PHYSICS

1. The mass of a ball is 1.76 kg. The mass of 25 such balls is :

(A) 0.44×10^3 kg (B) 44.0 kg (C) 44 kg (D) 44.00 kg

2. Given that $\int e^{ax}dx = a^m e^{ax} + C$, then which statement is incorrect (Dimension of $x = L^1$) ?

(A) m = – 1 (B) Dimension of $C = [L^1]$

(C) Dimensions of $a = [L^1]$ (D) None of these

3. If $|\hat{a} - \hat{b}| = \sqrt{2}$ then calculate the value of $|\hat{a} + \sqrt{3}\,\hat{b}|$.

(A) 2 (B) 3 (C) 4 (D) 5

4. If $\vec{A} = \hat{i}$ is rotated by 45° anticlockwise in xy-plane then new vector formed is :

(A) $\vec{B} = \frac{1}{\sqrt{2}}\hat{i} + \frac{1}{\sqrt{2}}\hat{j}$ (B) $\vec{B} = \frac{1}{\sqrt{2}}\hat{i} - \frac{1}{\sqrt{2}}\hat{j}$ (C) $\vec{B} = \frac{-1}{\sqrt{2}}\hat{i} + \frac{1}{\sqrt{2}}\hat{j}$ (D) $\vec{B} = \frac{-1}{\sqrt{2}}\hat{i} - \frac{1}{\sqrt{2}}\hat{j}$

5. A man starts from his home and walks 100 m towards north, then he turns towards east and walks 60 m and then reaches to his office after moving 20 m towards south. Total distance and displacement covered by the man from his home to office :

(A) 180, 100 m (B) 100, 100 m (C) 100, 180 m (D) 180, 180 m

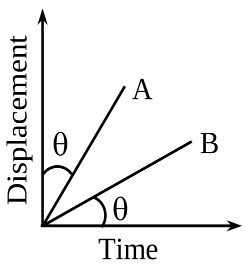
6. A particle moves along Y-axis in such a way that its y-coordinate varies with time t according to the relation $y = 3 + 5t + 7t^2$. The initial velocity and acceleration of the particle are respectively :

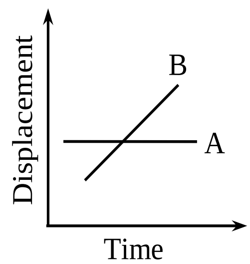
(A) $14\,ms^{-1}, -5\,ms^{-2}$ (B) $19\,ms^{-1}, -9\,ms^{-2}$ (C) $-14\,ms^{-1}, -5\,ms^{-2}$ (D) $5\,ms^{-1}, 14\,ms^{-2}$

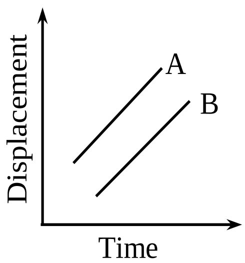
7. A body A is thrown up vertically from the ground with a velocity v_0 and another body B is simultaneously dropped from a height H. They meet at a height H/2, if v_0 is equal to :

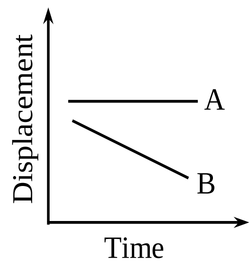
(A) $\sqrt{2gH}$ (B) $\sqrt{gH}$ (C) $\frac{1}{2}\sqrt{gH}$ (D) $\sqrt{\frac{2g}{H}}$

8. Which of the following displacement-time graph represents the zero relative speed between the two object A and B ?

(A)


(B)


(C)


(D)


9. Two trains A and B, 100 m and 60 m long, are moving in opposite directions on parallel tracks. The velocity of shorter train in 3 times that of the longer one. If the trains take 4s to cross each other, the velocity of the trains are :

(A) $v_A = 10 m/s, v_B = 30 m/s$ (B) $v_A = 2.5 m/s, v_B = 7.5 m/s$

(C) $v_A = 20 m/s, v_B = 60 m/s$ (D) $v_A = 5 m/s, v_B = 15 m/s$

10. The speed of a projectile at its maximum height is half of its initial speed. The angle of projection is :

(A) 60° (B) 15° (C) 30° (D) 45°

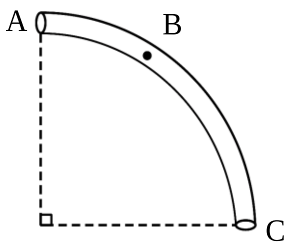
11. Newton's first law of motion describes the following :

