\Delta p}{\Delta V/V}$
$= \frac{(1.165 - 1.01) \times 10^5}{10/100}$
$= \frac{0.155 \times 10^5}{1/10}$
$= 1.55 \times 10^5 pa$

33) WKT,
$\Delta U = \frac{Mgh}{1+\frac{h}{R}}$
If h=nR
$\Delta U = \frac{Mg(nR)}{1+\frac{nR}{R}} = \left(\frac{n}{n+1}\right) mgR$
From law of conservation of energy
KE = PE
$\frac{1}{2}MV^2 = \frac{nMgR}{(n+1)}$
$V = \sqrt{\frac{2ngR}{n+1}}$

34) $Y = \frac{\frac{F}{A}}{\frac{\Delta \ell}{\ell}} = \frac{F\ell}{A\Delta\ell}, Y = \frac{F\ell \times 4}{\pi D^2 \times \Delta\ell}$

or $\Delta\ell \propto \frac{1}{D^2}$ (or) $\frac{\Delta\ell_2}{\Delta\ell_1} = \frac{D_1^2}{D_2^2} = \frac{n^2}{1}$

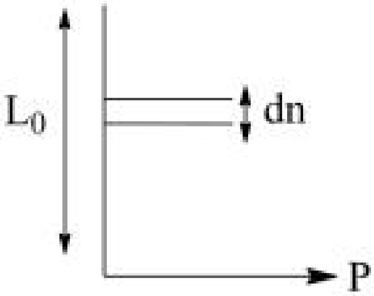
35) At any point inside the shell, the gravitational potential is constant and is equal to $\frac{-GM}{R}$
Which is nothing but the surface potential
$\therefore$ PE anypoint inside = $\frac{-GMm}{R}$ (constant)
$\rightarrow$ At any point outside shell, U = $\frac{-GMm}{r}$
$\Rightarrow$ U $\propto \frac{1}{r}$

36) Gravitational field at origin due to mass at '1' $m = \frac{G(1)}{(1)^2} = G$
Gravitational field at origin due to mass at '2' $m = \frac{G(1)}{(2)^2} = \frac{G}{4}$
Gravitational field at origin due to mass at '4' $m = \frac{G(1)}{(4)^2} = \frac{G}{16}$------so on
Net Gravitational field at origin due to all masses

$\Rightarrow G + \frac{G}{4} + \frac{G}{16} + - - - - - - - - \infty$
$\Rightarrow G\left[1 + \frac{1}{4} + \frac{1}{16} + - - - - = \infty\right]$
$\Rightarrow G\left[\frac{1}{1-\frac{1}{4}}\right] = \frac{4G}{3}$

37) $dU = \frac{1}{2}\,\frac{stress^2}{Y} A\,dx$

$dU = \frac{1}{2Y} \cdot \frac{F_0^{\,2}}{L_0^{\,2} \cancel{A}} x^2 \cancel{A} dx$



$U = \frac{F_0^{\,2}}{2L_0^{\,2} AY} \int_0^L x^2 dx$

$= \frac{F_0^{\,2}}{2\cancel{L_0^{\,2}} AY} \cdot \frac{\cancel{L_0^{\,3}}}{3}$

$= \frac{F_0^{\,2} L_0}{6AY}$

38) Centripetal acceleration = $\frac{V^2}{R}$

$= \frac{R^2\omega^2}{R}$

$= \frac{(R+h)(2\pi)^2}{T^2}$

$\begin{bmatrix} \because \quad R = R + h\, given \\ \omega = \frac{2\pi}{T} \end{bmatrix}$

$= \frac{4\pi^2(R+h)}{T^2}$

39) $K = \frac{\Delta p}{\left(\frac{\Delta v}{v}\right)}$

$K = \frac{1.5\times10^4}{\frac{10}{100}}$

$K = 1.5 \times 10^5\, pa$

$\Delta p = (1.165 - 1.015) \times 10^5\, pa$

$\Delta p = 0.15 \times 10^5 = 1.5 \times 10^4\, pa$

$\frac{\Delta v}{v} = 10\% = \frac{10}{100}$

40) $\eta = \frac{F/A}{\Delta x/h}$

$\Delta x = 4 \times 10^{-3} mm$

$\Delta x = 4 \times 10^{-6} m$

$\eta = \frac{10^5(0.04)}{0.5\times0.4\times(4\times10^{-6})}$

$\eta = 5 \times 10^9 N/m^2$

41) In the problem orbital radius is increased by 1%.

Time period of satellite $T \propto r^{3/2}$

Percentage change in time period

$=\frac{3}{2}$ (% change in orbital radius)$=\frac{3}{2}(1\%) = 1.5\%$

42) E at a due to masses at A and C=0

(Figure)

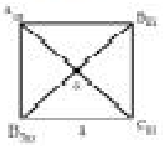
$E_A = \frac{2G3m}{a^2}$ along o A

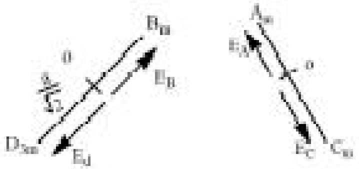
and $E_B = \frac{2Gm}{a^2}$ along o B

$E = \frac{6Gm}{a^2} - \frac{2GM}{a^2}$

$= \frac{4GM}{a^2}$

along o D





43) $g_\phi = g - Rw^2\cos^2 60^0$

$g = Rw^2 \times \frac{1}{4}$ $\left[\because\ g_\phi = 0\right]$

$\Rightarrow w = \sqrt{\frac{g}{R}} \times 2$

44) Gravitational potential $v = \frac{-3GM}{R^3}\left(\frac{3R^2-0^2}{6}\right)$

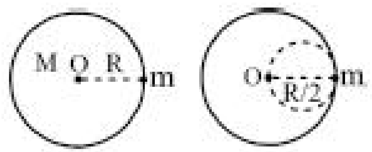
$KE_P + PE_P = PE$

$KE_P = \frac{-GMm}{4R} + \frac{3GM}{R^3}\left[\frac{3R^2-\left(\frac{R}{2}\right)^2}{6}\right]$

$= \frac{GMm}{R}\left[\frac{1}{4} + \frac{11}{8}\right]$

$= mgR\left(\frac{9}{8}\right)$

45) Force exerts on point mass 'm' is,



$F = \frac{GMm}{R^2} \quad \rightarrow (1)$

here $M = \rho\left(\frac{4}{3}\pi R^3\right)$

Now force $F^1 = \frac{GM^1m}{(R/2)^2}$

here $M^1 = \rho\frac{4}{3}\pi(R/2)^3 = \frac{\rho\frac{4}{3}\pi R^3}{8}$

$= \frac{M}{8}$

$\therefore F^1 = \frac{G\left(\frac{M}{8}\right)m}{\frac{R^2}{4}}$

$= \frac{GMm}{2R^2} \quad \rightarrow (2)$

from (1) & (2), $\therefore F^1 = \frac{F}{2}$

Chemistry

46) The normal boiling point of water is 373 K. Vapour pressure of water at temperature T is 19 mm Hg. If enthalpy of vaporization is 40.67 kJ/mol, then temperature T would be

$(Use : \log 2 = 0.3, R : 8.3 JK^{-1}, mol^{-1})$

1) 250 K 2) 291.4K 3) 230 K 4) 290 K

47) The freezing point of equimolal aqueous solution will be highest for

1) $C_6H_5NH_3{}^+Cl^-$ 2) $Ca(NO_3)_2$ 3) $La(NO_3)_2$ 4) $C_6H_{12}O_6$

48) The Henry's law constant for the solubility of O_2 gas in water at 293 K is 34.86kbar. The mole fraction of O_2 in air is 0.2. The number of moles of O_2 from air dissolved in 10 moles of water at 293K at 5 bar pressure is :

1) 2.86×10^{-4} 2) 4×10^{-5} 3) 5×10^{-4} 4) 4.7×10^{-6}

49) At 27^0C the ratio of the kinetic energies of Nitrogen and Oxygen whose weights ratio is 7:8 is

1) 1:1 2) 1:2 3) 2:1 4) 7:8

50) What will be the mass of Glucose that would be dissolved in 50 g. of water in order to produce the same lowering of vapour pressure as is produced by dissolving 1 g urea in the same quantity of water?

