Physics

1

A bar magnet is held perpendicular to a constant magnetic field. If the couple acting on the magnet is to be halved by rotating it, then at what angle it is to be rotated?

1	90º
2	60º
3	45º
4	30º

2
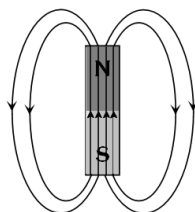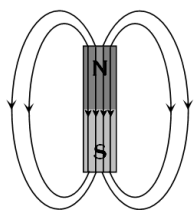
Which of the following figure correctly shows the magnetic field lines due to a bar magnet?
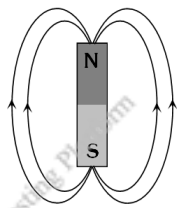
1

2

3

4

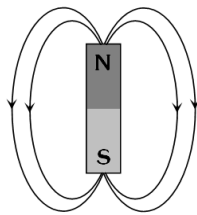
3

A wire of resistance R is elongated n-fold to make a new uniform wire. _____ is the resistance of new wire.

1

$2n^2R$

2

$2nR$

3

n^2R

4

nR

4

Choose the correct option: Two identical coaxial coils P and Q carrying equal amount of current in the same direction are brought nearer. The current in

1

Q increases while in P decreases

2

P increases while in Q decreases

3	both P and Q increases

4	both P and Q decreases

---

5 Find the net force on a Cl⁻ placed at the center of the bcc structure of CsCl.
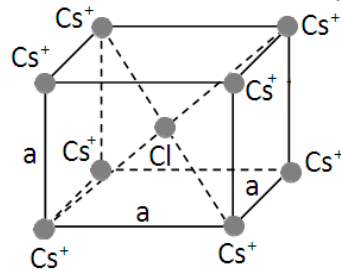
1	ke^2/a^2

2	ke^2a^2

3	Zero

4	Data is incomplete

---

6 Which of the following statement do not represent a property of light?

1	It has finite speed

2	It involves transportation of energy

3	It can travel through vacuum
4	It requires a material medium for propagation

7

A long solenoid carrying a current generates a magnetic field B along its axis. What is the new value of the magnetic field, if the current is doubled and the number of turns per cm is halved?

1	B/2
2	B
3	2 B
4	3 B

8

An alternating voltage is represented as $E = 20 \sin 300\, t$. What will be the average value of voltage over one cycle?

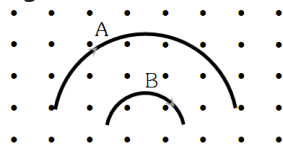| 1	$\dfrac{20}{\sqrt{2}}$ volt
2	$20\sqrt{2}$ volt

3	10 volt
4	0 volt

9

Two particles A and B of masses m_A and m_B respectively and having the same charge are moving in a plane. A uniform magnetic field exists perpendicular to this plane. The speeds of the particles are v_A and v_B respectively, and the trajectories are as shown in the figure. Then which of the following condition is correct?

1	$m_A v_A > m_B v_B$
2	$m_A v_A < m_B v_B$
3	$m_A < m_B$ and $v_A < v_B$
4	$m_A = m_B$ and $v_A = v_B$

10

A copper wire of length 1 m and radius 1 mm is connected in series with an iron wire of length 2 m and radius 3 mm and a current is passed through the wires. Find the ratio of the current density in the copper and iron wires.

1	2:3
2	6:1

3	9:1
4	18:1

11

Two particles of equal mass 'm' and charge 'q' are kept at a distance of 16 cm. They do not experience any force. Then evaluate $\dfrac{q}{m}$.

1	$\sqrt{4\pi\varepsilon_0 G}$
2	$\sqrt{\dfrac{\pi\varepsilon_0}{G}}$
3	$\sqrt{\dfrac{G}{4\pi\varepsilon_0}}$
4	I

12

The radius of hydrogen atom in its ground state is 5.3×10^{-11} m. After collision with an electron, it is found to have a radius of 21.2×10^{-11} m. Calculate the principal quantum number 'n' of the final state of an atom.

1	n = 2
2	n = 3

3	n = 4
4	n = 8

13

In a wire of circular cross-section with radius r, free electrons travel with a drift velocity V when a current I flows through the wire. When the drift velocity is 2V, then how much is the current in another wire of half the radius and of the same material?

1	I / 4
2	I / 2
3	I
4	2I

14

A plane mirror is approaching you at a speed of 10 cm/s. At what speed will your image approach you, so that you can see your image in it?