(A) Energy (B) Work (C) Inertia (D) Moment of inertia

12. A man fires a bullet of mass 200 g at a speed of 5m/s. The gun is of one kg mass. By what velocity the gun rebounds backwards:

(A) 0.1 m/s (B) 10 m/s (C) 1 m/s (D) 0.01 m/s

13. The tube AC forms a quarter circle in a vertical plane. The ball B has an area of cross-section slightly smaller than that of the tube, and can move without friction through it. B is placed at A and displaced slightly. It will



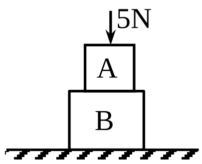
(A) always be in contact with the inner wall of the tube

(B) always be in contact with the outer wall of the tube

(C) initially be in contact with the inner wall and later with the outer wall

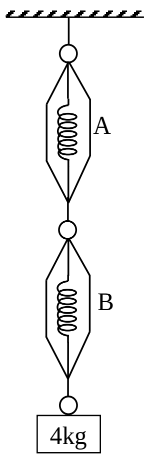
(D) initially be in contact with the outer wall and later with the inner wall

14. If masses of blocks A and B are 3kg and 8kg respectively, then normal reaction between A and B:



(A) 20 N (B) 30N (C) 35N (D) 115N

15. A block of mass 4 kg is suspended through two light spring balances A and B. When system is in equilibrium then A and B will read respectively :



(A) 4 kg and zero kg (B) zero kg and 4 kg (C) 4 kg and 4 kg (D) 2 kg and 2 kg

16. The some of work done by the external forces on a system equals the change in

(A) total energy (B) kinetic energy (C) potential energy (D) none of these

17. A ball is released from the top of a tower. The ratio of work done by force of gravity in first, second and third second of the motion of the ball is :

(A) 1 : 2 : 3 (B) 1 : 4 : 9 (C) 1 : 3 : 5 (D) 1 : 5 : 3

CHEMISTRY

[Use Gas constant R = 8.314 $JK^{-1}\ mol^{-1}$ = 2 Cal $K^{-1}\ mol^{-1}$, 1 cal = 4.18 J, 1atm = $1.01325 \times 10^5\ Nm^{-2}$]

18. Which of the following has lowest number of significant figures.

(A) 425 banana (B) 1.3025 g water (C) 0.1234 cm length (D) 2 pages in a copy

19. The dehydration yield of hexanol to hexene is 75%. What would be the yield if 100 g of hexanol is dehydrated?

(A) 61.7g (B) 16.5 g (C) 6.15 g (D) 615 g

20. If the threshold frequency of a metal for photoelectric effect is ν_0, then which of the following will not happen?

(A) If frequency of the incident radiation is ν_0, the kinetic energy of the electrons ejected is zero.

(B) If frequency of incident radiation is ν ($\nu > \nu_0$) , the maximum kinetic energy of the electrons ejected will be $h\nu - h\nu_0$.

(C) If frequency is kept same at ν ($\nu > \nu_0$) but intensity is increased, the number of electrons ejected will increase.

(D) If frequency of incident radiation is further increased, the number of photo–electrons ejected will increase.

21. Which is true regarding emission spectrum of hydrogen atom

(A) Lymann series doesn’t overlap with any other series.

(B) Balmer series overlaps with Paschen series.

(C) Paschen series overlap with both balmer and bracket series.

(D) All of these.

22. Which of the following statement is correct in relation to the hydrogen atom?

(A) 3s–orbital is lower in energy than 3p–orbital.

(B) 3p–orbital is lower in energy than 3d–orbital.

(C) 3s and 3p–orbitals are of lower energy than 3d–orbitals.

(D) 3s, 3p and 3d–orbitals all have same energy.

23. **Assertion :** The bond angle around PBr_3 is larger than that in PH_3 but bond angle of NBr_3 is less than that of NH_3.

Reason : As Br is more electronegative than Hydrogen, it attracts lone pair towards itself and this reduces the bond angle in NBr_3.

(A) Assertion and Reason both are true and reason is correct explanation of assertion.

(B) Assertion and Reason both are true and reason is not correct explanation of assertion.

(C) Assertion is true but reason is false.

(D) Assertion is false but reason is true.

