Physics

1

How micron is related to centimetre?

1	$1\text{ micron} = 10^{-4}\text{cm}$
2	$1\text{ micron} = 10^{-5}\text{cm}$
3	$1\text{ micron} = 10^{-6}\text{cm}$
4	$1\text{ micron} = 10^{-8}\text{cm}$

2

If the position vector of a particle is determined by the expression $\vec{r} = 3t^2\hat{i} + 4t^2\hat{j} + 7\hat{k}$, then determine the distance traversed in first 10 sec.

1	100 m
2	150 m
3	300 m
4	500 m

3

A man of mass 60 kg is riding in a lift. How much are the weight of the man, when the lift is accelerating upwards and downwards at $2\,ms^{-2}$? $\left(Take\, g = 10\ ms^{-2}\right)$

1. 720 N and 480 N

2. 600 N and 480 N

3. 600 N and 600 N

4. 480 N and 720 N

4. A car of mass 800 kg moves on a circular track of radius 40 m. If the coefficient of friction is 0.5, then maximum velocity with which the car can move is

1. 7 m/s

2. 8 m/s

3. 12 m/s

4. 14 m/s

5. What is the angle made by the vector $A = \hat{i} + \hat{j}$ with x-axis?

1	22.5°
2	30°
3	45°
4	90°

6 If an aeroplane flies 400 m north and 300 m south and flies 1200 m upwards, then evaluate the net displacement.

1	1500 m
2	1350 m
3	1300 m
4	1200 m

7 Which of the following is described by Newton's first law of motion?

1	Work

2	Inertia
3	Energy
4	Moment of inertia.

---

8 Centripetal force acting on a satellite orbiting round the earth as well as the gravitational force of earth acting on the satellite both equals F. Then find the net force on the satellite.

1	Zero
2	$F\sqrt{2}$
3	F
4	2F

---

9 125 ml of gas A at 0.6 atmosphere and 150 ml of gas B at 0.8 atmosphere pressure at same temperature is filled in a vessel of 1 litre volume. At the same temperature, find the total pressure of mixture.

1	0.212 atmosphere
2	0.195 atmosphere

3	0.140 atmosphere
4	0.120 atmosphere

10

If 2-identical solid copper spheres of radius R placed in contact with each other. Then the gravitational attraction between them is proportional to which of the following?
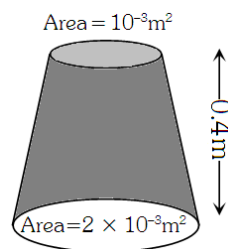
1	R^{-4}
2	R^4
3	R^{-2}
4	R^2

11

A uniformly tapering vessel is filled with a liquid of density 900 kg/m³. Find the force that acts on the base of the vessel due to the liquid. (g = 10 ms⁻²)

Area = 10^{-3}m²

0.4 m

Area = 2×10^{-3}m²

1	14.4 N

2	9 N
3	7.2 N
4	3.6 N

12

When 150 J of heat is added to a system and the work done by the system is 110 J, then find the change in internal energy.

1	40 J
2	110 J
3	150 J
4	260 J

13

A force of $5N$ acts on a particle along a direction making an angle of $60°$ with vertical. Its vertical component be

1	10 N
2	3 N

3	4 N

4	2.5 N

14

Consider ratio of the lengths of two wires A and B of same material as 1:2 and the ratio of their diameter is 2:1. They are stretched by the same force, then what will be the ratio of increase in length?

1	1:2

2	1:8

3	2:1

4	8:1

15

Three containers of the same volume contain 3 different gases. The masses of the molecules are m_1, m_2 and m_3 and the number of molecules in their respective containers are N_1, N_2 and N_3. The gas pressure in the containers are P_1, P_2 and P_3. All the gases are now mixed and put in one of the containers. Find the pressure P of mixture.

1	$P > (P_1 + P_2 + P_3)$

2	$P = P_1 + P_2 + P_3$

3	$P < (P_1 + P_2 + P_3)$
4	$P = \dfrac{P_1 + P_2 + P_3}{3}$

16

A wheel of radius 1 meter rolls forward half a revolution on a horizontal ground. Find the magnitude of the displacement of the point of the wheel initially in contact with the ground.

1	π
2	2π
3	$\sqrt{2}\,\pi$
4	$\sqrt{\pi^2 + 4}$

17

Dimensions of CR are same as that of:

1	Time period
2	Current
3	Frequency
4	Energy

18

Two equations of two S.H.M. are $y = a\sin(\omega t - \alpha)$ and $y = b\cos(\omega t - \alpha)$. What is the phase difference between the two?

1	180°
2	90°
3	0°
4	α°

19

A thin metal disc of radius 'r' floats on water surface and bends the surface downwards along the perimeter making an angle θ with vertical edge of the disc. If the disc displaces a weight of water W and surface tension of water is T, then what is the weight of metal disc?

1	$W - 2\pi r T\cos\theta$
2	$2\pi r T\cos\theta + W$
3	$2\pi r T\cos\theta - W$
4	$2\pi r T + W$

20

A small air bubble is at the inner surface of the bottom of a beaker filled with cold water. Now water of the beaker is heated. Then explain why the size of bubble increases?

1. As root mean square velocity of air molecules inside the bubble increases

2. As increase in the saturated vapor pressure of water

3. Due to decrease in surface tension of water

4. All of the above

21

What is the SI unit of pressure?

1. $Dynes/cm^2$

2. Pascal

3. Atmosphere

4. cm of Hg

22

A four-wheeler is going on an overbridge of radius R. The driver maintains a constant speed. As the four-wheeler is ascending on the overbridge, what happens to the normal force on it?

1	It fluctuates
2	It increases
3	It decreases
4	Itremains the same

23 Let a thermometer read freezing point of water as 20° C and boiling point as 150° C. What will the thermometer reading, if the actual temperature is 60° C?

1	40°C
2	60°C
3	98°C
4	110°C

24 A barometer tube reads 76 cm of mercury. If the tube is gradually inclined at an angle of 60° with vertical, keeping the open end immersed in the mercury reservoir, what will be the length of the mercury column?

1	$38\sqrt{3}\,cm$

2	38 cm
3	76 cm
4	152 cm

25 _____ can replace any vector in an arbitrary direction.

| 1	Two (or three) arbitrary vectors which have the original vector as their resultant
2	Two (or three) vectors which have the original vector as their resultant is mutually perpendicular
3	Two (or three) vectors which have the original vector as their resultant is parallel vector
4	None of the above

26 Two masses of 10 kg and 20 kg respectively are tied together by a massless spring. A force of 200 N is applied on a 20 kg mass as shown in figure. At the instant shown, the acceleration of 10 kg mass is 12 $m s^{-2}$, estimate the acceleration of 20 kg mass.

10 kg —0000— 20 kg → 200 N
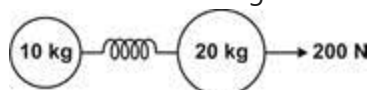
1	12 m s^{-2}
2	4 m s^{-2}
3	10 m s^{-2}
4	0

27 A man goes 10 m towards North, then 20 m towards east, then find the displacement.

1	30.5 m
2	25.5 m
3	20.5 m
4	22.5 m

28 A Body moves 6 m North, 8 m East and 10 m vertically upwards. Calculate its resultant displacement from initial position.

1	10 m
2	$10 \times 2 \text{ m}$

3	$\dfrac{10}{\sqrt{2}}$ m
4	$10\sqrt{2}$ m

29

A 0.10 kg block oscillates back and forth along a horizontal surface. Its displacement from the origin is given by, $x = (10 \text{ cm}) \cos[(10 \text{ rad/s})t + \pi/2 \text{ rad}]$. Find the maximum acceleration experienced by the block.

1	$\dfrac{10\pi}{3}$ m/s^2
2	$\dfrac{10\pi}{2}$ m/s^2
3	10π m/s^2
4	10 m/s^2

30

If the sum of two unit vectors is a unit vector, then find the magnitude of difference.

1	$\sqrt{2}$
2	$1/\sqrt{2}$
3	$\sqrt{3}$

4

$1/\sqrt{5}$

31

When a force $\vec{F} = 4\hat{i} + 5\hat{j}$ causes a displacement $\vec{s} = 3\hat{i} + 6\hat{k}$, then determine the work done.

1

4x3 unit

2

4x6 unit

3

5x6 unit

4

6x3 unit

32

A force of 98 N is required to just start moving a body of mass 100 kg over ice. Then find the coefficient of static friction.

1

0.1

2

0.2

3

0.4

4

0.6

33

A man moves 30 m North and then 20 m towards East and finally $30\sqrt{2}$ m in South-West direction. What will be the displacement of the person from the origin?

1	10 m along West
2	10 m along North
3	10 m long South
4	10 m along East

34

In changing the state of thermodynamics from A to B state, the heat required is Q and the work done by the system is W. Find the change in its internal energy.

1	$\dfrac{Q-W}{2}$
2	Q
3	Q - W
4	Q + W

35 A boy pushes a wall and fails to displace it. Why does he fail?

1 As he does no work at all

2 As he does negative work

3 As he does maximum work

4 As he does positive but not maximum work

36 Which of the following physical quantity do not remain constant, in case of uniform circular motion?

1 Mass

2 Kinetic energy

3 Momentum

4 Speed

37 The length of a cylinder is measured with a meter rod having least count 0.1 cm. Its diameter is measured with vernier calipers having least count 0.01 cm. Length of cylinder is 5.0 cm. and radius is 2.0 cm. Find the percentage error in the calculated value of the volume.

1		1%
2		3%
3		5%
4		7%

38 Name the scale of temperature on which the temperature is never negative.

1		Kelvin
2		Reaumur
3		Fahrenheit
4		Celsius

39 A body of mass 'm' kg is lifted by a man to a height of one metre in 30 seconds. Another man lifts the same mass to the same height in 60 seconds. Calculate the ratio of the work done by them.

1		1:1

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

40

A source of sound of frequency 600 Hz is placed inside water. The speed of sound in water is 1500 m/s and in air is 300 m/s. Find the frequency of sound recorded by an observer who is standing in air.

1	120 Hz
2	200 Hz
3	600 Hz
4	3000 Hz

41

What will happen if a cricket bat is cut at the location of its centre of mass as shown in the figure?