1	15 cm/s
2	20 cm/s
3	5 cm/s

4	10 cm/s

---

15 Mark the correct statement.

1	A magnetic material is in the paramagnetic phase below its Curie temperature
2	A paramagnetic material tends to move from a strong magnetic field to weak magnetic field
3	The resultant magnetic moment in an atom of a diamagnetic substance is zero
4	Typical domain size of a ferromagnetic material is 1 nm.

---

16 Choose the correct statement.

1	Liquids obey partially the ohm's law
2	Liquids obey fully the ohm's law
3	There is no relation between current and p.d. for liquids
4	None of the above

17

An electromagnetic radiation has an energy of 13.2 keV. Then the radiation belongs to the _____ region.

1

X-rays

2

ultraviolet

3

infrared

4

visible light

18

A solid conducting sphere of radius 'a' has a net positive charge 2Q. A conducting spherical shell of inner radius 'b' and outer radius 'c' is concentric with the solid sphere and has a net charge -Q. What will be the surface charge density on the inner and outer surfaces of the spherical shell?
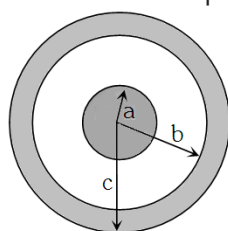
1

$$-\frac{Q}{4\pi b^2}, \frac{Q}{4\pi c^2}$$

2

$$-\frac{2Q}{4\pi b^2}, \frac{Q}{4\pi c^2}$$

3

$$0, \frac{Q}{4\pi c^2}$$

4	None of these

19

The ratio of intensities of two waves is 9:1. They are producing interference, then what is the ratio of maximum and minimum intensities?

1	2:1

2	4:1

3	8:1

4	10:8

20

A rod of length /rotates with a uniform angular velocity ω about an axis passing through its middle point but normal to its length in a uniform magnetic field of induction B with its direction parallel to the axis of rotation. What is the induced emf between the two ends of the rod?

1	$\dfrac{Bl^2\omega}{2}$

2	zero

3	$2Bl^2\omega$

4

$$\left(\frac{Bl^2\omega}{8}\right)$$

21

Copper has face centered cubic (fcc) lattice with interatomic spacing equal to 2.54 A^0....
Determine the value of the lattice constant for this lattice.

1

5.08 A^0

2

3.59 A0

3

2.54 A^0

4

1.27 A^0

22

In hydrogen atom, an electron is revolving in the orbit of radius $0.53\ \text{Å}$ with 6.6×10^{15}
rotations/second. Magnetic field produced at the center of the orbit is

1

$125\ \text{wb}/\text{m}^2$

2

$12.5\ \text{wb}/\text{m}^2$

3

$1.25\ \text{wb}/\text{m}^2$

4

$0.125\ \text{wb}/\text{m}^2$

23

2 wires of same material have length L and 2 L and cross-sectional areas 4 A and A respectively. What would be the ratio of their specific resistance?

1	1:1
2	1:2
3	1:8
4	8:1

24

A current of 1 ampere is passed through a straight wire of length 2 meters. What will be the magnetic field at a point in air at a distance of 3 meters from either end of wire and lying on the axis of wire?

1	0
2	$\dfrac{\mu_0}{2\pi}$
3	$\dfrac{\mu_0}{4\pi}$
4	$\dfrac{\mu_0}{8\pi}$

25

Find the wavelength of light of frequency 100 Hz.

1	1×10^6 m
2	4×10^6 m
3	3×10^6 m
4	2×10^6 m

26

The work done in turning a magnet of magnetic moment 'M' by an angle of 90° from the meridian is 'n' times the corresponding work done to turn it through an angle of 60°, where value of 'n' is:

1	1/4
2	1/2
3	1
4	2

27

A photocell stops emission if it is managed at 2 V negative potential. What is the energy of most energetic photoelectron?

1	2 keV
2	2 kJ
3	2 eV
4	2 J

28

Find the ratio of minimum to maximum wavelength in Balmer series.