24. If MX_3 is T shaped, then the number of lone pair around M is

(A) 2 (B) 0 (C) 3 (D) 5

25. Which of the following is arranged in order of increasing dipole moment?

(A) $BCl_3 < NH_3 < H_2O < NF_3$ (B) $BCl_3 < NF_3 < NH_3 < H_2O$

(C) $NH_3 < NF_3 < H_2O < BCl_3$ (D) $H_2O < NF_3 < NH_3 < BCl_3$

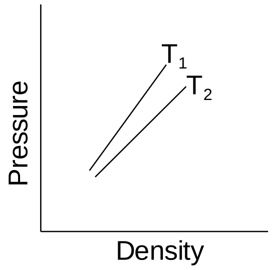
26. At moderate or low pressure, the compressibility factor of a gas can be given as

(A) $1-\frac{a}{RTV}$ (B) $1-\frac{RTV}{a}$ (C) $1+\frac{a}{RTV}$ (D) $1+\frac{RTV}{a}$

27. The rms speed of hydrogen is $\sqrt{7}$ times the rms speed of nitrogen. If T is the temperature of the gas

(A) $T(H_2) = T(N_2)$ (B) $T(H_2) > T(N_2)$ (C) $T(H_2) < T(N_2)$ (D) $T(H_2) = \sqrt{7}\,T(N_2)$

28. Figure shows graph of pressure versus density for an ideal gas at two temperatures T_1 and T_2. Which one is correct?



(A) $T_1 > T_2$ (B) $T_1 = T_2$ (C) $T_1 < T_2$ (D) None of these

29. For the combustion reaction at 298 K,

$2Ag(s) + \frac{1}{2} O_2(g) \longrightarrow 2Ag_2O(s)$

which of the following relation will be true?

(A) $\Delta H = \Delta U$ (B) $\Delta H > \Delta U$

(C) $\Delta H < \Delta U$ (D) ΔH and ΔU bear no relation with each other

30. A chemical reaction can not occur at all if its

(A) ΔH value is positive and ΔS value is negative

(B) ΔH value is negative and ΔS value is positive

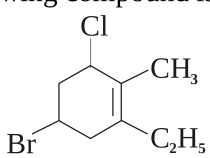
(C) ΔH and ΔS value are negative but $\Delta H > T\Delta S$

(D) ΔH and ΔS value are positive but $\Delta H > T\Delta S$

31. Given that $\frac{1}{2}S_8(s) + 6O_2 \longrightarrow 4SO_3(g);\ \ \Delta H^{\circ} = -1590\,kJ$. The standard enthalpy of formation of SO_3 is

(A) $-1590\ kJ\ mol^{-1}$ (B) $-397.5\ kJ\ mol^{-1}$ 1 (C) $-3.975\ kJ\ mol^{-1}$ (D) $-397.5\ kJ\ mol^{-1}$

32. IUPAC name of the following compound is



(A) 4-Bromo-6-chloro-2-ethyl-1-methylcyclohex-1-ene

(B) 5-Bromo-1-chloro-3-ethyl-2-methylcyclohex-2-ene

(C) 5-Bromo-3-chloro-1-ethyl-2-methylcyclohex-1-ene

(D) 1-Bromo-5-chloro-3-ethyl-4-methylcyclohex-3-ene

33. The first ionisation potential of Na, Mg, Al and Si are in the order of:

(A) Na < Mg > Al < Si (B) Na > Mg > Al > Si (C) Na < Mg < Al > Si (D) Na > Mg > Al < Si

34. The temperature at which molarity of pure water is equal to its molality is

(A) 273K (B) 298K (C) 277K (D) None of these

BIOLOGY

35. Biosystematics aims at

(A) the classification of organisms based on their evolutionary history and establishing their phylogeny studies.

(B) identification and arrangement of organisms on the basis of their cytological characteristics.

(C) the classification of organisms based on broad morphological characters.

(D) delimiting various taxa of organisms and establishing their relationships.

36. Which of the following is **false** about ascomycetes?

(A) Mode of nutrition saprophytic, decomposer, coprophilous (growing on dung) and parasitic.

(B) It includes unicellular (e.g. yeast) and multicellular forms of fungi.

(C) Its mycelium is coenocytic.

(D) *Aspergillus*, *Claviceps* and *Neurospora* are important members of ascomycetes.