1	Mass of handle piece is double the mass of bottom piece

2	The two pieces will have same mass
3	The bottom piece will have larger mass
4	The handle piece will have larger mass

42 Name the type of water waves.

1	Transverse
2	Longitudinal
3	Both longitudinal and transverse
4	Neither longitudinal nor transverse

43 In C.G.S. system the magnitude of the force is 100 dynes. In another system where the fundamental physical quantities are kilogram, metre and minute, the magnitude of the force is

1	36
2	3.6

3	0.36
4	0.036

44

Name the required element for the heat to flow from 1 part of a solid to another part.

1	Uniform temperature
2	Temperature gradient
3	Density gradient
4	Uniform density

45

Find the centre of mass of three bodies each of mass 1 kg located at the points (0,0) (3,0)and (0,4) in the x-y plane.

1	$\left(\dfrac{1}{3},\dfrac{2}{3}\right)$
2	$\left(\dfrac{4}{3},1\right)$
3	

$$\left(\frac{1}{2},\frac{1}{2}\right)$$

4

$$\left(1,\frac{4}{3}\right)$$

46

What is the resultant if a particle covers half the circle of radius R with constant speed?

1

Change in K.E. is zero

2

Change in K.E. is mv^2

3

Change in K.E. is $mv^2/2$

4

Momentum change is mvr

47

The incorrect statement of the following is:

1

The coefficient of friction between wood and wood is less than 1

2

Rolling friction is greater than sliding friction

3

The force of friction acts in a direction opposite to the applied force

4

The coefficient of friction between two surfaces increases as the surface in contact are made rough

---

48

Coefficients of thermal conductivity of copper, mercury and glass are K_c, K_m and K_g such that $K_c > K_m > K_g$. When the same quantity of heat is to flow per second per unit area of each and corresponding temperature gradients are X_c, X_m and X_g, then choose the correct condition?

1

$X_m < X_c < X_g$

2

$X_c < X_m < X_g$

3

$X_c > X_m > X_g$

4

$X_c = X_m = X_g$

49

By the longitudinal stress, the increase in length is l of a wire of length L. Then the stress is in proportion with:

1

$l \times L$

2

$l^2 \times L$

3

L/l

4

l/L

50

A block weighing 'W' is held against a vertical wall by applying a horizontal force F. How is the minimum value of 'F' which is needed to hold the block?

1	Equal to W
2	Greater than W
3	Less than W
4	Data is insufficient

Chemistry

1

Which of the following is true about ionic compounds?

1	Conduct electricity in the fused state
2	Soluble in non polar solvents
3	Have low melting point
4	Have low boiling point

2

The best example of law of conservation of mass is:

| 1 | The weight of a piece of platinum is the same before and after heating in air |

| 2 | A sample of air increases in volume when heated at constant pressure but its mass remains unaltered |

| 3 | When 12 g of carbon is heated in a vacuum, there is no change in mass |

| 4 | 12 g of carbon combines with 32 g of oxygen to form 44 g of CO_2 |

3

Which one of the following is true in case of an adiabatic process?

| 1 | $\Delta V = 0$ |

| 2 | $\Delta Q = 0$ |

| 3 | $\Delta W = 0$ |

| 4 | $\Delta H = 0$ |

4

There is a decrease in the _____ in the transition of Zn atoms to Zn^{++} ions.

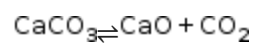| 1 | atomic number |
2	equivalent weight
3	atomic weight
4	number of valency electrons

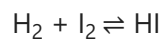**5**   Which of the following reaction is irreversible?

1	$O_2 + 2SO_2 \rightleftharpoons 2SO_3$
2	$CaCO_3 \rightleftharpoons CaO + CO_2$
3	$AgNO_3 + NaCl \rightleftharpoons AgCl + NaNO_3$
4	$H_2 + I_2 \rightleftharpoons HI$

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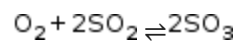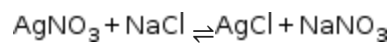
6   With ____ , CO_2 is isostructural.

| 1 | $HgCl_2$ |
| 2 | $SnCl_2$ |

| 3 | SO_2 |

| 4 | All the above |

7

'n' gm of substance X reacts with 'm' g of substance Y to form 'p' gm of substance R and 'q' gm of substance S. This reaction can be represented as, X + Y = R + S. What will be the relation established in the amounts of the reactants and the products?

| 1 | p = q |

| 2 | n + m = p + q |

| 3 | n = m |

| 4 | n - m = p - q |

8

Sodium chloride easily dissolves in water because

| 1 | its ions are easily solvated |

| 2 | it is a white substance |

| 3 | salt reacts with water |

4	it is a covalent compound

---

9 Find out the state quantity among the following.

1	q/w

2	q + w

3	q - w

4	q

---

10 The law of _____ is proved by different proportions of oxygen in the various oxides of nitrogen.

1	Multiple proportion

2	Equivalent proportion

3	Constant proportion

4	Conservation of matter

11

How the mixture of camphor and benzoic acid can be separated?

1	Sublimation
2	Chemical method
3	Fractional distillation
4	Extraction with a solvent

12

In the given reaction, $3Br_2 + 6CO_3^{2-} + 3H_2O = 5Br^- + BrO_3^- + 6HCO_3$

1	bromine is reduced and water is oxidized
2	bromine is neither reduced nor oxidized
3	bromine is oxidized and carbonate is reduced
4	bromine is both reduced and oxidized

13

By which of the following, chemical behaviour of an atom is determined?

1	Mass number
2	Atomic number
3	Binding energy
4	Number of isotopes

14 Kjeldahl's method cannot be used for the estimation of nitrogen in which of the following compound?

1	Nitrocompounds
2	Pyridine
3	Azo compounds
4	All of these

15 In which of the following case, temperature of the system decreases?

1	Adiabatic expansion

2	Isothermal expansion
3	Isothermal compression
4	Adiabatic compression

16

The most predominantly ionic compounds will be obtained from the combination of elements which belongs to

1	0 and 7 groups
2	3 and 5 groups
3	2 and 6 groups
4	1 and 17 groups

17

What is the atomic number of an element having the valency shell electronic configuration $4s^2 4p^6$?

1	38
2	37

3	36
4	35

18

A fuel contains 25% n-heptane and 75% iso-octane. What is its octane number?

1	25
2	50
3	75
4	100

19

Energy equal to one erg, one joule, one L-Atm and one calorie is in the order

1	1 joule > 1 calorie > 1 erg > 1 L-Atm
2	1 L-Atm > 1 calorie > 1 joule > 1 erg
3	1 L-Atm > 1 erg > 1 calorie > 1 joule
4	1 erg > 1 joule > 1 calorie > 1 L-Atm

20

An atom has the electronic configuration of $1s^2, 2s^2 2p^6, 3s^2 3p^6 3d^{10}, 4s^2 4p^5$. Its atomic weight is 80. What shall be its atomic number and the number of neutrons in its nucleus?

1	30 and 50

2	35 and 45

3	40 and 40

4	45 and 35

21

An atom has 26 electrons and its atomic weight is 56. What will be the number of neutrons in the nucleus of the atom?

1	56

2	36

3	30

4	26

22 What does the equilibrium means in the given reaction $N_2 + O_2 \rightleftharpoons 2NO$?

1. Concentration of reactants is changing whereas concentration of products is constant

2. Concentration of reactants is constant whereas concentration of products is changing

3. Concentration of all substances remains constant

4. Concentration of all substances is changing

23 Why acetic acid is a weak electrolyte?

1. Because it does not dissociate much or its ionization is very less

2. Because its molecular weight is high

3. Because it is covalent compound

4. Because it is highly unstable

24

Two element have electronegativity of 1.2 and 3.0. Find the bond formed between these two elements.

1	metallic
2	co-ordinate
3	polar covalent
4	ionic

25 An ionic solid is a poor conductor of electricity due to

1	charge on the ions is uniformly distributed
2	ions do not conduct electricity
3	ions occupy fixed positions in solids
4	ions have uniform field of influence around it.

26 Which of the following pairs of compounds illustrate the law of multiple proportions?

1	H_2S and SO_2

2	NH_3 and NCl_3
3	CS_2 and $FeSO_4$
4	CuO and Cu_2O

27 Compound that have electrovalent bonding is ____.

1	Water
2	Ammonia
3	Chloromethane
4	Calcium chloride

28 What is the cause of periodicity of properties?

1	Number of electrons in the valency orbit
2	The re-occurrence of similar outer electronic configuration

3	Increasing atomic weights
4	Increasing atomic radius

---

29 Which one of the following possess highest octane no.?

1	Iso-octane
2	n-hexane
3	n-heptane
4	n-heptane and iso-octane mixed in ratio 50 : 50

---

30 In compound A, 1.00 g nitrogen unites with 0.57 g oxygen. In compound B, 2.00 g nitrogen combines with 2.24 g oxygen. In compound C, 3.00 g nitrogen combines with 5.11 g oxygen. Which one of the following law is obeyed by these results?

1	Law of multiple proportion
2	Law of constant proportion
3	Law of reciprocal proportion

4

Dalton's law of partial pressure

31

All reactions that possess chemical disintegration is ___.

1

reversible or irreversible and endothermic or exothermic

2

exothermic

3

reversible and endothermic

4

reversible

32

A well stoppered thermos flask consists of some ice cubes. This gives an example of a

1

isolated system

2

closed system

3

open system

4

non-thermodynamic system

33

The atomic no. of the metal is:

1	38	
2	36	
3	34	
4	32	

34

After a chemical reaction, the total mass of products and reactants _____.

1	is always less or more
2	is not changed
3	is always decreased
4	is always increased

35

Find the number of electrons in $[^{40}_{19}K]^{-1}$.

1	40
2	20
3	19
4	18

---

36 What does the oxidation involve?

1	Gain of electrons
2	Loss of electrons
3	Increase in the valency of negative part
4	Decrease in the valency of positive part

---

37 Which of the following contains isopropyl group?

1	2,2,3,3-tetramethylpentane
2	3,3-dimethylpentane

3	2,2,3-trimethylpentane

4	2-methylpentane

---

38 The process in which higher hydrocarbons are broken down into lower hydrocarbons by controlled pyrolysis, is known as

1	cracking

2	hydrolysis

3	oxidation

4	reduction

---

39 $Zn^{2+}(aq) + 2e \rightarrow Zn(s).$ It indicates which of the following process?