1	1:4
2	3:4
3	5:9
4	5:36

29

An arc of a circle of radius R subtends an angle $\dfrac{\pi}{2}$ at the center. It carries a current i. The magnetic field at the center will be

1	$\dfrac{\mu_0\, i}{2R}$

2	$\dfrac{\mu_0\, i}{4R}$
3	$\dfrac{2\mu_0 i}{5R}$
4	$\dfrac{\mu_0\, i}{8R}$

---

30 A soap bubble is given a negative charge, then what will be the effect on its radius?

1	It increases
2	It decreases
3	It remains same
4	Nothing can be predicted as information is insufficient

---

31 What do Maxwell's equations describe?

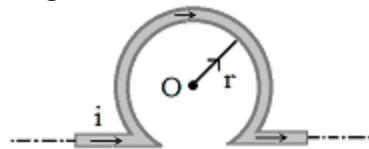| 1	The fundamental laws of magnetism only
2	The fundamental laws of electricity only

| 3 | The fundamental laws of mechanics only |
| 4 | Both (1) and (2) |

32

An infinitely long straight conductor is bent into the shape as shown in the figure below. It carries a current of i ampere and the radius of the circular loop is r meter. Then the magnetic induction at its center will be

1	$\dfrac{\mu_0}{4\pi}\dfrac{2i}{r}(\pi-1)$
2	$\dfrac{\mu_0}{4\pi}\dfrac{2i}{r}(\pi+1)$
3	zero
4	infinite

33

Two small spheres each having the charge +Q are suspended by insulating threads of length L from a hook. This arrangement is taken in space where there is no gravitational effect, then what will be the angle between the two suspensions and the tension in each?

| 1 | $180°,\ \dfrac{1}{4\pi\varepsilon_0}\dfrac{Q^2}{L^2}$ |

2

$$180°, \frac{1}{4\pi\varepsilon_0} \frac{Q^2}{2L^2}$$

3

$$90°, \frac{1}{4\pi\varepsilon_0} \frac{Q^2}{L^2}$$

4

$$180°, \frac{1}{4\pi\varepsilon_0} \frac{Q^2}{(2L)^2}$$

34

Which type of bonding is in a germanium crystal (semi-conductor)?

1

Covalent

2

Vander Waal's type

3

Ionic

4

Metallic

35

An object is at a distance of 0.5 m in front of a plane mirror. What is the distance between the object and image?

1

1.5 m

2

1 m

3	0.5 m
4	0.25 m

---

36 Name the process in which an ac is converted into dc.

1	Purification
2	Rectification
3	Amplification
4	Current amplification

---

37 A coil of 100 turns and area 5 square centimeter is placed in a magnetic field B = 0.2 T. The normal to the plane of the coil makes an angle of 60° with the direction of the magnetic field. Determine the magnetic flux linked with the coil.

1	10^{-2} Wb
2	5×10^{-3} Wb
3	10^{-4} Wb

4

5×10^{-5} Wb

38

Magnetic lines of force _____.

1	are always closed
2	are always intersect
3	tend to crowd far away from the poles of magnet
4	do not pass through vacuum

39

A boy is 180 cm tall and his eyes are 10 cm below the top of his head. In order to see his entire height right from toe to head, he uses a plane mirror kept at a distance of 1 m from him. What should be the minimum length of the required plane mirror?

1	85 cm
2	90 cm
3	170 cm
4	180 cm

40

If the value of potential in an ac circuit is 10 V, then what is the peak value of potential?

1

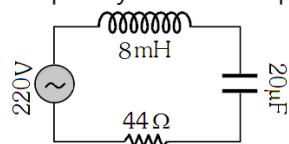$$\frac{20}{\sqrt{2}}$$

2

$$20\sqrt{2}$$

3

$$\frac{10}{\sqrt{2}}$$

4

$$10\sqrt{2}$$

41

Consider the series LCR circuit shown in the figure. Determine the respective resonance frequency and the amplitude of the current at the resonating frequency.

1

$25\ \mathrm{rad-s^{-1}}$ and $5\sqrt{2}$ A

2

$2500\ \mathrm{rad-s^{-1}}$ and $\dfrac{5}{\sqrt{2}}$ A

3

$2500\ \mathrm{rad-s^{-1}}$ and 5A

4

$2500\ \mathrm{rad-s^{-1}}$ and $5\sqrt{2}$ A

42

How much power is dissipated, in an ac circuit with voltage V and current I?