37. How many of the following algae belong to the category of red algae?

Polysiphonia, Gelidium, Laminaria, Spirogyra, Porphyra, Fucus, Chlamydomonas

(A) Two (B) Three (C) Four (D) Five

38. Match Column-I with Column-II and select the **correct** option.

Column-I		**Column-II**	
(A)	*Physalia*	(I)	Brain coral
(B)	*Adamsia*	(II)	Sea fan
(C)	*Pennatula*	(III)	Sea pen
(D)	*Gorgonia*	(IV)	Sea anemone
(E)	*Meandrina*	(V)	Portuguese man-of-war
(F)	*Aurelia*	(VI)	Jellyfish

(A) (A) – (V); (B) – (IV); (C) – (II); (D) – (III); (E) – (I); (F) – (VI)

(B) (A) – (V); (B) – (IV); (C) – (III); (D) – (II); (E) – (I); (F) – (VI)

(C) (A) – (V); (B) – (IV); (C) – (II); (D) – (I); (E) – (II); (F) – (VI)

(D) (A) – (V); (B) – (III); (C) – (IV); (D) – (II); (E) – (I); (F) – (VI)

39. The leaves of a plant are small and short-lived. The petioles in these plants expand, become green and synthesise food, such petiole is known as phyllode. Which of the following plants we are talking about?

(A) Sweat pea (B) *Clematis* (C) *Australian acacia* (D) *Eichhornia*

40. The most and the least abundant leucocytes are respectively

(A) neutrophils and basophils (B) lymphocytes and monocytes

(C) lymphocytes and basophils (D) neutrophils and monocytes.

41. If we separate the cell organelles / parts of a living cell, then which one should be alive?

(A) Endoplasmic reticulum (B) Chloroplast

(C) Cell wall (D) Ribosome

42. Haeme is prosthetic group of ______ enzyme.

(A) peroxidase (B) catalase (C) Both (A) and (B) (D) None of these

43. The stage of cell division at which morphology of chromosomes is most easily studied is

(A) prophase (B) metaphase (C) anaphase (D) telophase.

44. A bacterial cell divides every minute. It was found that it filled the petri-plate in half-an-hour. In how much time was the plate filled one-fourth?

(A) 7.5 minutes (B) 15 minutes (C) 28 minutes (D) 29 minutes

45. _______ is the basic pathway that result in the formation of the sugars and is common to the C_3 and C_4 plants.

(A) Photorespiration (B) TCA cycle (C) HMP shunt (D) Calvin cycle

46. Which of the following relations shows substrate level phosphorylation?

(A) Citric acid $\rightarrow \alpha$-Ketoglutaric acid (B) Malic acid $\rightarrow$ Oxalo-acetic acid

(C) α- Ketoglutaric acid $\rightarrow$ Succinic CoA (D) Succinyl CoA $\rightarrow$ Succinic acid

47. Consider the following statements regarding gibberellin. Which of the following are **correct**?

i. They cause fruits like apple to elongate and improve its shape.

ii. They promote bolting in beet and cabbages.

iii. They promote nutrient mobilisation.

iv. They are used to synchronise fruit-set in pineapples.

(A) ii, iii and iv (B) i, ii and iii (C) i and ii (D) All of these

48. Match Column-I with Column-II and select the **correct** option.

Column-I		**Column-II**	
(A)	Asthma	(I)	Inflammation of bronchi and bronchioles
(B)	Emphysema	(II)	Chronic disorder in which alveolar walls are damaged due to which respiratory surface area is decreased
(C)	Occupational Respiratory Disorder	(III)	Long exposure of respiratory organs, chemicals can give rise to inflammation leading to fibrosis (proliferation of fibrous tissues) and thus causing serious lungs damage.

(A) (A) – (I); (B) – (II); (C) – (III) (B) (A) – (II); (B) – (I); (C) – (III)

(C) (A) – (III); (B) – (I); (C) – (II) (D) (A) – (III); (B) – (II); (C) – (I)

49. If duration of cardiac cycle is 1 second, calculate cardiac output (assuming stroke volume to be 70 mL).

(A) 5000 mL (B) 6300 mL (C) 4200 mL (D) 4900 mL

50. Which of the following is **mismatched**?

(A) LUBB – First heart sound is associated with closure of tricuspid and bicuspid valves

(B) Cardiac output – Stroke volume multiplied by heart rate

(C) DUBB – Second heart sound, due to opening of semilunar valves

(D) Duration of cardiac cycle – 0.8 sec

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SOLUTION

PHYSICS

1. (D)

Mass of 25 ball = $1.76\times25=44.00\,\text{kg}$

Because device measuring mass can measure 2 place after decimal.