1	Redox reaction

2	Oxidation

3	Reduction

4 | None of these

---

40 | In the given reaction $3Mg + N_2 \rightarrow Mg_3N_2$,

1 | magnesium is oxidized

2 | magnesium is reduced

3 | nitrogen is oxidized

4 | none of these

---

41 | Nitrating mixture is given as

1 | mixture of nitric acid and anhydrous zinc chloride

2 | fuming nitric acid

3 | mixture of conc. H_2SO_4 and conc. HNO_3

4 | none of these

42

Ions are present in ____.

1. Ethanol in water

2. Caesium nitrate in water

3. Sulphur in CS_2

4. Sucrose in water

43

What does the nucleus of tritium contain?

1. 1 proton + 2 neutron

2. 1 proton + 0 neutron

3. 1 proton + 3 neutron

4. 1 proton + 1 neutron

44

Reactions which is reversible is:

1	$Fe + S \longrightarrow FeS$
2	$NaCl + AgNO_3 \longrightarrow NaNO_3 + AgCl$
3	$H_2SO_4 + Ba(OH)_2 \longrightarrow BaSO_4 + 2H_2O$
4	$H_2 + I_2 \longrightarrow 2HI$
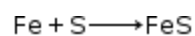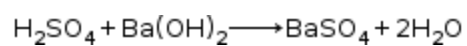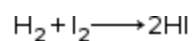
45 What is Avogadro number?

1	Number of molecules present in one gram molecular mass of a substance
2	Number of atoms in one gram of element
3	Number of milliliters which one mole of a gaseous substances occupies at NTP
4	All of these

46 Diagonal relationship is shown by elements of

1	third period
2	second period

3	first period
4	(2) and (3) both

47 ___ element is a lanthanide (Rare-earth element).

1	Cerium
2	Cadmium
3	Californium
4	Cesium

48 Which of the following is an appropriate method for molecular weight determination of chloroform?

1	Victor Meyer's method
2	Vapour pressure method
3	Diffusion method

4	Regnault's method

49 A sodium cation consist of different number of electrons from

1	F^-
2	O^{2-}
3	Al^{+3}
4	Li^+

50 In case of weak electrolytic solution, degree of ionization will be

1	reciprocal to the dilution
2	proportional to the square root of dilution
3	proportional to concentration of electrolyte
4	proportional to dilution

Botany

1

Match column-I with column-II and select the correct option from the codes given below.

Column-I	Column-II
A. Food	(i) Brown algae
B. Agar	(ii) Porphyra, Laminaria
C. Algin	(iii) Gelidium, Gracilaria
D. Carrageenin	(iv) Red Algae

1   A-(ii), B-(iii), C-(i), D-(iv)

2   A-(ii), B-(iii), C-(iv), D-(i)

3   A-(iii), B-(ii), C-(iv), D-(i)

4   A-(iii), B-(ii), C-(i), D-(iv)

2

Prokaryotic cell does not contain

1   Membrane bound organelles

2   Nucleolus

3   Centrioles

4   All of these

3   Assimilatory power refers to _____.

1. generation of ATP and NADPH$_2$

2. reduction of CO$_2$

3. disintegration of plastids

4. splitting of water

---

4   Angiosperm consist of:

1. Vessels

2. Trachieds

3. Both (1) and (2)

4. None of these

---

5   The S-shaped growth curve as well as 'grand period of growth' may change with

1	Change in temperature
2	It remains unaffected
3	Fluctuation in humidity
4	Sudden fluctuation in light intensity

6 _____ is not a lateral meristem.

1	Interfascicular cambium
2	Intrafascicular cambium
3	Phellogen
4	Intercalary meristem

7 Emerson effect explain the phenomenon of _____.

1	photosynthesis
2	respiration

3	absorption of water by roots
4	transpiration

---

8 The process of mitosis is classified into 4 phases. Identify the correct order in which these phases appear in mitosis

1	Prophase, metaphase, anaphase and telophase
2	Metaphase, prophase, anaphase and telophase
3	Telophase, anaphase, metaphase and prophase
4	Anaphase, metaphase, telophase and prophase

---

9 Vascular cambium and cork cambium are examples of _____.

1	Lateral meristem
2	Elements of xylem and phloem
3	Apical meristem

4	Intercalary meristem

10   Why penicillin inhibits bacterial multiplication?

1	It checks RNA synthesis
2	It inhibits cell wall formation
3	It destroys chromatin
4	It checks spindle formation

11   _____ has example of cork cambium and vascular cambium.

1	Apical meristem
2	Secondary meristem
3	Primary meristem
4	Wound tissue

12

_____ is the subaerial stem modification with long internode.

1	Offset	
2	Rhizome	
3	Runner	
4	Sucker	

13

A fibrous root system is better adapted than tap root system for:

1	Absorption of water and minerals	
2	Anchorage of plant to soil	
3	Storage of food	
4	Transport of water and organic food	

14

_____ in physiological anisogamy.

1	Gametes are morphologically dissimilar but physiologicaly similar
2	Gametes are morphologically similar but physiologically dissimilar
3	Gametes are morphologically and physiologically similar
4	None of these

15 Which of the following plant hormone promotes root initiation, flowering and induces parthenocarpy?

1	Auxin
2	Gibberellin
3	Cytokinin
4	ABA

16 In which organism are the blue-green algae included?

1	chlorophyceae

2	prokaryotes
3	rhodophyceae
4	eukaryotes

17 Why bacteria are found to be primitive organism?

1	they possess incipient nucleus and show amitotic division
2	they produce endospores which are very resistant to adverse conditions
3	they cause serious diseases to human being, domesticated animals and crop plants
4	they are small, microscopic which are not seen with naked eye

18 _____ causes 'Citrus canker'.

1	Bacterium
2	Virus

| 3 | Fungus |
| 4 | Nematoda |

19

In _____ processes CO_2 is not released.

1	aerobic respiration in animals
2	aerobic respiration in plants
3	alcoholic fermentation
4	lactate fermentation

20

Fermentation is represented by which of the following equation

1	$C_6H_{12}O_6 + 6O_2 \xrightarrow{light} 6CO_2 + H_2O + 673\text{kcal}$
2	$C_6H_{12}O_6+ \rightarrow 2C_2H_5OH + 2CO_2 + 18\text{kcal}$
3	$6CO_2 + 12H_2O \xrightarrow{Chlorophyll} C_6H_{12}O_6 + 6H_2O + 6O_2$

4	$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$
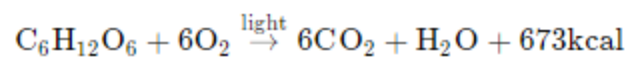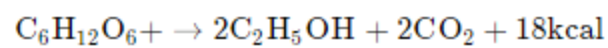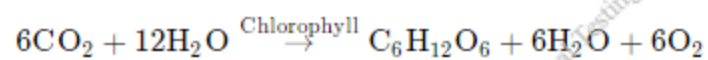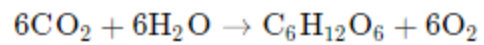
21 Sugar formed in photosynthesis is converted into starch in

1	All plants
2	Majority of plants
3	Bacteria only
4	Algae only

22 Smallest known cell is called

1	Pleuropneumonia like organism
2	Chlamydomonas
3	Nostoc
4	Acetabularia

23

In onion root tip during metaphase stage of mitosis, what will be the number of kinetochores?

1	8
2	4
3	16
4	32

24

What happen during seed germination?

1	Heat is liberated
2	Starch is synthesized
3	Light is absorbed
4	Fat is synthesized

25

Which one of the following expresses an exponential growth in plants?

1	$L_e = L_t rt$
2	$L_t = L_0 + rt$
3	$W_1 = W_0 e^{rt}$
4	$W_1 = W_0 e\, rt$

---

26 _____ of the following produces non-motile gametes.

1	Anabaena
2	Spirogyra
3	Cladophora
4	Ulothrix

---

27 Fusiform roots are found in _____.

1	daucus carota
2	calocasia

3	solanum tuberosum
4	raphanus sativus

---

28 Recombinant nodules are found during which of the following phase?

1	Prophase
2	Anaphase
3	Telophase
4	Metaphase

---

29 In which of the following plant, roots cap is absent?

1	Mesophytes
2	Hydrophytes
3	Xerophytes

4	Epiphytes

30

_____ proposed the "Cell theory"

1	Watson and Crick
2	Schleiden and Schwann
3	Mendel and Morgan
4	Robert Hooke

31

_____ refer to the energy -releasing metabolic process in which substrate is oxidized without an external electron acceptor.

1	Photorespiration
2	Fermentation
3	Aerobic respiration
4	Glycolysis

32

The graph given below shows the effect of potassium cyanide on the rate of photosynthesis of Chlorella at different light intensities. Which one of the following can be deduced from the graph
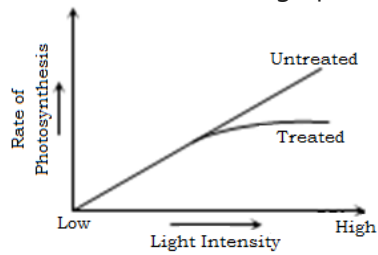
1

Potassium cyanide appears to absorb more light at high light intensities

2

Potassium cyanide appears to inhibit the light (Hill) reaction

3

Potassium cyanide appears to inhibit photosynthesis equally at high and low light intensities

4

Potassium cyanide appears to have no inhibiting effect on photosynthesis at low light intensities

33

_____cell is totipotent.

1

Meristem

2

Sieve tube

3

Xylem vessel

4	Collenchyma

34 Agar-Agar is obtained from

1	Gracillaria
2	Chara
3	Gelidium
4	A and C

35 The smallest organism capable of autonomous growth and reproduction is _____.

1	mycoplasma
2	virus
3	viroid
4	none of the above

36 Which one of the following is absent in prokaryotes?

1 RNA

2 Mitochondria

3 DNA

4 Plasma membrane

37 Anaerobic synthesis found in bacteria is _____.

1 endergonic

2 isothermal

3 exergonic

4 None of the above

38 Meiosis differentiated from mitosis as

1	It shows crossing over
2	It forms two cells
3	It takes place in vegetative cells
4	Number of chromosomes remain unchanged

---

39 Thallophyta contains _____.

1	fungi and bryophyta
2	algae and bryophyta
3	algae, fungi and bryophyta
4	algae only

---

40 In which of the following , enzymes concerning H_2O_2 metabolism are present?

1	Peroxisomes

2	Golgi bodies
3	rRNA
4	Chloroplasts

41 The process of mitosis can be explained in

1	Tendril tip
2	Onion root tip
3	Garlic root tip
4	All of the above

42 What is a permanent tissue ? It is a tissue _____.

1	which does not move
2	which divides and cause growth
3	which does not divide

4	which is not discountable

43

Which of the following is the Currency of cell?