1	VI
2	$\dfrac{1}{\sqrt{2}}VI$
3	$\dfrac{1}{2}VI$
4	Depends on the phase between V and I

43

A metallic ring connected to a rod oscillates freely like a pendulum. Now if a magnetic field is applied in horizontal direction so that the pendulum swings through the field, then define the position of pendulum.
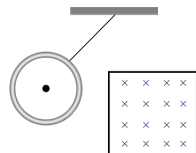
1	Come to rest very soon
2	Keep oscillating with a larger time period
3	Keep oscillating with a smaller time period
4	Keep oscillating with the old time period

44

A force F acts between sodium and chlorine ions of salt (sodium chloride), when put 1 cm apart in air. The permittivity of air and dielectric constant of water are ε_0 and K respectively. Determine the electrical force acting between sodium and chlorine ions 1 cm apart, when a piece of salt is put in water.

1	$\dfrac{F\varepsilon_0}{K}$
2	$\dfrac{F}{K\varepsilon_0}$
3	$\dfrac{FK}{\varepsilon_0}$
4	$\dfrac{F}{K}$

45

F_g and F_e indicate gravitational and electrostatic force respectively between electrons situated at a distance 10 cm. What is the ratio of F_g/F_e?

1	1
2	10
3	10^{-43}
4	10^{42}

46

The absorption transitions between the first and the fourth energy states of hydrogen atom are 3. What will be the emission transitions between these states?

1	6
2	5
3	4
4	3

47

If n, e, τ and m represent the density, charge relaxation time and mass of the electron respectively, then what will be the resistance of a wire of length l and area of cross-section A?

1	$\dfrac{ne^2 A}{2m\tau l}$
2	$\dfrac{ne^2 \tau A}{2ml}$
3	$\dfrac{m\tau^2 A}{ne^2 l}$
4	$\dfrac{ml}{ne^2 \tau A}$

48

A solenoid is 1.5 m long and its inner diameter is 4 cm. It has three layers of windings of 1000 turns each and carries a current of 2 ampere. What is the magnetic flux for a cross-section of the solenoid?

1	4.2×10^{-5} weber
2	5.2×10^{-5} weber
3	6.31×10^{-6} weber
4	2.5×10^{-7} weber

49

A plane electromagnetic wave is incident on a material surface. If the wave delivers momentum p and energy E, then which of the following relation is true?

1	$p = 0, E \neq 0$
2	$p \neq 0, E = 0$
3	$p \neq 0, E \neq 0$
4	$p = 0, E = 0$

50

An iron rod of length L and magnetic moment M is bent in the form of a semicircle. Now what will be its magnetic moment?

1	π
2	$M\pi$
3	$\dfrac{M}{\pi}$
4	$\dfrac{2M}{\pi}$

Chemistry

1

The carbonyl compounds are usually

1	carboxylic acids
2	aldehydes and ketones
3	aldehydes, ketones and carboxylic acids
4	ethers, aldehydes, ketones and carboxylic acids

2

If an aqueous solution of glucose is allowed to freeze, then crystal of which will be separated out first?

1	Water
2	Glucose
3	Both of these
4	None of these

3 | Which of the following is the correct statement about Henry's law?

1	The pressure applied should be high
2	The gas in contact with the liquid should behave as an ideal gas
3	There should not be any chemical interaction between the gas and liquid
4	All of these

4 | What is the main function of a catalyst in speeding up a reaction?

1	To change the reaction path so as to decrease the energy of activation for the reaction

2	To increase the rate of the forward reaction
3	To reduce the temperature at which the reaction can occur
4	To increase the energy of the molecules of the reactants

5 Find the reagent which forms crystalline osazone derivative when reacted with glucose.

1	Benedict solution
2	Fehling solution
3	phenylhydrazine
4	hydroxylamine

6 Find the correct statement from the following.

1	The structural information about their biosynthesis is contained in a class of compounds called nucleic acids, e.g. RNA and DNA
2	Proteins are polyamides of β-amino acids

3	Starches are polymers of α−glucose molecules with $\beta-1,4$−linkages and some $\beta-1,6$−cross-linkages
4	Cellulose are linear polymers of β−glucose molecules with $\beta-1,4$−linkages

---

7 Which is not a polymer?

1	Wax (eg. bees wax)
2	Perspex
3	Gun cotton
4	Shellac (eg. lac shellac)

---

8 Which of the following has yellow colour?

1	Fischer's salt
2	Potassium cobaltinitrite
3	Potassium hexanitrocobaltate (III)

4	All the above

9 The Allyl isocyanide has

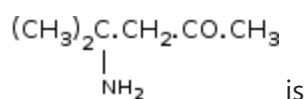| 1	9 sigma bonds, 3 pi bonds and 2 non-bonding electrons
2	8 sigma bonds, 3 pi bonds and 4 non-bonding electrons
3	8 sigma bonds and 5 pi bonds
4	9 sigma bonds and 4 pi bonds

10 Wax are long chain compounds belonging to class

1	ethers
2	esters
3	alcohols
4	acids

11

$(CH_3)_2C.CH_2.CO.CH_3$
  |
  NH_2 is

1	acetoneamine
2	diacetone
3	diacetoneamine
4	aminoacetone

12

In observing the effect of pressure on the solubility of a gas in liquid, _____ is the most appropriate explanation.