2. (C)

Power of exponential function will be dimensionless

Hence $ax = M^oL^oT^o$

$a = L^{-1}$ $\{x = L \text{ given}\}$

Dimensions of $\int e^{ax}dx$ will be length L

Hence $a^m = L$ and $c = L^1$

$$\left(\frac{1}{L}\right)^m = L$$

$-m = 1 \Rightarrow m = -1$

Dimension of c = L, $a = L^{-1}$ and $m = -1$

3. (A)

$\left|\hat{a}-\hat{b}\right| = \sqrt{2}$

$\sqrt{|\hat{a}|^2+|\hat{b}|^2-2|\hat{a}||\hat{b}|\cos\theta} = \sqrt{2}$

$= 2 - 2\cos\theta = 2$

$\cos\theta = 0 \Rightarrow \theta = 90°$

$\left|\hat{a}+\sqrt{3}\hat{b}\right| = \sqrt{|\hat{a}|^2+|\sqrt{3}\hat{b}|^2+2|\hat{a}||\sqrt{3}\hat{b}|\cos\theta}$

$= \sqrt{1+3+2\sqrt{3}(0)}$

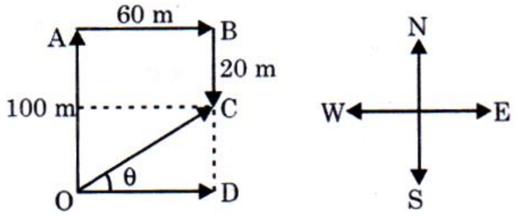
= 2

4. (A)

By rotating vector its magnitude does not change but its components changes.

So $\vec{B} = \frac{1}{\sqrt{2}}\hat{i} + \frac{1}{\sqrt{2}}\hat{j}$

5. (A)



Total distance travelled by the man is

OA + AB + BC = 100 + 60 + 20 = 180 m

Displacement of the person is OC, which can be calculated by Pythagoras theorem i.e.,

$OC = \sqrt{OD^2 + CD^2} = \sqrt{80^2 + 60^2}$

$\Rightarrow OC = 100\text{m}$

6. (D)

$v = \frac{dy}{dt} = 5 + 14t$

Initial velocity at t = 0 is $v = 5ms^{-1}$

Also, acceleration, $a = \frac{d^2y}{dt^2} = 14ms^{-2}$

7. (B)

Suppose the two bodies A and B meet at time t, at a height $\frac{H}{2}$ from the ground.

For body $B, u = 0, h = \frac{H}{2}$

$h = ut + \frac{1}{2}gt^2$

$\frac{H}{2} = \frac{1}{2}gt^2$

For body A, $u = v_0, h = \frac{H}{2}$

$h = ut - \frac{1}{2}gt^2$

Hence, $\frac{H}{2} = v_o t - \frac{1}{2}gt^2$

So, from eqs. i and ii we get

$v_0 t - \frac{1}{2}gt^2 = \frac{1}{2}gt^2 \Rightarrow v_o t = gt^2 \Rightarrow t = \frac{v_0}{g}$

Thus, $\frac{H}{2} = \frac{1}{2}g \times \frac{v_0^2}{g^2} \Rightarrow H = \frac{v_0^2}{g} \Rightarrow v_0 = \sqrt{gH}$

8. (C)

Relative velocity of particles moving with same velocity is zero. Among the graphs shown, option c. graphs has same slope and hence same velocity for A and B.

9. (A)

$3v_A = v_B, S_{rel} = v_{rel}t \Rightarrow 100 + 60 = (v_A + v_B) \times 4$

Solve to get, $v_A = 10m/s$ and $v_B = 30m/s$

10. (A)

At maximum height H speed will be

$v = u\cos\theta$ (Horizontal speed is always constant in projectile motion)

$v = \frac{u}{2}$ (given)

$\Rightarrow \frac{u}{2} = u\cos\theta \Rightarrow \cos\theta = \frac{1}{2} \Rightarrow \theta = 60°$

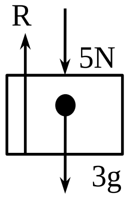
11. (C)