1	ATP
2	Glucose
3	Chloroplast
4	Mitochondria

44

In _____, roots are used in vegetative propagation.

1	potato
2	sweet potato
3	onion
4	ginger

45

The loosely arranged nonchlorophyllous parenchyma cells present in lenticels are termed as

1	complementary cells
2	passage cells
3	albuminous cells
4	water stomata

46

Epiphytes like Vanda develop special layer of absorptive tissue velamen consisting of 4 or 5 layers of long polygonal cells. Velamen is produced by

1	Stem
2	Clinging roots
3	Absorbing roots
4	Hanging roots

47

Water blooms may be caused by _____.

1. blue-green algae

2. virus

3. mycoplasma

4. bacteria

48

Pyrenoids are formed of _____.

1. core of nucleic acid surrounded by protein sheath

2. proteinaceous centre and starchy sheath

3. core of protein surrounded by fatty sheath

4. core of starch surrounded by sheath of protein

49

The roots are _____, in Dahlia.

1. stilt

2	fibrous
3	moniliform
4	fasciculated tuberous

50

In pollen mother cells cytokinesis during meiosis is _____.

1	successive type
2	simultaneous type
3	no cytokinesis takes place
4	in some cases successive type while in others simultaneous type

Zoology

1

Find the pO_2 and pCO_2 in the systemic arteries.

1	$pO_2 95 mm\,Hg ; pCO_2 104 mm\,Hg$

2	$pO_2\ 40\,mm\,Hg; pCO_2\ 45\,mm\,Hg$
3	$pO_2\ 95\,mm\,Hg; pCO_2\ 40\,mm\,Hg$
4	$pO_2\ 45\,mm\,Hg; pCO_2\ 40\,mm\,Hg$

---

2   Find the wrong statement.

1	The total volume of air accommodated in the lungs at the end of a forced inspiration is called the 'vital capacity'.
2	Solubility of CO_2 in blood is 20-25 times higher than that of O_2.
3	Every 100mL of deoxygenerated blood delivers approximately 4mL of CO_2 to the alveoli.
4	O_2 can bind with haemoglobin in a reversible manner to form oxyhaemoglobin.

---

3   _____ is the normal haemoglobin contents of a healthy man per 100 ml of blood.

1	12.0 to 14.0 gms
2	11.5 to 12.5 gms

3	12.5 to 14.5 gms
4	14.0 to 16.0 gms

4   What is the excretory material of marine bony fish?

1	Protein
2	Amino acid
3	Urea
4	Ammonia

5   _____ sugars cannot be hydrolysed further to yield simple sugars.

1	Ribose
2	Maltose
3	Lactose

4	Sucrose

6 In which of the following, glutenin an important protein is present?

1	Spinach
2	Wheat
3	Soybean
4	Potato

7 Portuguese Man of War is

1	Obelia
2	Coral
3	Pennatula
4	Physalia

8 Mark the correct option with respect to cockroaches.

1   Malpighian tubules convert nitrogenous wastes into urea.

2   Males bear short anal styles not present in females.

3   The fore wings are tegmina which are used in flight.

4   Nervous system comprises of a dorsal nerve cord and ten pairs of gangion.

9 _____ pairs of hormones are not antagonistic (having opposite effects) to each other?

1   Aldosterone - Atrial Natriuretic Factor

2   Relaxin -Inhibin

3   Insulin - Glucagon

4   Parathormone - Calcitonin

10 ____ lubricates joints.

1	Dermis
2	Synovial fluid
3	Tympanic membrane
4	Epidermis

11 From the following groups, mark the one which has only secondary metabolites?

1	Glycine, gums, serine, diterpenes
2	Arbin, cellulose, arginine, tyrosine
3	Carotenoids, phenylalanine, curcumin, rubber
4	Conclavin- A, morphine, codeine, vinblastine

12 Which of the following substances world cause coagulation of blood at the site of its introduction, if introduced into the blood stream,?

1	Thromboplastin

2	Heparin
3	Prothrombin
4	Fibrinogen

13

What is the amount of CSF in the cranial cavity?

1	500 mL
2	140 mL
3	1.5 mL
4	1 L

14

Snake, a terrestrial animal that excretes nitrogen wastes in the form of uric acid, is known as

1	ureotelic
2	uricotelic

3	ammonotelic
4	not confirmed for any type

15

In several vertebrates the rate of heart beat as well as increase in blood pressure is caused by a hormone

1	Secretin
2	Thyroxin
3	Noradrenalin
4	Adrenalin

16

Gliding joint is present between which of the following?

1	Carpals
2	Knee
3	Carpal and metacarpal of thumb

4	Humerus and pectoral girdle

17 In which of the following, cell aggregate body plan is found?

1	Porifera
2	Colonial protozoans
3	Volvox
4	Both (1) and (3)

18 _____ happens in the common cockroach.

1	Oxygen is transported by haemoglobin in blood.
2	Malpighian tubules are excretory organs projecting out from the colon.
3	Nitrogenous excretory product is urea.
4	The food is ground by mandibles and gizzard.

19

_____ human organs is often called the "graveyard" of RBCs.

1	Kidney
2	Gall bladder
3	Spleen
4	Liver

20

In Ascon-type of canal system, choanocytes form lining of ____.

1	porocyte
2	spongocoel
3	apopyle
4	incurrent canal

21

Estimate how many double bonds are present in arachidonic acid.

1	Four
2	Three
3	Two
4	One

---

22 Which of the following is the most abundant, harmful and universal waste product of metabolism?

1	CO_2
2	H_2O
3	Uric acid
4	None of these

---

23 Glycogen is most structurally same as _____.

1	cellulose

2	maltose
3	starch
4	glucose

24

A diagram of left human hindlimb is given from front. It has certain mistakes in labeling. Find the 2 wrongly labelled bones?
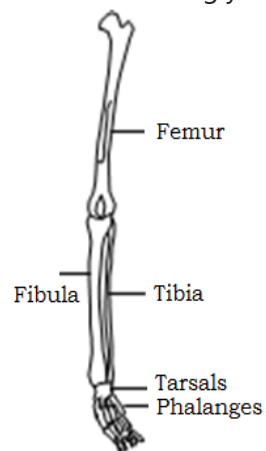
1	Femur and fibula
2	Fibula and phalanges
3	Tibia and tarsals
4	Tarsals and femur

25

Give the correct match in the following

	Column I		Column II
A	Flame Cells	p	Sponges
B	Collar Cells	q	Hydra
C	Stinging Cells	r	Planaria
-	-	s	Ascaris

1   A-r, B-p, C-q

2   A-r, B-p, C-s

3   A-r, B-s, C-p

4   A-r, B-q, C-s

26

Consider the statements about human neural system and mark the wrong one.

1   The PNS is divided into somatic and autonomic neural system.

2   The CNS includes the brain and the spinal cord.

3   The somatic neural system is classified into sympathetic and parasympathetic neural system.

4   The autonomic neural system transmits impulses from the CNS to the involuntary organs and smooth muscles.

27 Point out the wrong statement.

1. In ureotelic organisms, ammonia is not a product of metabolism

2. In mammals some amount of urea may be retained in the kidney matrix of ureotelics to maintain osmolarity

3. Urea and uric acid are less toxic than ammonia

4. In fishes, kidneys do not play any significant role in the removal of ammonium ions

28 What will be the result of complete bronchus obstruction?

1. A rise in intrapleural pressure on the affected side

2. Collapse of the portion of the lung supplied by the bronchus

3. Vasodilation of alveoli supplied by the bronchus

4. An increase in physiological dead space

29 Mark the incorrect statements.

1	Starch is made up of amylose and amylopectin.
2	Starch is a polymer of α -glucose.
3	Amylose is linear structure consisting of several glucose residues joined by 1, 4-glycosidic linkages.
4	Amylopectin is a straight chain with several glucose residues joined only by 1, 4-glycosidic linkages.

30 Collar cells appear in ____.

1	hydra
2	sponges
3	star fish
4	sandworm

31 Mark the incorrect statement out of the following.

1	Eosinophils resist infection.

2	Neutrophils constitute the majority of leucocytes.
3	Basophils secrete histamine and serotonin.
4	RBCs in mammals are enucleated and biconvex in shape.

32 Which of the following are the 4 lobes of right lung of rabbit?

1	Posterior lobe, posterior and anterior azygous, right anterior and right posterior
2	Anterior lobe, anterior azygous, posterior lobe and right anterior
3	Anterior azygous, right anterior, right posterior and posterior azygous lobe
4	Anterior lobe, anterior azygous, right anterior and posterior azygous lobe

33 Carbohydrates, the most abundant biomolecules on earth, are synthesized by

1	Fungi, algae and green plant cells
2	All bacteria, fungi and algae

3	Some bacteria, algae and green plant cells
4	Viruses, fungi and bacteria

---

34   Which of the following is the common passage in swallowing food and breathing?

1	Gullet
2	Pharynx
3	Glottis
4	Larynx

---

35   What are the 3rd, 6th and 11th cranial nerves?

1	Optic, facial, spinal accessory
2	Occulomotor, trigeminal, spinal accessory
3	Occulomotor, abducens, spinal accessory
4	Trichlear, abducens, vagus

36 Which of the following is produced by Endocrine glands?

1 Vitamins

2 Hormones

3 Minerals

4 Enzymes

37 What happens if a man Rh^+ marries a lady Rh^{-}?

1 first child will survive

2 first child will die

3 no child will be born

4 none of these

38

In _____, the largest number of neurons are found.