1	Increase in pressure increases the rate at which the gaseous particles are striking the surface of solution.
2	Increase in pressure increases the number of gaseous particles per unit volume over solution.
3	Increase in pressure increases the solubility of a gas in solution.
4	All of these

13

Find the number of unpaired electrons in Fe^{+++} (Z = 26).

1   3

2   6

3   5

4   4

14

In the extraction of ____ , complex ion forms.

1   Na

2   Fe

3   Ag

4   Cu

15

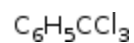Which of the following is step-growth polymer?

1   Nylon

2	Polyisoprene
3	Polythene
4	Polyacrylonitrile

---

16 Which of the following is benzylidene chloride?

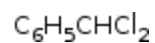| 1	$C_6H_5CCl_3$
2	$C_6H_4ClCH_2Cl$
3	$C_6H_5CHCl_2$
4	$C_6H_5CH_2Cl$

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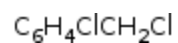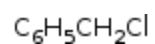
17 Which of the following aldehyde is most reactive?
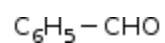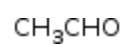
1	HCHO
2	$C_6H_5 - CHO$
3	CH_3CHO
4	All are equally reactive

18

Find the formula of tartar emetic.

1

CH(OH)COOH
|
CH(OH)COOK

2

CH(OH)COONa
|
CH(OH)COO(SbO)

3

CH(OH)COOK
|
CH(OH)COONa

4

CH(OH)COOK
|
CH(OH)COOK
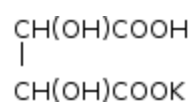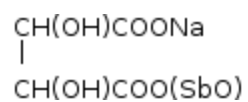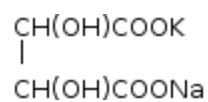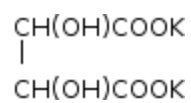
19

Which one of the following halide is 2°?

1

n-butyl chloride

2

n-propyl chloride

3

Isobutyl chloride

4

Isopropyl chloride

20 Because of covalent bonding, the transitional metals are

1 ductile

2 hard and brittle

3 conductor

4 lustrous

21 ____ give green hydrated ion.

1 Ni^{2+}

2 Fe^{+2}

3 V^{3+}

4 (1) and (2) both

22 The concentration of a reactant decreases from 0.2 M to 0.1 M in 10 minutes. What is the rate of the reaction?

1	0.01 M
2	0.01 mol $dm^{-3} min^{-1}$
3	10^{-2}
4	1 mol $dm^{-3} min^{-1}$

23 Nitroglycerine is a/an

1	acid
2	nitro compound
3	alcohol
4	ester

24 What does the solution of sugar in water contain?

1	Free atoms
2	

Free molecules

| 3 | Free ions |
| 4 | Free atom and molecules |

25

A strong electrolyte in aqueous solution exhibit:

1	completely dissociated
2	hydration
3	partial dissociation
4	no dissociation

26

The solubility of gas in liquid increases with which of the following condition?

1	Reduction of gas pressure
2	Increases in temperature
3	Decrease in temperature

4	Amount of liquid taken

---

27 Find the incorrect statement for D_2O from the following statements.

1	Solubility of NaCl in it is more than H_2O
2	Viscosity is higher than H_2O at $25°$
3	D_2O reacts slowly than H_2O
4	Boiling point is higher than H_2O

---

28 Rate of a reaction depends on the

1	force
2	volume
3	pressure
4	concentration of reactant

29

The statement "If 0.003 moles of a gas are dissolved in 900 g of water under a pressure of 1 atmosphere, 0.006 moles will be dissolved under a pressure of 2 atmospheres", states

1	Henry's law
2	Raoult's law
3	Graham's law
4	Dalton's law of partial pressure

30

Leakage of _____ gas was responsible for the Bhopal tragedy in 1984.