1) 3g 2) 2g 3) 1g 4) 6g

51) The density of a gas is 1.964g dm^{-3} at 273k and 76 cm Hg. The gas is

1) Xe 2) CO_2 3) C_2H_6 4) CH_4

52) Which of the following satisfies the greater compressibility of real gas?

1) At the higher pressure	2) Above the Boyle's temperature	3) Lesser the value of "a" but higher value of "b"	4) Z < 1

53) Henry's Law constants for aqueous solution of CO, O_2, CO_2 and C_2H_2 gases are respectively at 25^0C as $58 \times 10^3, 48 \times 10^3, 1.61 \times 10^3, 1.34 \times 10^3$. The solubility of these gases decreases in the order

1) 2) 3) 4)

54) The most suitable method of separation of 1 : 1 mixture of ortho and para - nitrophenols is :

1) Sublimation 2) Chromatography 3) Crystallisation 4) Steam distillation

55) pV value decreases with increases in p at constant temperature when

1) There is no attractive or repulsive forces between molecules 2) Attractive and repulsive forces between molecules are equal 3) Attractive forces between molecules are predominant 4) Repulsive forces between molecules are predominant

56) 0.01 (M) solution of an acid HA freezes at -0.0205^0C. If K_f for water is 1.86 K kg mol^{-1}, the ionization constant of the conjugate base of the acid will be (consider molarity $\simeq$ molality)

1) $1.1 x 10^{-4}$ 2) $1.1 x 10^{-3}$ 3) $9 x 10^{-11}$ 4) $9 x 10^{-12}$

57) At what temperature RMS speed of N_2 gas is equal to that of propane at STP conditions?

1) STP 2) $-40^{\circ}C$ 3) 173.7 K 4) $173.7^{\circ}C$

58) Which of the following aqueous solution has the highest boiling point?

1) $0.1\, M\, KNO_3$ 2) $0.1\, M\, Na_3PO_4$ 3) $0.1\, M\, BaCl_2$ 4) $0.1\, M\, K_2SO_4$

59) The relationship between the coefficient of viscosity of a liquid and temperature can be expressed as

1) $\eta = Ae^{RT/E}$ 2) $\eta = Ae^{E/RT}$ 3) $\eta = Ae^{ERT}$ 4) $\eta = ET/R$

60) A pressure cooker reduces cooking time for food because

1) Boiling point of water involved in cooking is increased 2) Heat is more evenly distributed in the cooking space 3) the higher pressure inside the cooker crushes the food material 4) Boiling point of water is reduce

61) If two gases of molecular weights M_A *and* M_B at temperatures T_A and T_B have the relation $T_A M_B = T_B M_A$, then which property has the same magnitude for both the gases.

1) Pressure 2) KE per mol 3) Density 4) V_{rms}

62) At $17^{\circ}C$, the osmotic pressure of sugar solution is 580 torr. The solution is diluted and the temperature is raised to $57^{\circ}C$, when the osmotic pressure is found to be 165 torr. The extent of dilution is

1) 2 times 2) 3 times 3) 4 times 4) 5 times

63) 0.5 molal aqueous solution of weak acid HX is 20% ionized. If K_f for water is 1.86 $K kg\ mol^{-1}$, the lowering in freezing point of solution is

1) -0.56 K 2) -1.12 K 3) 0.56 K 4) +1.12 K

64) 5g of Na_2SO_4 was dissolved in x g of H_2O. The change in freezing point was found to be $3.82^{o}C$. If Na_2SO_4 is 81.5% ionised, the value of x
(K_f for water=$1.86^{o}C\ kg\ mol^{-1}$) is approximately:
(molar mass of S=32 g mol^{-1} and that of Na=23 g mol^{-1})

1) 15 g 2) 25 g 3) 45 g 4) 65 g

65) For the following concentration cell, to be spontaneous $Pt\ (H_2)\ P_1$ atm. $|HCl|\ Pt\ (H_2)\ P_2$ atm. Which of the following is correct?

1) $P_1 = P_2$ 2) $P_1 < P_2$ 3) $P_1 > P_2$ 4) can't be predicted

66) A 0.025m solution of monobasic acid has a freezing point of $-0.060^{0}c$. Calculate dissociation constant of acid. If k_f is $1.86^{0}C$

1) 3×10^{-3} 2) 9×10^{-3} 3) 4×10^{-3} 4) 3×10^{-2}

67) What is the temperature at which the kinetic energy of 0.3 moles of helium is equal to the kinetic energy of 0.4moles of argon at 400K

1) 400K 2) 873K 3) 533K 4) 300K

68) The molecular weight of O_2 and SO_2 are 32 and 64 respectively. If one litre of O_2 at 15^0C and 750 mm pressure contains 'N' molecules, the number of molecules in two litres of SO_2 under the same conditions of temperature and pressure will be

1) $N/2$ 2) N 3) $2N$ 4) $4N$

69) The ratio of rate of diffusion of carbon dioxide and nitrous oxide is

1) 2:1 2) 1:2 3) 16:1 4) 1:1

70) A complex containing K^+, Pt (IV) and Cl^- is 100% ionized giving i = 3. Thus, complex is

1) $K_2[PtCl_4]$ 2) $K_2[PtCl_6]$ 3) $K_3[PtCl_5]$ 4) $K[PtCl_3]$

71) Densities of two gases are in the ratio 1:2 and their temperature are in the ratio 2:1, then the ratio of their respective pressures is

1) 1:1 2) 4:1 3) 2:1 4) 1:2

72) For real gases, van der Waals' equation is written as $\left(p + \frac{an^2}{V^2}\right)(V - nb) = nRT$ where a and b are van der Waals' constants. Two sets of gases are:(I) $O_2, CO_2, H_2\, and\, He$ (II) CH_4, $O_2\, and\, H_2$. The gases giver Select the correct order from the following:

1) $(I)\ He < H_2 < O_2 < CO_2\,(b)\,CH_4 > O_2 > H_2$ 2) $(I)\ H_2 < He < O_2 < CO_2\,(b)\,CH_4 > H_2 > O_2$ 3) $(I) E$

73) 100 ml of NaOH is neutralised by 10 ml of 0.5 M H_2SO_4 Hence NaOH in 100 ml solution is