1. brain

2. retina

3. tongue

4. spinal cord

39

Where is the humerus bone situated?

1. In lower arm

2. In thigh

3. In upper arm

4. In shank

40

Cockroach is a ____, on basis of metamorphosis.

1. hcmimetabolous

2	paurometabolus
3	holemetabolous
4	ametabolous

41 _____ an excretory product gives fishes their distinctive smell.

1	Allantoic acid
2	Ammonia
3	Trimethylamine oxide
4	Hippuric acid

42 The animal not excrete nitrogen as urea is

1	Frog
2	Tadpole

3	Elesmobranch fish
4	Toad

43 During the transportation of gases, to maintain the ionic balance, in which direction is the shifting of chloride ions?

1	Blood to lungs
2	Plasma to RBCs
3	Lungs to blood
4	RBCs to plasma

44 _____ hormone is not involved in tyrosine metabolism.

1	Calcitonin
2	Melanin
3	Epinephrine

4	Thyroxine

---

45 "Triploblastic, unsegmented, acoelomate exhibiting bilateral symmetry and reproducing both asexually and sexually with parasitic forms." The above description is characteristic of which of the following phylum?

1	Cnidaria
2	Ctenophora
3	Annelida
4	Platyhelminthes

---

46 Respiratory rhythm centre is located in

1	Hypothalamus
2	Cerebellum
3	Cerebrum
4	Medulla oblongata

47 Which of the following differentiates the male cockroach and female cockroach?

1	Anal cerci
2	Anal styles
3	Ocelli
4	Both (2) and (3)

48 Choose from following the hereditary character of blood.

1	Haem
2	Blood group
3	Nucleus
4	None of the above

49 In cockroach, where does the malpighian tubules open?

1	At the posterior end of gizzard.
2	Near rectum
3	At the end of hindgut.
4	At the junction of midgut and hindgut.

50 Achilles tendon is linked with _____.

1	hamstring muscle
2	gastrocnemius muscle
3	quadriceps muscle
4	gluteus muscle

Physics - Answer keys

1	1
2	4
3	1

4	4
5	3
6	4
7	2
8	3
9	2
10	2
11	3
12	1
13	4
14	2
15	2
16	4
17	1
18	2
19	2
20	4
21	2
22	2
23	3
24	4
25	1
26	2
27	4
28	4

29	4
30	3
31	1
32	1
33	1
34	3
35	1
36	3
37	2
38	1
39	1
40	3
41	3
42	3
43	2
44	2
45	4
46	1
47	2
48	2
49	4
50	2

Chemistry - Answer keys

1	1

#	Answer
2	4
3	2
4	4
5	3
6	1
7	2
8	1
9	2
10	1
11	2
12	4
13	2
14	4
15	1
16	4
17	3
18	3
19	2
20	2
21	3
22	3
23	1
24	4
25	3
26	4

27	4
28	2
29	1
30	1
31	1
32	1
33	1
34	2
35	2
36	2
37	4
38	1
39	3
40	1
41	3
42	2
43	1
44	4
45	1
46	4
47	1
48	1
49	4
50	2

Botany - Answer keys

#	Answer
1	1
2	4
3	1
4	3
5	2
6	4
7	1
8	1
9	1
10	2
11	2
12	3
13	2
14	2
15	1
16	2
17	1
18	1
19	4
20	2
21	2
22	1
23	4

24	1
25	3
26	2
27	4
28	1
29	2
30	2
31	2
32	4
33	1
34	4
35	1
36	2
37	1
38	1
39	4
40	1
41	4
42	3
43	1
44	2
45	1
46	4
47	1
48	2

49	4
50	4

Zoology - Answer keys

1	3
2	1
3	4
4	3
5	1
6	2
7	4
8	2
9	2
10	2
11	4
12	1
13	2
14	2
15	4
16	1
17	1
18	4
19	3
20	2
21	1

22	1
23	3
24	2
25	1
26	3
27	1
28	2
29	4
30	2
31	4
32	3
33	3
34	2
35	3
36	2
37	1
38	1
39	3
40	2
41	3
42	2
43	2
44	1
45	4
46	4

Physics - Solutions

1

1 micron $= 10^{-6}$ m $= 10^{-4}$ cm

2

$\vec{r} = 3t^2\hat{i} + 4t^2\hat{j} + 7\hat{k}$ at t $= 0$, $\vec{r}_1 = 7\hat{k}$

at t $= 10$ s, $\vec{r}_2 = 300\hat{i} + 400\hat{j} + 7\hat{k}$,

As $\vec{\Delta r} = \vec{r}_2 - \vec{r}_1 = 300\hat{i} + 400\hat{j}$

Hence, $|\vec{\Delta r}| = |\vec{r}2 - \vec{r}_1| \Rightarrow \sqrt{(300)^2 + (400)^2} = 500$ m

3

Here, $m = 60\,kg, g = 10\,m\,s^{-2}, a = 2\,m\,s^{-2}$

When the lift is accelerating upwards with constant acceleration a, the weight of the man is

$W' = m(g + a) = 60(10 + 2) = 720$ N

When the lift is accelerating downwards with same acceleration a, the weight of the man is

$W'' = m(g - a) = 60(10 - 2) = 480\,N$

4

Maximum velocity, $V_{max.} = \sqrt{\mu r g}$

$\Rightarrow \sqrt{0.5 \times 40 \times 9.8} = 14$ m / s

5

$\vec{A} = \hat{i} + \hat{j} \Rightarrow |A| = \sqrt{1^2 + 1^2} = \sqrt{2}$

$\cos\alpha = \dfrac{A_x}{|A|} = \dfrac{1}{\sqrt{2}} = \cos 45°$, $\therefore \alpha = 45°$

6

As an aeroplane flies 400 m north and 300 m south, the net displacement is 100 m towards north. Then it flies 1200 m upward.

$\therefore r = \sqrt{(100)^2 + (1200)^2} \Rightarrow 1204$ m $\simeq 1200$ m

The option should be 1204 m, as this value mislead one into thinking that net displacement is in upward direction only.

7

Newton's first law of motion defines the inertia of body. It is stated as, every body has a tendency to remain in its state (either rest or motion) because of its inertia.

8

Actually the centripetal force is provided by gravitational force.

9

From the given problem,

Pressure of gas A, $P_A = \dfrac{125 \times 0.6}{1000} = 0.075$ atm

Pressure of gas B, $P_B = \dfrac{150 \times 0.8}{100} = 0.120$ atm

Therefore by using Dalton's law of pressure,

$P_{mixture} = P_A + P_B = 0.075 + 0.120 = 0.195$ atm

10

Here, $F = \dfrac{G \times m \times m}{(2R)^2} \Rightarrow \dfrac{G \times \left(\dfrac{4}{3}\pi R^3 \rho\right)^2}{4R^2} = \dfrac{4}{9}\pi^2 \rho^2 R^4$

$\therefore F \propto R^4$

11

Force acting on the base of the vessel due to liquid is given as,

$F = P \times A = hdgA = 0.4 \times 900 \times 10 \times 2 \times 10^{-3} = 7.2$ N

12

From given problem,

$\Delta Q = \Delta U + \Delta W$

$\Rightarrow \Delta U = \Delta Q - \Delta W = 150 - 110 = 40$ J

13
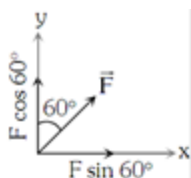
The component of force in vertical direction

$= F \cos \theta = F\cos 60° = 5 \times \dfrac{1}{2} = 2.5$ N

14

From the Young's modulus,

$l = \dfrac{FL}{AY} \Rightarrow l \propto \dfrac{L}{d^2} \Rightarrow \dfrac{l_1}{l_2} = \dfrac{L_1}{L_2} \times \left(\dfrac{d_2}{d_1}\right)^2$

$\therefore \dfrac{1}{2} \times \left(\dfrac{1}{2}\right)^2 = \dfrac{1}{8}$

15

By the Dalton's law of partial pressures, the total pressure will be, $P_1 + P_2 + P_3$.

16

In half revolution, horizontal distance covered by the wheel $= \pi R$.
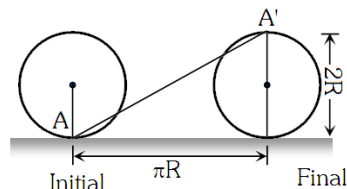
Hence, the displacement of the point which was initially in contact with ground =

$AA' = \sqrt{(\pi R)^2 + (2R)^2}$

$= R\sqrt{\pi^2 + 4} = \sqrt{\pi^2 + 4}$ (As R = 1m)

17

$$\text{Capacity} \times \text{Resistance} = \frac{\text{Charge}}{\text{Potential}} \times \frac{\text{Volt}}{\text{amp}}$$

$$\Rightarrow \frac{\text{amp} \times \text{second} \times \text{Volt}}{\text{Volt} \times \text{amp}} = \text{Second}$$

18

Given that, $y = a \sin(\omega t - \alpha) = a \cos\left(\omega t - \alpha - \frac{\pi}{2}\right)$

Another equation is given as, $y = b \cos(\omega t - \alpha)$

Therefore, there exists a phase difference of $\frac{\pi}{2} = 90°$.

19
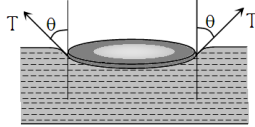
Here, Weight of metal disc = Total upward force
= upthrust force + force because of surface tension
= weight of displaced water + $T\cos\theta(2\pi r)$
= W + $2\pi r T \cos\theta$

20

All of the above

21

Pascal

22

From the following figure,

$$R = mg \cos\theta - \frac{mv^2}{r}$$
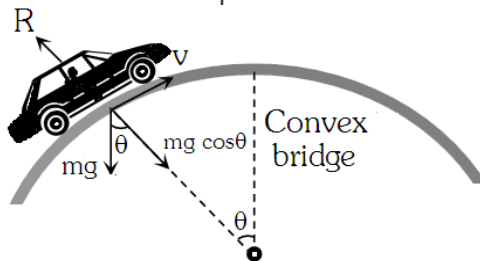
When θ decreases, $\cos\theta$ increases that means R increases.