12. (C)

$v_G = \frac{m_B v_B}{m_G} = \frac{0.2 \times 5}{1} = 1m/s$

13. (C)

14. (C)



F.B.D of block A

R = 5 + 3g

= 5 + 30

= 35 N

15. (C)

Reading $_A$ = Reading $_B$ = m = 4 kg

16. (A)

17. (C)

W.D.= mg s cos θ

$W.D_{1st} = mg s_{1st}$

$W.D_{2nd} = mg s_{2nd}$

$W.D_{3rd} = mg s_{3rd}$

$W.D_{1st} : W.D_{2nd} : W.D_{3rd} : s_{1st} : s_{2nd} : s_{3rd} :: 1 : 3 : 5$

As $s_{nth} = \frac{g}{2}(2n-1)$

CHEMISTRY

18. (C)

Counting numbers has infinite significant figures. Hence (a) and (d) option has infinite sig figs.

(b) has 5 sig figs and (c) has 4 sig figs

19. (A)

$$\underset{\text{mol.wt.102}}{C_6H_{13}OH} \xrightarrow{-H_2O} \underset{\text{mol.wt.84}}{C_6H_{12}}$$

$\because$ 102 g hexanol gives 84 g C_6H_{12}

100 g hexanol will give = $\frac{84 \times 100}{102}$ g C_6H_{12}

Also % yield is 75%

$\therefore$ 100 g hexanol will give = $\frac{84 \times 100}{102} \times \frac{75}{100}$ g C_6H_{12} = 61.76 g C_6H_{12}

20. (D)

Number of photo electrons depends on intensity or number of photon emitted per second.

21. (D)

Lyman Series : $n_1 = 1$, $n_2 = 2, 3, 4, \ldots\ldots\ldots\ldots\ldots\infty$

$$\left.\begin{array}{l}\lambda\min = 912 \quad Å \\ \lambda\max = 1212 \quad Å\end{array}\right\}\text{UV region}$$

Balmer Series : $n_1 = 2$ $n_2 = 3, 4, 5, \ldots\ldots\ldots\ldots\ldots\infty$

$$\left.\begin{array}{l}\lambda\min = 3636 \quad Å \\ \lambda\max = 6563 \quad Å\end{array}\right\}\text{Visible region}$$

Paschen Series $n_1 = 3$, $n_2 = 4, 5, 6\ldots\ldots\ldots\ldots\ \infty$

$$\left.\begin{array}{l}\lambda\min = 8202 \quad Å \\ \lambda\max = 18747 \quad Å\end{array}\right\}\text{Near infrared region}$$

Brackett Series : $n_1 = 4$, $n_2 = 5, 6, 7, \ldots\ldots\ldots\ \infty$

$$\left.\begin{array}{l}\lambda\min = 14585 \quad Å \\ \lambda\max = 40515 \quad Å\end{array}\right\}\text{Mid infrared region}$$

22. (D)

Energy of single electron system is only depend on the principle quantum number, so that energy of different orbitals of same principle quantum number is same.

23. (B)

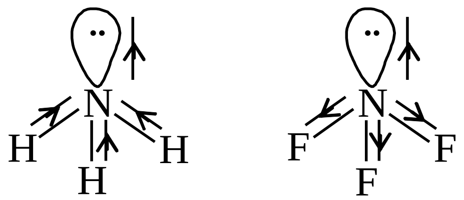
Assertion and Reason both are true and reason is not correct explanation of assertion.

24. (A)

For T–shape 2 lps appear at same side of axial line at plane of paper.

25. (B)

BCl_3 is a planar species. Hence it has zero dipole moment. Out of NH_3 and NF_3, NH_3 has higher dipole moment because of orientation of bond moments as shown



$\therefore$ Correct order is $BCl_3 < NF_3 < NH_3 < H_2O$.