1) 0.2 g 2) 0.4 g 3) 0.6 g 4) 0.8 g

74) Consider the reaction equilibrium

$2SO_2\,(g) + O_2\,(g) \leftrightarrow 2SO_3\,(g)\,; \Delta H^0 = -198KJ$. On the basis of Le Chatelier's principle, the condition favorable for forward reaction is

1) Lowering of temperature as well as pressure
2) Increasing temperature as well as pressure
3) Lowering the temperature and increasing the pressure
4) Any value of temperature and pressure

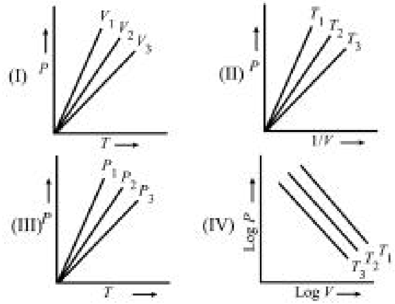
75) The percentage composition by weight of an aqueous solution of a solute (molecule mass 150) which boils at 373.26 is $(K_b = 0.52)$

1) 5 2) 15 3) 7.5 4) 10

76) The graph of viscosity coefficient and absolute temperature is .....

1) Straight line passing through origin
2) Straight line parallel to temperature axis
3) Straight line with (+)ve slope
4) Rectangular hyperbola

77) For 1 mol of an ideal gas,$V_1 > V_2 > V_3$ in Fig. (1), $T_1 > T_2 > T_3$ in Fig. (II),$P_1 > P_2 > P_3$ in Fig. (III), and $T_1 > T_2 > T_3$ in Fig. (IV), then which curves are correct.



1) I,II 2) I,II,III 3) II,IV 4) I,III,IV

78) In which case depression in freezing point is equal to cryoscopic constant for water;

1) 6% by mass of urea aqueous solution 2) 100 g of sucrose in 100 mL solution 3) 9 g of glucose in 59 g aqueous solution 4) 1 M KCl Solution

79) If 'α' is the degree of dissociation of Na_2SO_4, the van't Hoff factor(i) for it is

1) $1+\alpha$ 2) $1-\alpha$ 3) $1+2\alpha$ 4) $1-2\alpha$

80) 60 g of urea is dissolved in 1100 gr of solution. to keep $\frac{\Delta T_f}{k_f}$ as 1 mole/kg, weight of water separated in the form of ice is

1) 60 g 2) 40 g 3) 20 g 4) 80 g

81) Which of the following will have the lowest vapour pressure

1) $0.1M\ KCl$ solution 2) $0.1M$ urea solution 3) $0.1M\ Na_2SO_4$ solution 4) $0.1M\ K_4Fe(CN)_6$ solution

82) If 0.05 mole of gas are dissolved in 500 grams of water under 1 atm. Pressure, 0.1 moles will be dissolved if the pressure is 2atm. It illustrates

1) Graham's Law 2) Dalton's Law 3) Henry's Law 4) Boyle's Law

83) Two liquids A and B from ideal solutions. At 300 K, the vapour pressure of solution containing 1 mole of A and 3 mole of B is 550 mm Hg. At the same temperature, if one mole of B is added to this solution, the vapour pressure of the solution increases by 10 mm Hg. Determine the vapour pressure of A and B in their pure states (in mm Hg):

1) 400,600 2) 500,500 3) 600,400 4) 100,100

84) Mole fraction of water vapour in the saturated air is 0.02. If total pressure is 1.2 atm, partial pressure of dry air is

1) 1.18 atm 2) 1.22 atm 3) 1.176 atm 4) 1.224 atm

85) Which of the following mixtures of gases does not obey Dalton's law of partial pressure

1) O_2 and CO_2 2) N_2 and O_2 3) Cl_2 and O_2 4) NH_3 and HCl

86) A solution containing 0.1 g of a non-volatile organic substance P (molecular mass 100) in 100 g of benzene raises the boiling point of benzene by 0.2^0C, while a solution containing 0.1 g of another non-volatile substance Q in the same amount of benzene raises the boiling point of benzene by 0.4^0C. What is the ratio of molecular masses of P and Q?

1) 1 : 2 2) 4 : 1 3) 1 : 4 4) 2 : 1

87) The density of a gas A is thrice that of a gas B at the same temperature. The molecular weight of gas B is twice that of A. What will be the ratio of the pressures acting on B and A?

1) $\frac{1}{4}$ 2) $\frac{7}{8}$ 3) $\frac{2}{5}$ 4) $\frac{1}{6}$

88) Among the following mixtures, dipole-dipole as the major interaction, is present in

1) Acetonitrile and acetone 2) KCl and water 3) Benzene and carbon tetrachloride 4) Benzene and ethanol

89) A solution of 0.640 g of azulene in 100.0 g of benzene boils at 80.23^oC. The boiling point of benzene is 80.10^oC; the K_b is $2.53^oK/$ molal. What is the molecular weight of azulene?

1) 108 2) 99 3) 125 4) 134

90) A 0.004 M solution of Na_2SO_4 is isotonic with a 0.010 M solution of glucose at same temperature. The apparent degree of dissociation of Na_2SO_4 is

1) 0.25 2) 0.5 3) 0.75 4) 0.85

46) 2	47) 4	48) 1	49) 1	50) 1	51) 2	52) 4	53) 3	54) 4
55) 3	56) 3	57) 3	58) 2	59) 2	60) 1	61) 4	62) 3	63) 4
64) 3	65) 3	66) 1	67) 3	68) 3	69) 4	70) 2	71) 1	72) 2
73) 2	74) 3	75) 3	76) 4	77) 3	78) 3	79) 3	80) 2	81) 4
82) 3	83) 1	84) 3	85) 4	86) 4	87) 4	88) 1	89) 3	90) 3

46) The vapour pressure of a liquid increases with increase of temperature according to the Clausius Clayperon equation.

$$\log \frac{p_2}{p_1} = \frac{\Delta H}{2.3 \times 8.3}\left(\frac{1}{T_1} - \frac{1}{T_2}\right)$$

$$\log \frac{760}{19} = \frac{40.67 \times 10^3}{19.11}\left(\frac{1}{T_1} - \frac{1}{373}\right)$$

T_1=291 K

47) $\Delta T_b = i \times K_b \times m$

$T_b^o - T_b = i \times K_b \times m$

Here $T_b^o,\ K_b$ & m are constants.