23

We know that,

Temperature on any scale can be converted into other scale by, $\frac{x - LFP}{UFP - LFP} = $ Constant for all scale.

$$\therefore \frac{x - 20}{150 - 20} = \frac{60}{100} \Rightarrow x = 98°C$$

24
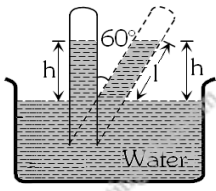
From the problem and the figure above,

$\cos 60° = \dfrac{h}{l} \Rightarrow l = \dfrac{h}{\cos 60°} = \dfrac{76}{1/2}$

$\therefore l = 152$ cm

25

Arbitrary vectors which have the original vector as their resultant can replace any vector in an arbitrary direction.

26

Force on 10 kg block $= ma = 10 \times 12 = 120\,N$.

The total force applied $= 200\,N$.

The force acting on 20 kg block $= 200 - 120 = 80\,N$.

Hence, the acceleration of this block $= \dfrac{80}{20} = 4\,m\,s^{-2}$.

27

As per given data Displacement,

$\vec{r} = 20\hat{i} + 10\hat{j}$, $\therefore r = \sqrt{20^2 + 10^2} = 22.5$ m

28

The resultant displacement, $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$

Thus, $r = \sqrt{x^2 + y^2 + z^2} = \sqrt{6^2 + 8^2 + 10^2} = 10\sqrt{2}\,m$

29

From the given equation, $a = 10 \times 10^{-2}\,m$ and $\omega = 10$ rad/s

$\therefore A_{max} = \omega^2 a = 10 \times 10^{-2} \times 10^2 = 10\,m/s^2$

30

Here $\hat{n}_1$ and $\hat{n}_2$ are two unit vectors, then the sum is

$\vec{n}_s = \hat{n}_1 + \hat{n}_2$ or $n_s^2 = n_1^2 + n_2^2 + 2n_1 n_2 \cos\theta \Rightarrow \vec{n}_s = 1 + 1 + 2\cos\theta$

As it is given that n_s is also an unit vector,

$\therefore 1 = 1 + 1 + 2\cos\theta \Rightarrow \cos\theta = -\dfrac{1}{2} \Rightarrow \theta = 120°$

Now the difference vector is $\hat{n}_d = \hat{n}_1 - \hat{n}_2$ or

$n_d^2 = n_1^2 + n_2^2 - 2n_1 n_2 \cos\theta \Rightarrow 1 + 1 - 2\cos(120°)$

$\therefore n_d^2 = 2 - 2(-1/2) = 2 + 1 = 3 \Rightarrow n_d = \sqrt{3}$

31

Work done, $W = \vec{F}.\vec{s} = (4\hat{i} + 5\hat{j} + 0\hat{k}).(3\hat{i} + 0\hat{j} + 6\hat{k})$

i.e. $W = 4 \times 3$ units

32

As, $\mu = \dfrac{F}{R} = \dfrac{F}{mg} \Rightarrow \dfrac{98}{100 \times 9.8} = \dfrac{1}{10} = 0.1$

33
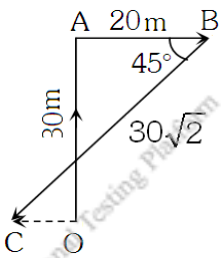
From the figure, $\overrightarrow{OA} = 0\vec{i} + 30\vec{j}$, $\overrightarrow{AB} = 20\vec{i} + 0\vec{j}$

$\overrightarrow{BC} = -30\sqrt{2}\cos 45°\vec{i} - 30\sqrt{2}\sin 45°\vec{j} = -30\vec{i} - 30\vec{j}$

Thus, Net displacement, $\overrightarrow{OC} = \overrightarrow{OA} + \overrightarrow{AB} + \overrightarrow{BC} = -10\vec{i} + 0\vec{j}$

$\Rightarrow |\overrightarrow{OC}| = 10$ m

34

Here, $\Delta Q = \Delta U + \Delta W$

$\Rightarrow \Delta U = \Delta Q - \Delta W = Q - W$ (using proper sign)

35

As there is no displacement.

36

As momentum is a vector quantity.

37

Volume of cylinder, $V = \pi r^2 l$

Percentage error in volume,

$\dfrac{\Delta V}{V} \times 100 = \dfrac{2\Delta r}{r} \times 100 + \dfrac{\Delta l}{l} \times 100$

$= \left(2 \times \dfrac{0.01}{2.0} \times 100 + \dfrac{0.1}{5.0} \times 100\right)$

Percentage error $= (1 + 2)\% = 3\%$

38

We know that, Zero kelvin $= -273°C$ (i.e. absolute temperature). Since no matter can attain this temperature, temperature can never be negative on Kelvin scale.

39

As work done is independent of time.

40

Frequency of sound remains unchanged with medium, as it is a characteristics of source.

41

As centre of mass is closer to massive part of the body, thus the bottom piece of bat has larger mass.

42

Water waves are both transverse as well as longitudinal in nature.

43

$n_2 = n_1 \left(\dfrac{M_1}{M_2}\right)^1 \left(\dfrac{L_1}{L_2}\right)^1 \left(\dfrac{T}{T_2}\right)^{-2}$

$n_2 = 100 \left(\dfrac{gm}{kg}\right)^1 \left(\dfrac{cm}{m}\right)^1 \left(\dfrac{sec}{min}\right)^{-2}$

$$n_2 = \frac{100\left(\frac{gm}{10^3 gm}\right)^1 \left(\frac{cm}{10^2 cm}\right)^1 \left(\frac{sec}{60\,sec}\right)^{-2}}{}$$

$$n_2 = \frac{3600}{10^3} = n_2 = 3.6$$

44

Heat energy always flows from higher temperature to lower temperature. Therefore, temperature difference w.r.t. length (i.e. temperature gradient) is required to flow heat from one part of a solid to other part.

45

Here, $m_1 = 1\,kg, (x_1, y_1) = (0,0),\ m_2 = 1\,kg$,
$(x_2, y_2) = (3,0),\ m_3 = 1\,kg, (x_3, y_3) = (0,4)$

$$X_{CM} = \frac{m_1 x_1 + m_2 x_2 + m_3 x_3}{m_1 + m_2 + m_3} = \frac{1 \times 0 + 1 \times 3 + 1 \times 0}{1 + 1 + 1} = 1$$

$$Y_{CM} = \frac{m_1 y_1 + m_2 y_2 + m_3 y_3}{m_1 + m_2 + m_3} = \frac{1 \times 0 + 1 \times 0 + 1 \times 4}{1 + 1 + 1} = \frac{4}{3}$$

Hence, the coordinates of centre of mass are $\left(1, \frac{4}{3}\right)$.

46

Since, momentum is vector quantity, change in momentum,
$\Delta P = 2mv\,\sin(\theta/2) = 2mv\sin(90) = 2mv$
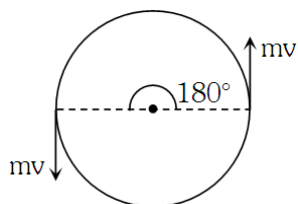
But kinetic energy remains always constant therefore change in kinetic energy is zero.

47

We know that, sliding friction is greater than rolling friction.

48

We know that, $\frac{Q}{At} = K\frac{\Delta\theta}{l} \Rightarrow K\frac{\Delta\theta}{l} = $ constant

$\Rightarrow \frac{\Delta\theta}{l} \propto \frac{1}{K}$

$\therefore$ If $K_c > K_m > K_g$, then

$$\left(\frac{\Delta\theta}{l}\right)_c < \left(\frac{\Delta\theta}{l}\right)_m < \left(\frac{\Delta\theta}{l}\right)_g \Rightarrow X_c < X_m < X_g$$

Since higher K implies lower value of the temperature gradient.

49

As we know, Stress $\propto$ Strain $\Rightarrow$ Stress $\propto \frac{l}{L}$

50

In this problem, applied horizontal force F acts as normal reaction.
For holding the block,
Force of friction = Weight of block
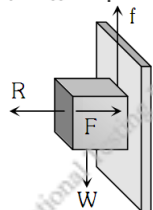
Chemistry - Solutions

1

In general, ionic compounds conduct electricity in fused state.

2

12 g of carbon combines with 32 g of oxygen to form 44 g of CO_2.

3

$\Delta Q = 0$, for adiabatic process as there is no heat exchange between system and surroundings.

4

Ion is formed by gaining or losing the electrons. For forming cation electron are lost from the valency shell, thus Zn atoms to Zn^{++} ions, there is a decrease in the no. of valency electron.
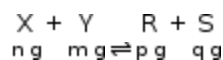
5

$AgNO_3 + NaCl \rightleftharpoons AgCl + NaNO_3$. This reaction is irreversible

6

Here, $O = C = O$, linear structure $180°$ angle and $Cl - Hg - Cl$, linear structure $180°$ angle.

7

$$\underset{ng \quad mg}{X + Y} \rightleftharpoons \underset{pg \quad qg}{R + S}$$

n + m = p + q, according to the law of conservation of mass.

8

Sodium chloride dissolves in water as it is electrovalent compound, water is a polar solvent.

9

$\because q_{abs} = \Delta U + (-w) \Rightarrow \Delta U = q + w; \Delta U$ is state function.

10

Multiple proportion

11

Chemical method by using $NaHCO_3$ solution.

12

$$3\overset{0}{Br_2} + 6CO_3^{2-} + 3H_2O \rightarrow 5\overset{-1}{Br^-} + \overset{+5}{BrO_3^-} + 6HCO_3$$
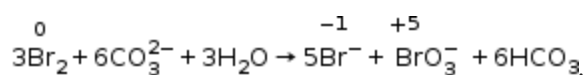
Now here bromine is oxidized and reduced.

13

Atomic number

14

Kjeldahl's method for estimation of nitrogen fails for nitrogen containing compound in the ring (pyridine) and compounds containing nitrogen directly linked to oxygen atom (nitro compounds) or another nitrogen atom (azo compounds).

15

When a real gas is forced through a porous plug into a region of low pressure, it is found that because of expansion, the gas on the side of low pressure gets cooled.
Phenomenon of producing lowering of temperature when a gas is made to expand adiabatically from a region of high pressure into a region of low pressure is called as Joule-Thomson effect.

16

When there is large difference of electro-negativities between the atoms, ionic bond is formed.