26. (A)

Vander Waal's equation for one mole of gas is given by

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

at low P, volume V is high

$$V - b \approx b$$

$$\therefore \left[P + \frac{a}{V^2}\right]V = RT$$

$$PV = RT - \frac{a}{V}.$$

27. (C)

$$u_{rms} = \sqrt{\frac{3RT_{(H_2)}}{2}} = \sqrt{7}\ \sqrt{\frac{3RT_{(Ne)}}{28}}$$

$$\therefore\ \frac{T_{(H_2)}}{2} = 7 \times \frac{T_{(N_2)}}{28}$$

$$\therefore\ T_{(H_2)} = \frac{T_{(N_2)}}{2}$$

$$\therefore\ T_{(H_2)} < T_{(N_2)}$$

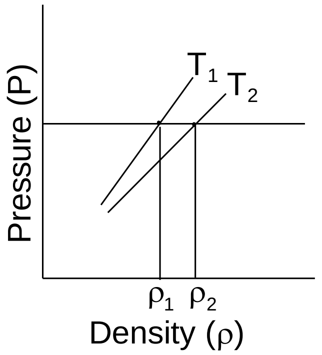
28. (A)

$$\rho = \frac{PM}{RT}$$

$$\rho \propto P$$

$$\rho \propto \frac{1}{T}$$

Keeping the pressure constant it is visible from the graph.



Since, $\rho_1 < \rho_2$ and $\rho \propto \frac{1}{T}$ therefore, $T_1 > T_2$

29. (C)

$2Ag(s) + \frac{1}{2}O_2(g) \longrightarrow 2Ag_2O(s)$

$\Delta H = \Delta U + \Delta ng\ RT$

$\Delta H = \Delta U - \frac{1}{2}\ RT$

$\Rightarrow\ \Delta H < \Delta U.$

30. (A)

ΔG is positive if ΔH is positive and ΔS is negative. Thus, reaction is non–spontaneous.

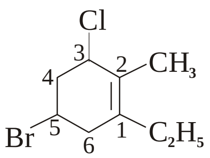
31. (B)

Standard enthalpy of formation of SO_3 = Heat of formation of 1 mole = – 1590/4

= – 397.5 kJ mole^{-1}.

32. (C)

5-Bromo-3-chloro-1-ethyl-2-methylcyclohex-1-ene



33. (A)

34. (C)

At 277 K of 4°C ⇒ density of water = 1g/ml.

Hence molarity = molality

BIOLOGY

35. (A)

Biosystematics is the study of the diversification of living forms, both past and present, and the relationships among living things through time.

36. (C)

The mycelium of ascomycetes is branched and septate. Each cell is uninucleate (not coenocytic). Coenocytic mycelium is the characteristic feature of class phycomycetes.

37. (B)

Polysiphonia, *Gelidium and Porphyra* belong to red algae. *Laminaria and Fucus* belong to brown algae. *Spirogyra* and *Chlamydomonas* belong to green algae.

38. (B)

39. (C)

A phyllode is the modification of petiole. In this modification, the petiole swells up to store food, e.g., *Australian acacia*.

40. (A)

Neutrophils are the most abundant cells (60-65 percent) of the total WBCs and basophils are the least (0.5-1 percent).

41. (B)

Only those organelles are considered alive which contain DNA, such as mitochondria and chloroplasts.

42. (C)

Haeme is an iron containing prosthethic group and is responsible for binding and carrying oxygen. It is present both in peroxidase and catalase enzymes.

43. (B)

The chromosome appears thickest during metaphase. At this stage the chromosome is visible with two chromatids (or four arms) attached to a centromere at equatorial plate.

44. (C)

It is given that a bacterial cell divides every minute. Within half-an-hur (30 min), the petri-plate gets filled. One minute before (i.e. in 29 min.), the petri-plate was half filled. One more minute before (i.e., in 28 min.), it was filled half of the half, i.e., one-fourth filled.

45. (D)

the Calvin cycle is the only way to synthesise carbohydrates (starch, sugar etc.) in plants. So, whether it may be C_3 plants or C_4 plants, food synthesis always occurs by Calvin cycle.

46. (D)

Substrate-level phosphorylation is a type of reaction that results in the formation of ATP by direct transfer and donation of a phosphoryl (PO_3^-) group to ADP. During the conversion of succinyl CoA to succinic acid in Krebs cycle, substrate level phosphorylation takes place.

47. (C)

Gibberellin causes fruits like apple to elongate and improve its shape. It also promotes bolting (Internode elongation) in beet, cabbages etc.

Nutrient mobilisation is carried by Cytokinin. Ethylene is used to initiate flowering and for synchronising fruit-set in pineapples.

48. (A)

49. (C)

Cardiac output = Stroke volume x Rate of heartbeat

= 70 mL x 60 times / min = 4200 mL / min.

50. (C)

Second heart sound is produced when closure of the semilunar valves occurs.