$T_b \ \propto \dfrac{1}{i}$

T_b =Highest means i=lowest

In case of $C_6H_{12}O_6,\ \ i = 1$

other cases $i > 1$

48) $p = k_H \times x_{O_2}$

$$0.2 \times 5 = 34.86 \times \frac{n_{O_2}}{10} \times 10^3$$

$$n_{O_2} = \frac{1 \times 10 \times 10^{-3}}{34.86}$$

$$= 0.286 \times 10^{-3}$$

$$= 2.86 \times 10^{-4}$$

49) $nN_2 = \frac{7}{28} = \frac{1}{4}$; $nO_2 = \frac{8}{32} = \frac{1}{4}$

$KE = \frac{3}{2} n\, RT$

At constant Temp, $KE \propto n$

$KE_{N_2} = KE_{O_2}$

50) $R.L.V.P = \frac{w_z}{M_2} \times \frac{M_1}{w_1}$

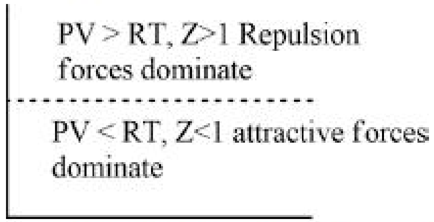
$(R.L.V.P)_{glu\cos e} = (R.L.V.P)_{urea}$

$\frac{x}{180} \times \frac{18}{50} = \frac{1}{60} \times \frac{18}{50} \Rightarrow x = 3$

51) $1 \times M = 1.964 \times \frac{22.4}{273} \times 273$

$M = 44\,(CO_2)$

52) When attractive forces dominate, the volume of a real gas is less than volume expected for an ideal gas. We say that the gases are more compressible.



53) Higher the value of K_H lower will be the solubility.

54) O-Ni F60 phenol is steam volatile due to intramuscular hydrogen bonding while p-Nitro phenol is less Volatile due to inter molecular hydrogen bonding so they can be separated by steam distillation

55) P_v value decreases with increase in 'P' at constant temperature when attractive forces between molecular predominant

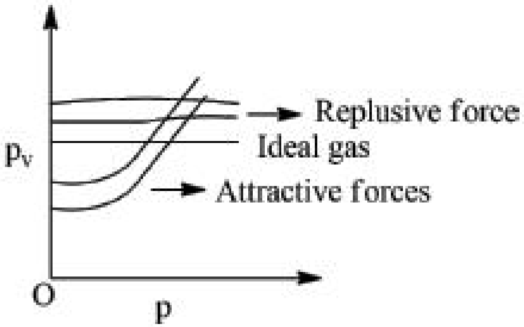
Real gases show deviation from ideal gas behavior and for the $PV < RT$ or $PV > RT$ This is because of two reason: Attractive force between molecules and relative volume of molecules and the volume of gas containing at low pressure V is large and

$$V - b \approx v$$

$$\left(P + \frac{a}{V^2}\right)V = RT$$

$$PV + \frac{a}{V} = RT \quad PV < RT$$

It is not molecular size but intermolecular force that can deviation at low pressure



56) $\Delta Tf = Kf \times m \times i$

$0.0205 = 1.86 \times 0.01 \times i$

$i = \dfrac{0.0205}{0.0186} = 1.1$

Now

$\alpha = \dfrac{i-1}{n-1}$

$\alpha = \dfrac{1.1-1}{2-1} = 0.1 = 10^{-1}$

$\alpha = 0.1$

$Ka = \dfrac{c\alpha^2}{1-\alpha}$

$Ka = \dfrac{0.01 \times \left(10^{-1}\right)^2}{1-0.1}$

$Ka = \dfrac{10^{-2} \times 10^{-2}}{0.9}$

$Ka = 1.11 \times 10^{-4}$

$Kb = \dfrac{10^{-14}}{Ka}$

$Kb = \dfrac{10^{-14}}{1.11 \times 10^{-4}}$

$= 9 \times 10^{-11}$

$Kb = 9 \times 10^{-11}$

57) $C = \sqrt{\dfrac{3RT}{M}}$

$\dfrac{C_{N_2}}{C_{C_3H_8}} = \sqrt{\dfrac{T_{N_2}}{T_{C_3H_8}} \times \dfrac{M_{C_3H_8}}{M_{N_2}}}$

$1 = \sqrt{\dfrac{273}{T_{C_3H_8}} \times \dfrac{44}{28}}$

$T_{C_3H_8} = 173.7\,K$

58) Na_3PO_4 contains more no. of particles. So, its B.P is high.

59) Co efficient of viscosity $\eta = Ae^{E/RT}$

60) Boiling point increases with increasing pressure.

61) If two gases have same RMS velocity

$$C_1 = C_2$$

$$\sqrt{\frac{3RT_1}{M_1}} = \sqrt{\frac{3RT_2}{M_2}}$$

$$\frac{T_1}{M_1} = \frac{T_2}{M_2}$$

$$T_1M_2 = T_2M_1$$

62) $$\pi_1 = \frac{nRT_1}{V_1}, \pi_2 = \frac{nRT_2}{V_2}$$

Hence, $\frac{\pi_1}{\pi_2} = \frac{580}{165} = \frac{V_2T_1}{V_1T_2} = \frac{V_2 \times 290}{V_1 \times 330} \Rightarrow \frac{V_2}{V_1} = 4$

63) $HX \rightarrow H^+ + X^-$

$$i = 1 + \frac{20}{100}[2-1] = 1.2$$

$$\Delta T_f = 1.86 \times 0.5 \times 1.2$$

$$= 1.116 = 1.12\,K$$

64) $\Delta T_f = i \times kf \times m$

degree of dissociation

$$i = 1 + (n-1)\,\alpha$$

$$i = 1 + (3-1)\,\frac{81.5}{100}$$

$$i = 2.63$$

$$3.82 = 2.63 \times 1.86 \times \frac{5}{142} \times \frac{1000}{x\,(gr)}$$

$$x = \frac{2.63 \times 1.86 \times 5 \times 1000}{142 \times 3.82}$$

$$x = \frac{24459}{542.44}$$

$$x = 45$$

65) $Pt\,(H_2)\,P_1$ atm. $|Pt\,(H_2)\,P_2$ atm.

For spontaneous reaction, E_{cell} should be positive so $P_1 > P_2$

$$E_{\text{cell}} = \frac{0.059}{2}\log\frac{P_1}{P_2}$$

Also, if $P_1 > P_2$, oxidation occurs at L.H.S electrode and reduction occurs at R.H.S electrode.

66) $\Delta T_f = i.\,k_f.\,m$

$$\Delta T_f = T_f^o - T_f$$

$$= 0 - (-0.06)$$

$$\Delta T_f = 0.06$$

$$\Delta T_f = i.\,k_f.\,m$$

$$6.06 = i \times 1.86 \times 0.025$$

$$i = \frac{0.06}{1.86 \times 0.025} = 1.29\,(or)\,1.3$$

$$\left(HX \quad H^+ \underset{n=2}{+} X^-\right)$$

$$\alpha_{Dis} = \frac{i-1}{n-1}$$

$$\alpha = \frac{1.3-1}{2-1}$$

$$\alpha = 0.3$$

$$K_b = \frac{c\,\alpha^2}{1-\alpha}$$

$$= \frac{0.025 \times (0.3)^2}{1-(0.3)}$$

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

67) $K.E_1 = K.E_2$

$$n_1T_1 = n_2T_2$$

$$0.3 \times T_1 = 0.4 \times 400$$

$$T_1 = \frac{0.4 \times 400}{0.3} = 533.3\ K$$

68) At same temperature and pressure, equal volumes have equal number of molecules. If 1lit. of oxygen consists N molecules then at same temperature and pressure 1 lit of SO_2 will consists N molecules. So 2 lit. of SO_2 will contain $2N$ molecules.