17

Complete $E.C. = [Ar]^{18} 3d^{10} 4s^2 4p^6$.
$\therefore$ No. of $e^- =$ No. of protons $= 36 = Z$.

18

Octane number is the percentage by volume of iso-octane in the mixture of iso-octane and n-heptane which possess the same anti knocking properties like fuel under examination.
Given fuel (25% n-heptane +75% iso-octane) Thus, octane number = 75 (because iso octane is 75%).

19

1 L-Atm > 1 calorie > 1 joule > 1 erg

20

We know, $_{35}Br^{80} = 1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^5$
$A = 80, Z = 35, N = ?$
Now, $N = A - Z = 80 - 35 = 45$
Atomic number (Proton) is 35 and no. of neutron is 45.

21

Let, $_{26}X^{56}$
Now, $A = P + N = Z + N = E + N$
$\Rightarrow N = A - E = 56 - 26 = 30$

22

Concentration of all substances remains constant

23

Because it is a weak electrolyte as it's ionization is very less.

24

The bond is called as ionic bond when electronegativity difference is from 1.7 to 3.0.

25

In ionic solids, ions are not free to move to carry the current.

26

CuO and Cu_2O

27

$CaCl_2$ will have electrovalent bonding as calcium is electropositive metal whereas chlorine is electronegative thus they will combine with electrovalent bond.

28

The re-occurrence of similar outer electronic configuration.

29

Iso-octane possess highest octane number.

30

Law of multiple proportion

Here, According to given information

Compound A : 1.00 g N + 0.57 g O_2
Compound B : 2.00 g N + 2.24 g O_2
Compound C : 3.00 g N + 5.11 O_2

So If we fixed the amount of nitrogen (1 g) for all compound then,

Compound A :
1.00 g of N combine with 0.57 g of O_2

Compound B :
2 g N of N combine with 2.24 g of O_2
1g N=1.12g O_2

Compound C :
3 g N combine with 5.11 O_2
1 g N = 1.70 g O_2

Thus,
Take in consideration the ratio of oxygen of all three compounds for the fixed amount of Nitrogen then we get
Ratio of oxygen ≈ 1 : 2 : 3
This ratio indicates the law of multiple proportion.

31

Reversible or irreversible and endothermic or exothermic.

32

In an isolated system neither exchange of matter nor exchange of energy is possible with the surroundings.

33

38 is the atomic number of strontium (Sr) that is s-block element and all the elements of s-block are metals.

34

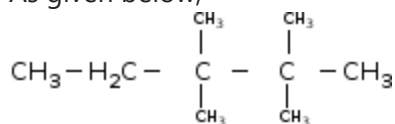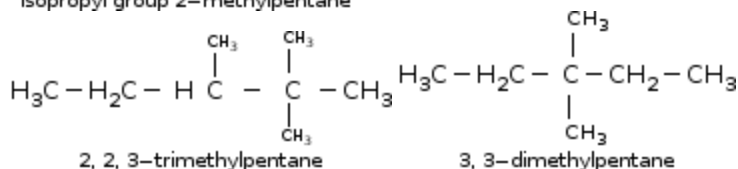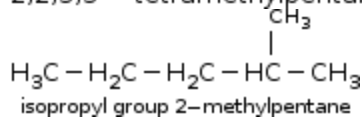After a chemical reaction, the total mass of products and reactants is not changed.

35

20

36

In oxidation process, electrons are lost (means de - electronation).

37

As given below,

2,2,3,3 – tetramethylpentane

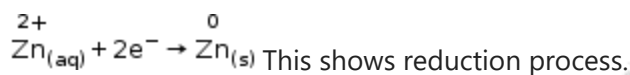isopropyl group 2–methylpentane

2, 2, 3–trimethylpentane

3, 3–dimethylpentane

38

Cracking

39

$Zn^{2+}_{(aq)} + 2e^- \rightarrow Zn^{0}_{(s)}$ This shows reduction process.

40

In the given reaction, $3Mg + N_2 \rightarrow Mg_3N_2$ oxidation state of Magnesium (Mg) is changing from 0 to +2 whereas in nitrogen it is changing from 0 to -3. Thus, oxidation of Mg and reduction of nitrogen takes place.

41

The mixture of conc. H_2SO_4 and conc. HNO_3 is known as nitrating mixture. It is used in the nitration of aryl compounds.
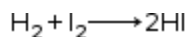

benzene

nitro benzene
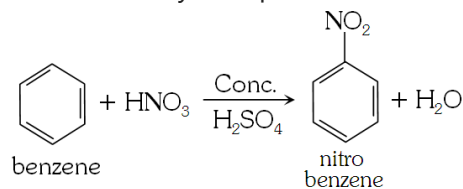
42

Because it is an ionic compound and gets dissociated in water, others are covalent compounds.

43

The nucleus of tritium contains $[H^3_1]$ $p = 1$, $e = 1$, $n = 2$.
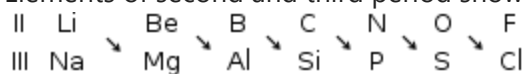
44

$H_2 + I_2 \longrightarrow 2HI$

45

Number of molecules present in one gram molecular mass of a substance.

46

Elements of second and third period show diagonal relationship.

II Li ↘ Be ↘ B ↘ C ↘ N ↘ O ↘ F
III Na   Mg   Al   Si   P   S   Cl

47

Cerium is a lanthanide.

48

Victor Meyer's method.

49

Na^+ has 10 electron and Li^+ has 2 electron therefore these are different number of electron from each other.

50

Ostwald's dilution formula is $\alpha^2 = K(1-\alpha)/C$ but for weak electrolyte α is very small. Thus $(1-\alpha)$ can be neglected for weak electrolytes. Hence, the dilution formula is $\alpha = \sqrt{\dfrac{K}{C}}$ for weak electrolyte.

Botany - Solutions

1

A-(ii), B-(iii), C-(i), D-(iv)

2

All of these

3

Arnon (1956) used the term 'Assimilatory powers' for ATP as well as $NADPH_2$. ($NADPH_2$ alone is known as reducing power).

4

Vessels along with tracheids forms the main tissue of xylem of vascular bundles of the angiosperms and help in conduction.

5

It remains unaffected

6

Lateral meristem, apical meristem and intercalary meristem are the catagory of meristem on the basis of position in plant bodies.
Lateral meristem is present on the lateral sides of the plant. e.g., vascular cambium (fascicular and interfascicular cambium) and cork cambium (phellogen).

7

R. Emerson as well as C.M Lewis (1943) observed that the quantum yield of photosynthesis decreases towards the far red end of the spectrum.

8

Prophase, metaphase, anaphase and telophase

9

Lateral meristems take place laterally in the axis, parallel to the sides of stems and roots. The cambium of vascular bundles (fascicular, interfascicular and extrastelar cambium) and the cork cambium (phellogen) belongs to this category.

10

It inhibits cell wall formation

11

Cork cambium and vascular cambium are the example of secondary meristem. Secondary meristems are formed secondarily from the permanent tissues by the process of dedifferentiation.

12

Runners is the subaerial stem modification with long internode. They have long and thin internodes and branches creep over the surface of soil. There branches develop adventitious roots at nodes on lower side. Scaly leaves are present on nodes, from the axil of which arise aerial branches. When long branches break up by any method they form new plants. In this way large number of new plants are formed. Some examples are Doob grass, Oxalis, Hydrocotyle.

13

They are thin thread - like adventitious roots that often produces in groups. Fibrous roots provide better and firm anchorage to the plant e.g. Grass.

14

In physiological anisogamy, fusing gametes are similar in morphology but different in behaviour, (+) and (-) type e.g., C. monoica.

15

Auxin

16

Prokaryotes

17

They possess incipient nucleus and show amitotic division

18

Bacterium

19

Two types of anaerobic respiration or fermentation are lactate fermentation and ethanol fermentation. Lactate fermentation produces lactic acid only as pyruvic acid produced in glycolysis is directly reduced by NADH to form lactic acid and no CO_2 is produced. Alcoholic (ethanol) fermentation involves conversion of pyruvate to acetaldehyde, so, CO_2 is released.

20

$$C_6H_{12}O_6 + \rightarrow 2C_2H_5OH + 2CO_2 + 18kcal$$
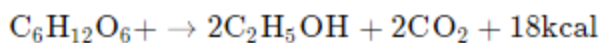
21

As starch is highly stable and water insoluble product of carbohydrate.

22

Pleuro-pneumonia like organism (PPLO), Mycoplasma gallisepticum is having an average size of 0.150μ.

23

Metaphase is the best time to quantify and study the morphology of chromosomes. At metaphase, the condensed chromosomes with two chromatids are organized at the equatorial plate. Kinetochore, consisting of multilayered plates of proteins, forms on opposite sides of each centromere and becomes intimately associated with the two sister chromatids. In onion root tip, each somatic cell contains 8 chromosomes. A cell undergoing cell division has duplicated its chromosomes thus a cell at metaphase stage of cell division has 16 chromosomes. As each chromosome has two kinetochores so during metaphase 32 kinetochores can be seen.

24

In seed germination, heat is liberated by the process of respiration.

25

The exponential growth in plants expressed as: $W_1 = W_0 e^{rt}$, where

W_1 =final size (weight, height, number etc.)

W_0 = initial size at the beginning of the period.

r = growth rate,

t = time of growth

e = base of natural logarithms

Here, r is the relative growth rate and is also the measure of the ability of the plant to produce new plant material, referred to efficiency index.

Therefore, the final size of W_1 depends on the initial size, W_0.

26

Spirogyra

27

The storage root is like a spindle, narrow towards both base and apex, which occurs in Raphanus sativus. The basal part of it is made of tap root.

28

Knot like structure 'Chromomeres' found in the stage leptotene of prophase first of meiosis.

29

Hydrophytes

30

M.J. Schleiden and T. Schwann (1838 - 39) proposed cell theory.

31

Fermentation is refer to the process of deriving energy from the oxidation of organic compounds such as carbohydrates and using an endogenous electron acceptor not external or exogenous, which is usually an organic compound, as opposed to respiration where electrons are donated to an exogenous electron acceptor, like oxygen via an electron transport chain.