69) $CO_2 = \text{GmW} = 44$

Nitrous oxide $(N_2O) = 44$

$\frac{r_1}{r_2} = \sqrt{\frac{m_2}{m_1}}; \; Where\, m_1 = m_2$

So the rate of diffusion of CO_2 and N_2O = 1:1

70) I = Van't hoff factor $1 + (y-1)\,\alpha$

$\alpha = 100\% = 1$

Y = No. of ions, α = degree of ionization

$Y \quad i = 1 + (Y-1)\alpha$

$(a)\; K_2PtCl_4 \to 2K^+ + PtCl_4^{-2} \to 3 \quad 1+2=3$

$(b)\; K_2PtCl_6 \to 2K^+ + PtCl_6^{-2} \to 3 \quad 1+2=3$

In (a) oxidation no. of Pt = +2

In (b) oxidation no. of Pt = +4

71) $d = \frac{PM}{RT} \Rightarrow \frac{P_1}{P_2} = \frac{d_1T_1}{d_2T_2}$

$= \frac{1}{2}.\frac{2}{1}$

$= 1 \; : \; 1$

72) Van der Waals constant b is related to molecular size. Helium is smallest and CO_2 highest with H_2 and O_2 coming in between, hence b varies as $He < H_2 < O_2 < CO_2$. Van der Waals consatnt a is related to the strength of intermolecular attraction. CH_4 is most easily liquefied and has the highest critical temperature a is highest for CH_4 since its attractions is highest. H_2 is most difficult to liquefy with the lowest critical temperature. Attraction are weakest and a is smallest. Hence a varies as $CH_4 > O_2 > H_2$

73) It is neutralisation reaction

$NaOH \; = H_2SO_4$

$N_bV_b = N_aV_a$

$\frac{w}{GEw} \quad = N \times V(lit)$

$\frac{w}{40} \quad = 0.5 \times 2 \times \frac{10}{1000}$

$w \quad = 0.4 \; g$

74) Formation of SO_3 is an exothermic process - low temperature is favourable

During the formation SO_3, number of moles decreases - high pressure is favourable

75) $\Delta T_b = i.\ K_b.\ m$

$T_b - T^o b = i.\ K_b.\ m$

$373.26 - 373 = 1 \times 0.52 \times \left(\frac{wt}{150} \times \frac{1000}{100}\right)$

$wt = 7.5$

76) The relation between viscosity coefficient and temperature is somewhat similar to the relation between pressure and volume as in Boyle's law. Both follow a rectangular hyperbolic behaviour.

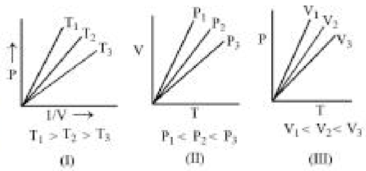
77) From Boyles' law : Isotherms : [Constant temperature]

Dia - I

From Charles law : Isobars : [At Constant pressure]

Dia - II

From Gaylussac law : Isobars : [At Constant volume]



Dia - III

From above data Graphs II and IV are correct.

78) Find molality of solution and use the equation that links ΔT_f and molality.

Moles of glucose = $9/180 = 5 \times 10^{-2}$. Mass of solvenet water = 0.50 kg.

Molality = $5 \times 10^{-2}/0.05 = 1$. $\Delta T_f = K_f \times$ molality

79) α is the degree of dissociation of $Na_2SO_4; i?$

$Na_2SO_4 \rightarrow 2Na^+ + SO_4^{-2}$ n = 3

$\alpha = \frac{i-1}{n-1}; \alpha = \frac{i-1}{3-1}; \alpha = \frac{i-1}{2}$

$i = 1 + 2\alpha$

80) $molarity = 1$

$$\Rightarrow \frac{60}{60} \times \frac{1000}{w_{solvent}} = 1$$

$\Rightarrow w_{solvent} = 1000g$

$\Rightarrow$Given weight of solution=1100g

Given weight of solute=60g

Given weight of solvent=1040g

Amount of solvent seperated as ice=1040-1000

=40g

81) $K_4[Fe(CN)_6]$ gives maximum ion. Hence it have lowest vapour pressure.

82) Solubility of gas in liquid ;

0.05 mole of gas in 500 gr of $H_2O \rightarrow$ 1 atm P

0.1 mole of gas in 500 gr of $H_2O \rightarrow$ 2 atm P

$x \propto P$

$P = KH.x$

This is illustrates by Henry's law.

83) Since, $P = X_A P_A^0 + X_B P_B^0$, we have

$$\left(\frac{1}{1+3}\right) P_A^0 + \left(\frac{3}{1+3}\right) P_B^0 = 550mm\ Hg; \left(\frac{1}{1+4}\right) P_A^0 + \left(\frac{4}{1+4}\right) P_B^0 = 560mm\ Hg$$

That is, $0.25P_A^0 + 0.75P_B^0 = 550mm\ Hg$;

$0.25P_A^0 + 0.8P_B^0 = 560mm\ Hg$

Solving for P_A^0 and P_B^0, we get;

P_A^0=400 mm Hg and P_B^0=600 mm Hg

84) Mole fraction of dry air = 1- 0.02 = 0.98

P.P(dry air) = 0.98 × 1.2 = 1.176 atm

85) Because HCl & NH_3 gases may react to produce NH_4Cl gas. Dalton's Law is applicable for non reacting gas mixtures.

86) $\Delta Tb \propto \frac{1}{mol\ wt\ of\ solute}$

$\frac{M_1}{M_2} = \frac{(\Delta Tb)_2}{(\Delta Tb)_1} = \frac{0.4}{0.2}$

$(B.P \propto particle\ concentration)$

=2:1

87) $\frac{d}{p} = \frac{M}{RT}$

Let density of gas B be d.

Density of gas A = 3d

And let molecular weight of A be M.

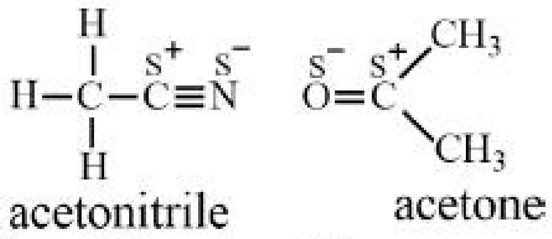
Molecular weight of B = 2M

Since, R is a gas constant and T is same for both gases, so

$p_A = \frac{d_A RT}{M_A}$ and $p_B = \frac{d_B RT}{M_B}$

$\frac{p_B}{p_A} = \frac{d_B}{d_A} \times \frac{M_A}{M_B} = \frac{d}{3d} \times \frac{M}{2M} = \frac{1}{6}$

88) The following mixtures, dipole-dipole as the major interaction, is present in dipole-dipole interactions observed in acetonitrile and acetone.



89) $\Delta T_b = i = K_b . m$

$T_b - T_b^o = i . K_b . m$

$= i . K_b . \frac{W}{M} \times \frac{1000}{\text{wt of solvent in gra}}$

$80.23 - 80.10 = 1 \times 2.53 \times \frac{0.64}{M} \times \frac{1000}{100}$

$M = \frac{2.53 \times 0.64 \times 10}{0.13} = 124.55$

90) $\underset{(0.004-x)}{Na_2SO_4} \quad \underset{2x}{2Na^+} + \underset{x}{SO_4^{2-}}$

$\Rightarrow 0.004 - x + 2x + x = 0.004 + 2x$

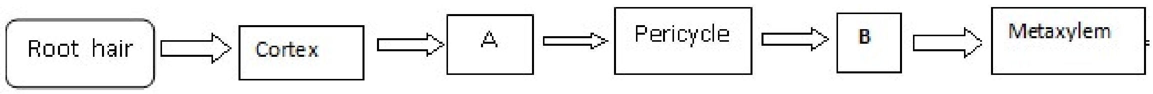
Since both the solution are isotonic $0.004 + 2x = 0.01$

$x = 3 \times 10^{-3}$

Percent dissociation $= \dfrac{3 \times 10^{-3}}{0.004} \times 100 = 75\%$

TOPIC: TRANSPORT IN PLANTS, MINERAL NUTRITION AND PLANT GROWTH AND DEVELOPMENT
UNIT NO: B-06

91. In the given flow chart, the flow of water is shown from soil to xylem of the root. Identify the tissues involved in steps A and B.



1. A- Hypodermis; B-Protoxylem
2. A-Medullary rays; B-Phloem
3. A- Endodermis; B- Phloem
4. A- Endodermis; B- Protoxylem

92. Loss or excretion of water in the form of liquid droplets from the margins and tips of leaves is called
1. Transpiration 2. Guttation 3. Bleeding 4. Precipitation

93. Ascent of sap is best explained by
1. Mass (bulk) flow 2. Pulsation theory
3. Root pressure 4. Cohesion- tension transpiration pull

94. Which of the following is called necessary evil
1. Osmosis 2. Absorption 3. Transpiration 4. Photosynthesis

95. Unidirection flow of water, minerals, some organic nitrogen and hormones occurs through
1. Xylem 2. Phloem 3. Root 4.Vascular tissue

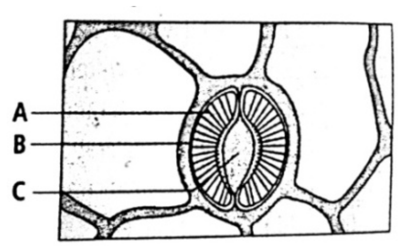
96. Water moves up against gravity and even for a tree of 20 M height, the tip receives water within two hours. The most important physiological phenomenon which is responsible for the upward movement of water is_______________
1. Guttation 2. Evaporation 3. Transpiration 4. None of these

97. A girdled plant(upto bast) may survive for some time but it will eventually die, because
1. Water will not move downwards
2. Water will not move upwards
3. Sugars and other organic materials will not move downwards
4. Sugars and other organic materials will not move upwards

98. What will be the direction of movement of water, when solution A having water potential of -9 bars and another solution B of -4 bars is separated by a semi-permeable membrane?
1. B to A 2. A to B 3. Both directions 4. None of these.

99. Which of the following is true about mycorrhizae?
1. Association between roots and fungus
2. Fungal hyphae have very large surface area that absorb water and mineral from the soil
3. Roots provide sugar and N- containing compound to the fungus 4. All of the above

100. Refer to the given figure and select the correct statement regarding the labeled parts A-C
1. The inner wall of B towards C is thick and elastic
2. The opening and closing of the stomata is due to change in the turgidity of B
3. The opening of the stoma is aided due to the orientation of A in the cell walls of B
4. All of these



101. When sugar is added to the source, water potential of sucrose _______ and when sugar is removed from sink, the water potential of sink_________
1. Increases, increases 2. Increases, decreases
3. Decreases, decreases 4. Decreases, increases

102. Match the following

	Column I		Column II
i.	K^+ pump theory	A	Dixon & Jolly
ii.	Plasmolysis	B	Hydathodes
iii.	Imbibition	C	Stomatal movement
iv.	Guttation	D	Exosmosis
v.	Transpiration cohesion theory	E	Hydrophilic colloids

1. i-C, ii-D, iii-E, iv-B, v-A 2. i-A, ii-B, iii-C, iv-D, v-E
3. i-B, ii-C, iii-E, iv-A, v-D 4. i-C, ii-D iii-B, iv-E, v-A

103. Read the following statements and select the correct options
A. Apoplastic movement may be aided by cytoplasmic streaming
B. *Pinus* seeds cannot germinate and establish with the presence of mycorrhizae
C. Less than 1% of the water reaching the leaves is used in photosynthesis and plant growth
D. Cohesion is the attraction of water molecules to polar surfaces such as tracheary elements
E. Elements most readily mobilized are phosphorus, nitrogen etc. but some elements that are structural components like potassium are not remobilized.
F. Phloem tissue is composed of sieve tube cells, which form long columns with holes in the cross walls called sieve plates
1. A, B, D & E are correct and C & F are wrong statements.
2. A, B, C & F are correct and D & E are wrong statements
3. C & F are correct and A, B, D & E are wrong statements
4. A, B, D & F are correct and C & E are wrong statements

104. Proteins in the membrane, responsible for facilitated diffusion and active transport, show some common characteristic like.
A. Being highly selective B. Being liable to saturate
C. Responding to inhibitor D. Being regulated by hormones
1. A and B only 2. B and C only 3. C and D only 4. All of these

105. How we can get the egg membrane?
1. Remove yolk and albumin through a small hole at one end of the egg
2. Place the shell in dilute HCl for few hours
3. Both 1 and 2 4. None of these

106. The pressure exerted by the protoplast due to the entry of water against the rigid cell wall is called
1. Osmotic potential 2. Pressure potential 3. Water potential 4. Matrix potential

107. Read the given statements and select the correct option
Statement 1: Xylem transport is unidirectional
Statement 2: Phloem transport is bi-directional
1. Both statements 1 and 2 are correct 2. Statement 1 is correct but statement 2 is incorrect
3. Statement 1 is incorrect but statement 2 is correct
4. Both statements 1 and 2 are incorrect

108. Concentration of minerals in the soil is usually________ than the concentration of minerals in root hair
1. Lower 2. Higher 3. Similar 4.None of these

109. The cells surrounding the stomatal pore are
1. Guard cells 2. Subsidiary cells 3. Chromophil cells 4. None of these

110. Which of the following is not a controlled process
1. Transpiration 2. Guttation 3. Both 1 and 2 4. None of the above

111. Which of the following is done during ringing experiment?
1. Xylem is removed 2. Bark is removed 3. Pith is removed 4. All of these

112. Where is apoplastic movement shifted to symplastic pathway?
1. Cortex 2. Xylem 3. Pericycle 4. Endodermis

113. Which of the following statement are/ is correct with respect to guttation?
1. It is a controlled phenomenon 2. Occurs during day time
3. It is a universal process 4. Impure water is lost through hydathode

114. An RBC and a plant cell are placed in distilled water. The solute concentration is the same in both the cells. What changes would be observed in them?
1. Both plant cell & RBC would decrease in size and collapse
2. Both plant cell & RBC would not undergo any change
3. The RBCs would increase in size & burst while plant cell would remain about the same size.
4. The plant cell would increase in size and burst while the RBC would remain about the same size.