32 Potassium cyanide appears to have no inhibiting effect on photosynthesis at low light intensities

33 Meristem possess the capacity of division. Therefore plants keep growing in length whole life time.

34 Agar-agar is a jelly like substance. It is a non-nitrogenous carbohydrate consisting of two polysaccharides namely agarose and agaropectin. It is obtained from several red algae. e.g., Gracillaria, Gelidium, Gigartinia. It was discovered by Lady Hesse and used by Robert Koch to solidify culture medium.

35 Mycoplasma

36 Mitochondria

37 Endergonic

38 It shows crossing over in its pachytene stage of prophase-I. It explain to reduction division. In this division diploid cell convert in haploid cell.

39 algae only

40 Peroxisomes

41 All of the above

42 Permanent tissue is made up of the matured cells.

43 ATP

44 The reproductive roots are present in sweet potato. The adventitious roots may develop adventitious buds and help in vegetative propagation.

45 Lenticels are aerating pores in the bark of plants which appear on the surface of the bark as depressions in woody trees. The lenticel is surrounded by loosely arranged thin walled rounded and suberised (e.g., Prunus) or unsuberised cells called complementary cells. They enclose

intercellular spaces for gaseous exchange. The suberised nature of complementary cells checks
excessive evaporation of water.

46   Hanging roots help the plants in absorbing moisture from the wet atmosphere such as Vanda.

47   Blue-green algae

48   Proteinaceous centre and starchy sheath

49   In Dahlia, swollen adventitious roots of definite shape that occur in groups or fascicles and arise from base of stem are found.

50   In some cases successive type while in others simultaneous type

Zoology - Solutions

1   The amount of oxygen that can bind with haemoglobin is estimated by oxygen tension. This is expressed as partial pressure of oxygen pO_2, similarly partially pressure of carbon dioxide is pCO_2. The pCO_2 and pO_2 in oxygenated blood i.e., arterial blood is 40 mm Hg and 95 mm Hg respectively.

2   The total volume of air accommodated in the lungs at the end of a forced inspiration is called the 'vital capacity' is worng statement. Vital capacity is the maximum volume of air a person can breathe in after a forced expiration or the maximum volume of air a person can breathe out after a forced inspiration. It varies from 3400 mL to 4800 mL.

3   14.0 to 16.0 gms

4   Mammals, marine fishes and many terrestrial amphibians mainly excrete urea, a lesser toxic nitrogenous waste and are known as ureotelic animals. Ammonia produced by metabolism is converted into urea in the liver of these animals and released into blood which is filtered and excreted out by the kidneys.

5   Ribose is a monosaccharide and cannot be broken down further. Maltose, lactose and sucrose all are disaccharides and so can be hydrolysed to produce their component monosaccharides.

6   Glutenin is the major protein present in wheat flour, making up 47% of the total protein content and it is present in the form of protein aggregates of high molecular weight and low molecular weight subunits with molar masses from 200,000 to a few millions. Glutenin is responsible for the strength and elasticity of dough.

7 Physalia is commonly known as 'Portuguese man of war' due to sudden appearance and disappearance like active Navy ships of Portugal which is pelagic, marine swimming animal.

8 The main excretory structures in cockroach are malpighian tubules. They extract nitrogenous wastes and water from haemolymph and reabsorb certain salts resulting in precipitation of uric acid. Thus, cockroach is uricotelic. Males have paired anal styles on 9th abdominal sternite which are absent in females. Nervous system consist of a ventral nerve cord and ten pairs of ganglion. Forewings are highly sclerotized and are not used in flight but serve to protect the hindwings at rest.

9 Relaxin is secreted by ovary and placenta during pregnancy, which relaxes ligaments in pelvis and softens and widens cervix during childbirth.
Whereas inhibin secreted by granulosa cells in the ovaries inhibits secretion of FSH by anterior pituitary.
Therefore, relaxin and inhibin have different functions and are not antagonistic.

10 Synovial membrane secretes synovial fluid that lubricate the joints.

11 Secondary metabolites are derivatives of primary metabolites which have no direct function in growth and development of plants. These compounds are accessory rather than central to the functioning. e.g., arbrin, cellulose, gums, diterpenes, carotenoids, curcumin, rubber etc. whereas Argenine, tyrosine, glycine, serine and phenylalanine are amino acids, which are primary metabolites.

12 Stage I of blood clotting is concerned with the formation of thromoplastin released from damaged tissue or platelets. Thromboplastin helps in the formation of the enzyme thrombokinase.

13 The amount of CSF in the cranial cavity is 140 mL and the cerebrospinal fluid (CSF) is secreted by anterior choroid plexus and posterior choroid plexus and is found inside the ventricles of the brain, the central canal of the spinal cord and in the subarachnoid space around the brain and spinal cord.

14 The phenomenon of excretion of uric acid is called as uricotelism and animals which excrete their nitrogenous wastes mainly in the form of uric acid are called as uricotelic animals. Uricotelic animals include most insects (e.g., cockroach), some land crustaceans (e.g. Oniscus commonly known as "wood louse"), land snails, land reptiles (e.g., lizards and snakes) and birds.

15 Adrenalin

16 Gliding joints are found between the carpal bones and between the tarsal bones. The elbow, the knee and ankle are examples of hinge joint. Whereas the joint between the atlas and axis is

pivot joint and the joint between the carpal and metacarpal thumb of the hand is an example of saddle joint. Ball and socket joint is present between glenoid cavity of the pectoral girdle and head of the humerus.

17 Porifera

18 Mouth part of cockroach contain two mandibles which bears teeth. When both the mandibles work simultaneously in a horizontally plane, the food matter is cut and masticated into fine and smaller pieces. Gizzard is a part of alimentary canal and it bears six muscular folds which are covered by chitinous conical plates, the teeth, used for grinding the food.

19 Spleen is a vertebrate organ, lying behind the stomach, that is basically a collection of lymphoid tissue and its functions include producing lymphocytes and destroying foreign particles. It acts as a reservoir for erythrocytes and can regulate the number in circulation and also the site for the breakdown of worm out erythrocytes and it stores the iron they contain.

20 Spongocoel

21 Four double bonds are present in arachidonic acid. Arachidonic acid is a polyunsaturated Omega-6 fatty acid present in the phospholipids of membrane of the body cells and is abundant in the brain muscle and liver. In chemical structures it is a carboxylic acid with 20-carbon chain and four cis-double bonds.

22 CO_2 and H_2O are the end product of complete aerobic oxidation of food through Krebs cycle and electron transport chain (E.T.C.) CO_2 is most abundant, harmful and universal waste product of metabolism.

23 Starch common in glycogen, in animals and plant are two food storage polysaccharides. Both of them can easily be hydrolysed into their glucose monomeres.

24 Fibula and phalanges

25 A flame cell is a specialized excretory cell found in the simplest freshwater invertebrates including flatworms. So, it is present in Planaria. Collar cells are cells that line the interior of asconoid, syn conoid and leuconoid body type sponges. Along with jellyfish, sea anemones and corals, hydra is a part of animal family Cnidaria, who use stinging cells to catch prey. So, the correct answer is option A.

26 The somatic neural system is classified into sympathetic and parasympathetic neural system.

27 Mammals, many terrestrial amphibians and marine fishes prominantly excrete urea, a lesser toxic nitrogenous waste and are known as ureotelic animals. Ammonia produced by metabolism

is converted into urea in the liver of these animals ad released into blood which is filtered and excreted out by the kidneys.

28 Collapse of the portion of the lung supplied by the bronchus

29 Amylopectin is a branched chain with $\alpha(1,6)$ glycosidic bonds at the branching points and α (1,4) linkages everywhere else.

30 Collar cells occurs in sponges and located at the anterior end of each choanocyte.

31 In fish, amphibians, reptiles and birds, RBCs are usually nucleated, oval and biconvex whereas in mammals, RBCs are enucleated, circular and biconcave except camel and llama, they possess oval RBCs.

32 In rabbit, left lungs is divided into 2 lobes, left anterior and left posterior while the right lung has 4lobes, anterior azygous, right anterior right posterior and posterior azygous.

33 Some bacteria, algae and green plant cells

34 Pharynx provides passage to both air as well as food.

35 3rd, 6th, 11th cranial nerve are respectively occulomotor, abducens and spinal accessory. All of these are motor nerve.

36 Hormones

37 Rh^- woman married with Rh^+ man, become sensitized simply by carrying a Rh^+ child within her body. Some of the cells from the embryo may mix into her own blood stream in development. First child of the parents with this genetic back ground is nearly always normal.

38 Largest number of cell bodies of neurons in our body are present in brain. They are three major groups unipolar, bipolar and multipolar.

39 Each upper arm or brachium of mammals also possesses a single long humerus bone whose swollen, spherical and smooth proximal end or "head" fits into a glenoid cavity of pectoral girdle on its side.

40 Paurometabolus

41 Trimethylamine oxide (TMAO) is the excretory product of marine teleosts and it is accumulated in their body in order to prevent water loss. It gives distinctive smell to these fishes.

42

Tadpole

43

During the internal respiration, the carbon dioxide in gaseous form diffuses out of the cells into the capillaries. The largest fraction of CO_2 is converted to bicarbonate ions $\left(HCO_3^-\right)$ in the RBCs and these ions are quite diffusible, so, they diffuse from RBCs into the plasma. To maintain ionic balance chloride $\left(Cl^-\right)$ ions move from the plasma into the RBCs. The ionic exchange is known as chloride shift.

44

Calcitonin hormone is not involved in tyrosine metabolism. The predominant metabolism of phenylalanine occurs through tyrosine and tyrosine is incorporated into proteins and is involved in the synthesis of variety of biologically important compounds-epinephrine, norepinephrine, dopamine (catecholamine), thyroid hormones-and the pigment melanin.

45

Platyhelminthes

46

Medulla oblongata (myelencephalon) is the outgrowth within the skull of the upper end of the spinal cord, forming the lowest part of the brainstem. Besides forming the major pathway for nerve impulses entering and leaving the skull, the medulla contains centres which are responsible for the regulation of the heart and blood vessels, respiration, salivation, and swallowing.

47

Anal styles

48

Blood group in human are inheritable trait and are inherited from parents to offsprings according to Mendel's law.

49

At the junction of midgut and hindgut.

50

Achilles tendon is the strongest and thickest tendon in the body. Former is a large tendon at lower end of the gastrocnemius muscle which is inserted into oscalcis.