115. Stomata in angiosperms open and close due to
1. Their genetic constitution 2. Effect of hormones
3. Changes of turgor pressure in guard cells 4. Pressure of gases inside the leaves

116. Sink and source in sucrose transport may be reversed depending on
1. Plant's need 2. Season 3. Both 1 & 2 4. None of these

117. Which one of the following doesn't help in molecule transport?
1. Diffusion 2. Osmosis 3. Surface tension 4. Active transport

118. The process of guttation takes place
1. When the root pressure is high and the rate of transpiration is low
2. When the root pressure is low and the rate of transpiration is low
3. When the root pressure equals the rate of transpiration
4. When the root pressure as well as rate of transpiration are high

119. Root pressure contributes to the
1. Ascent of sap in small herbaceous plants. 2. Guttation
3. Re- establishment of continuous chains of water molecules in the xylem which often breaks down under the enormous tension created by transpiration 4. All of these

120. If two solutions have the same osmolarity, they are said to be
1. Hypotonic 2. Isotonic 3. Hypertonic 4. None of these

121. Plants use zinc as
1. Zn 2. Zn^{2+} 3. $ZnSO_4$ 4. $Zn(NO_3)_2$.

122. Select the correct match
A. *Nitrosomonas* – Nitrite to nitrate B. *Thiobacillus* – Denitrification
C. *Azotobacter* – Anaerobic nitrogen fixation D. *Nostoc* – Free living
1. A and B 2. B and D 3. B and C 4. A and D

123. Which mobile element is appear first in young leaves
1. Sulphur 2. Calcium 3. Potassium 4. None of these.

124. *Frankia* is a
1. Fungi 2. *Actinomycetes* 3. Alga 4. Cyanobacteria

125. Non mineral elements includes
1. C 2. H 3. O 4. All of these

126. The activities of enzyme nitrogenase shows in
1. Anaerobic conditions 2. Aerobic conditions
3. Aerobic and anaerobic conditions 4. None of these

127. Oxygen scavenger is
1. Nitric acid 2. Polymerase 3. Leg-haemoglobin 4. None of these

128. The one ammonia synthesis by nitrogenase requires a energy is
1. 16 ATP 2. 8 ATP 3. 12 ATP 4. 18 ATP

129. Ureides contains
1. High nitrogen to carbon ratio 2. High carbon to oxygen ratio
3. High oxygen to nitrogen ratio 4. None of these

130. One of the following is a nitrogen fixing enzyme
1. Arginase 2. Urease 3. Nitrate reductase 4. All of these

131. Pigment leg haemoglobin is present in roots of
1. Maize 2. Rice 3. Soyabean 4. Potato

132. The number of essential nutrient needed in plants is
1. 16 2. 5 3. 4 4. 8

133. Legume's roots have swellings called nodules that
1. Produce antibiotics that protect the plant from soil bacteria.
2. Provide a steady supply of sugar to the host plant
3. Increases the surface area for water uptake
4. Contain nitrogen fixing bacteria.

134. Match the following

a. Photolysis of water	1. Zinc
b. Diazotrophy	2. Copper
c. Cytochrome 'c' oxidase	3. Manganese
d. Biosynthesis of IAA	4. Molybdenum
	5. Boron

1. a-3, b-4 , c-2, d-1
2. a-5, b-2, c-3, d-4
3. a-3, b-2, c-1, d-4
4. a-4, b-1, c-3, d-2.

135. Uptake of mineral ions against concentration gradient is called
1. Active absorption 2. Passive absorption 3. Negative absorption 4. None of these.

136. Essential elements of plants are obtained from
1. Soil 2. Soil and water
3. Soil, water and atmosphere 4. Water and atmosphere

137. On the basis of the symptoms of chlorosis in leaves, a student inferred that this was due to the deficiency of nitrogen. The inference could be correct only if we assume that the yellowing of the leaves first appeared in
1. Old leaves 2. Young leaves followed by mature leaves
3. Young leaves 4. Mature leaves followed by young leaves

138. Plants such as clover and bean that have nitrogen fixing bacteria in their roots are in which of the following families?
1. Orchidaceae 2. Solanaceae 3. Leguminosae 4. Asteraceae

139. Crop rotation is used by farmers to increase
1. Soil fertility 2. Community area
3. Organic content of soil 4. Nitrogenous content in soil

140. Nitrogen fixation is a process of
1. Converting nitrogen in the air to form a usable form by plants
2. Recycling nitrogen from organic matter in the soil
3. Absorbing nitrogen from the soil 4. Conversion of NO_3 to N_2

141. Minerals enter a plant mainly by
1. Diffusion 2. Pressure flow 3.Translation 4. Active transport

142. Plants absorb mineral salts from the soil through
1. A semipermeable membrane in to the cytoplasm by selectively absorption
2. Perforation at the apex of root hair cells
3. The cell wall which is permeable 4. None of these

143. At physiological pH, the ammonia is protonated to which form?
1. Ammine 2. Ammonium ion 3. Amides 4. None of these

144. What is the process involved in converting of ammonia and α- ketoglutaric acid into glutamic acid?
1. Transamination 2. Nitrification 3. Reductive amination 4. None of these

145. Find out the amides
1. Aspargine 2. Glutamine 3. Both 1and 2 4. None of these

146. Nodule with nitrogen fixing bacteria are present in roots of
1. Cotton 2. Gram 3. Wheat 4. Maize

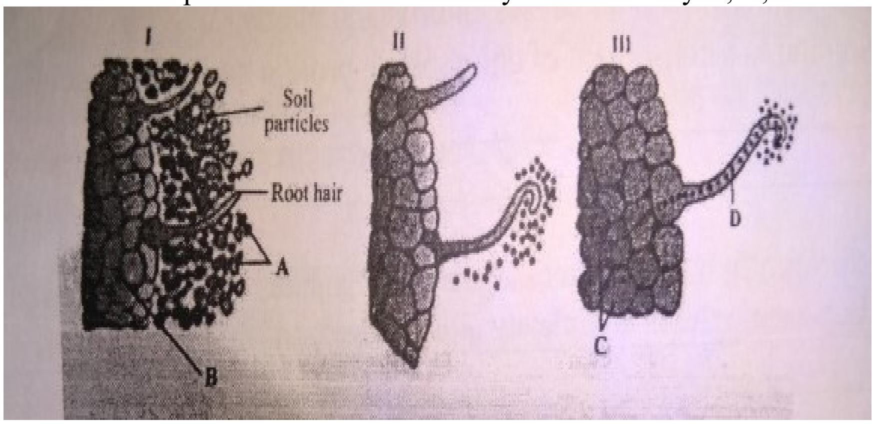
147. Members of bean family are particularly important for rotation of crop
1. Because they add green manure 2. They add nitrates to soil
3. They make soil porous 4. They add calcium to soil

148. Nitrogen is an essential component of
1. Fats 2. Carbohydrates 3. Proteins 4. Hormones

149. If a dried leaf is taken in a crucible and heated to $600^{o}c$ a grey coloured powder is left behind. It is referred to as

1. Dry weight	2. Plant ash
3. Wilting percentage	4. Protein content of the plant

150. The diagram shows the development of root nodule in soyabean. Identify A, B, C and D.



1. A- *Rhizobial* bacteria, B- cortex cell, C- outer cortex, D- Infection thread
2. A- *Rhizobial* bacteria, B- cortex cell, C- Inner cortex and pericycle cells, D- Infection thread
3. A- *Rhizobial* bacteria, B- Endodermal cells, C- Inner endodermis, D- Infection thread
4. A- *Nitrosomonas* bacteria, B-cortex cells, C- Inner cortex and pericycle cells, D- Infection thread

151. Find the true statements with respect to arithmetic growth.

A. It is exemplified by a root elongating at a constant rate.
B. On plotting, length against time, a linear curve is obtained.
C. Here both the progeny cells following mitotic cell division retain the ability to divide and continue to do so.
D. This exponential growth is expressed as $L_t=L_0+rt$

1. All except A	2. All except B	3. All except C	4. All except D

152. Find the true statements.

A: Differentiation results in loss of the ability of division, leads to maturity.
B: Dedifferentiation is reacquiring of ability of cell division, occurs during secondary growth
C: Redifferentiation is differentiation of cells derived from dedifferentiation.
D: Intra fascicular cambium, inter fascicular cambium and cork cambium are the examples for dedifferentiated tissues.

1. All except A	2. All except B	3. All except C	4.All except D

153. Development is

1. The one which includes all changes occurring throughout the lifetime.
2. Sum of growth and differentiation.
3. Controlled by several extrinsic and intrinsic factors	4. All of these

154. Ability of plants to respond to environment or phases of life, by forming different kinds of structures is called

1. Totipotency	2. Plasticity	3. Pleuripotency	4. Adaptation

155. Hormone used as substitute for vernalisation is

1. Auxin	2. Gibberellins	3. Ethyene	4. Cytokinin

156. Foolish seedling disease led to the discovery of

1. Auxin	2. Gibberellin	3. Ethylene	4. Cytokinin

157. Growth can be measured in various ways. Which of these can be used as parameters to measure the growth?

1. Increase in cell number	2. Increase in cell size
3. Increase in length and weight	4. All of these

158. Rate of growth is highest in

1. Log phase	2. Lag phase	3. Steady phase	4. Declining phase

159. Which of the followings is the correct sequence of the developmental process in a plant cell?
1. Plasmatic growth, Differentiation, Senescence and Maturation respectively.
2. Plasmatic growth, Differentiation, Maturation and Senescence respectively.
3. Maturation, Plasmatic growth, Differentiation and Senescence respectively.
4. Differentiation, Plasmatic growth Maturation and Senescence respectively.

160. Pick out the correct statements
a) Cytokinins specially help in delaying senescence
b) Auxins are involved in regulating apical dominance
c) Ethylene is especially useful in enhancing seed germination.
d) Gibberellins are responsible for immune falling of leaves
1. a and c only 2. a and d only 3. a and b only 4. b and c only

161. Ethylene is used for
1. Retarding ripening of tomatoes 2. Hastening of ripening of fruits
3. Slowing down ripening of apples 4. Both 2 and 3

162. Plants requiring exposure to light for less than critical period in order to flower are called
1. Long day plants 2. Day neutral plants
3. Intermediate day plants 4. Short day plants

163. Match the following

1. IAA	a) Herring sperm DNA
2. ABA	b) Bolting
3. Ethylene	c) Stomatal closure
4. GA	d) Weed free lawns
5. Cytokinins	e) Ripening of fruits

1. 1-d, 2-c, 3-e, 4-b, 5-a 2. 1-e, 2-c, 3-d, 4-b, 5-a
3. 1-d, 2-a, 3-e, 4-c, 5-b 4. 1-e, 2-c, 3-b, 4-a, 5-d

164. Which is true for ethaphon?
1. It is the commercially available source of ethylene.
2. It releases ethylene after the breakdown
3. Chemically it is 2-chloro ethyl phosphonic acid 4. All of these

165. Vernalisation can covert
1. Biennial into annual 2. Spring variety into winter variety
3. Annual into perennial 4. Biennial into perennial

166. Phototrophic and geotrophic movements are linked to
1. GA 2. Enzymes 3. Auxin 4. Cytokinine

167. Hormone present in the coconut milk is
1. Auxin 2. Gibberelin 3. Ethylene 4. Cytokinin

168. Richmond-lang effect refers to
1. Delay in senescence 3. Shortening of internode
2. Increased respiration during ripening 4. Increased cell division

169. Ethylene gas used for
1. Growth of plants 2. Delaying fruit's abscission
3. Ripening of fruits 4. Prevention of leaf abcission

170. Foolish seedling disease led to the discovery of
1. Auxin 2. Gibberellin 3. Ethylene 4. Cytokinin

171. The movement of roots away from the source of light is
1. +ve geotropism 2. +ve phototropism
3. +ve hydrotropism 4. –ve phototropism

172. Choose the odd one out of the following
1. NAA 2. 4-D 3.TIBA 4.BAP

173. Assertion: 2,4-D is used to prepare weed-free lawns by gardeners.
Reason: It affects the root system of monocot weeds.
1. Both assertion and reason are true and reason is the correct explanation of assertion

2. Both assertion and reason are true and not reason is the correct explanation of assertion
3. Assertion is true and reason is false 4. Both Assertion and reason are false

174. Plant hormone associated with climacteric respiration is
1. Auxin 2. Cytokinins 3. Ethylene 4. Gibberellin

175. Intrinsic heterophylly is seen in all except
1. Cotton 2. Coriander 3. Buttercup 4. Larkspur

176. Which of the following effects is brought about by gibberellins but not by auxins?
1. Inhibition of leaf abscission. 2. Stimulation of cambial activity.
3. Stimulation of fruit development. 4. Breaking of dormancy in leaf buds

177. During leaf fall, the hormone produced in abundant quantity is
1. IAA 2.Kinins 3. ABA 4. All these

178. Most abundant gibberellins is
1. GA_1 2. GA_3 3. GA_{10} 4. GA_5

179. Hormone used as substitute for vernalisation is
1. Auxin 2. Gibberellins 3. Ethyene 4. Cytokinin

180. Cut or excised leaves remain green for long if induced to root or dipped in
1. Gibberellins 2. Cytokinin 3. Auxin 4. Ethylene

TOPIC: TRANSPORT IN PLANTS, MINERAL NUTRITION AND PLANT GROWTH AND DEVELOPMENT

UNIT NO: B-06

ANSWER KEY

Q. No.	Ans.	Q. No.	Ans.	Q. No.	Ans.	Q. No.	Ans.	Q. No.	Ans.
91	4	92	2	93	4	94	3	95	1
96	3	97	3	98	1	99	4	100	4
101	4	102	1	103	3	104	4	105	3
106	2	107	1	108	1	109	1	110	2
111	2	112	4	113	4	114	3	115	3
116	3	117	3	118	1	119	4	120	2
121	2	122	2	123	3	124	2	125	4
126	1	127	3	128	2	129	1	130	3
131	3	132	1	133	4	134	1	135	1
136	3	137	4	138	2	139	4	140	1
141	4	142	1	143	2	144	3	145	3
146	2	147	2	148	3	149	2	150	2
151	3	152	4	153	4	154	2	155	2
156	2	157	4	158	1	159	2	160	3
161	2	162	4	163	1	164	4	165	1
166	3	167	4	168	1	169	3	170	2
171	4	172	4	173	3	174	3	175	3
176	4	177	3	178	2	179	2	180	2