1	$CH_3-C-N=S$
2	$CH_3-N=C=O$
3	$CHCl_3$
4	C_6H_5COCl
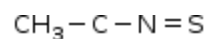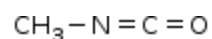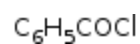
31

What is the temperature coefficient of a reaction?

| 1 | The ratio of the rate constants at two temperatures differing by $1°C$ |

2	The ratio of the rate constants at temperatures $35°C$ and $25°C$
3	The rate of the reaction at $100°C$
4	Specific reaction rate at $25°C$

32 diethyl ether is used to prepare_____

1	Williamson's synthesis
2	Wurtz's synthesis
3	Frankland's synthesis
4	Kolbe's synthesis

33 Which of the following compound contains all the four $1°$, $2°$, $3°$ and $4°$ carbon atoms?

1	3-chloro-2, 3-dimethylpentane
2	2, 3-dimethyl pentane

3	3-chloro-2,2,3-trimethyl pentane
4	3, 3-dimethylpentane

---

34 Electrolysis of molten anhydrous calcium chloride ($CaCl_2$) produces

1	sodium
2	sulphur
3	phosphorus
4	calcium

---

35 What do we get on the electrolysis of aqueous solution of sodium sulphate, on cathode?

1	SO_3
2	SO_2
3	H_2
4	Na

36

Melmoware are made up of

1. thermoplastic

2. thermosetting

3. both (1) and (2)

4. none of these

37

Among following, which types of isomerism is shown by pentanone?

1. Functional isomerism

2. Chain isomerism

3. Position isomerism

4. All of these

38

Among the following series of transition metal ions, the one where all metals ions have $3d^2$ electronic configuration is

1	$Ti^+, V^{4+}, Cr^{6+}, Mn^{7+}$
2	$Ti^{3+}, V^{2+}, Cr^{3+}, Mn^{4+}$
3	$Ti^{2+}, V^{3+}, Cr^{4+}, Mn^{5+}$
4	$Ti^{4+}, V^{3+}, Cr^{2+}, Mn^{3+}$

39

____ faradays are required to generate one gram atom of magnesium from $MgCl_2$.

1	4
2	3
3	2
4	1

40

Which of the following is responsible for electrical conduction of molten sodium chloride (NaCl)?

1	Free ions

2	Free electrons
3	Free molecules
4	Atoms of sodium and chlorine

---

41 CH_3MgI is an organometallic compound because of

1	C-H bond
2	C-Mg bond
3	C-I bond
4	Mg-I Bond

---

42   What is the formula of alum?

1	$K_4[Fe(CN)_6]$
2	$Na_2CO_3.10H_2O$
3	$K_2SO_4.Al_2(SO_4)_3.24H_2O$

4	$K_2SO_4.Al_2(SO_4)_3.6H_2O$
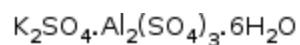
43

At 290 K, velocity constant of a reaction was found to be 3.2×10^{-3}. At 310 K it will be about

1	3.2×10^{-4}
2	6.4×10^{-3}
3	9.6×10^{-3}
4	1.28×10^{-2}

44

Reduction in atomic size with increase in atomic no. is a characteristic of elements of

1	f -block
2	high atomic masses
3	d-block
4	radioactive series

45

In the presence of concentrated sulphuric acid, chlorobenzene has to react with which of the following compound to get DDT?

| 1 | Trichloroacetaldehyde |

| 2 | Dichloroacetaldehyde |

| 3 | Dichloroacetone |

| 4 | Trichloroethane |

46

_____ is optically active.

| 1 | Tartaric acid |

| 2 | Glycerol |

| 3 | Oxalic acid |

| 4 | Ethylene glycol |

47

Identify the compound which is not isomeric with diethyl ether.

1	Butanone
2	2-methylpropan-2-ol
3	Butan-1-ol
4	n-propyl methyl ether

---

48 As per the Werner's theory,

1	only primary valency cannot be ionized
2	primary and secondary valencies both cannot be ionized
3	secondary valency can be ionized
4	primary valency can be ionized

---

49 Rate law for the reaction $RCl + NaOH(aq) \longrightarrow ROH + NaCl$ is given by Rate $= K_1[RCl]$. What will be the rate of the reaction?

1	halved on reducing the concentration of alkyl halide to one half

2	doubled on doubling the concentration of sodium hydroxide
3	unaffected by increasing the temperature of the reaction
4	decreased on increasing the temperature of the reaction

---

50 When quantity of electricity passed is one faraday then the mass deposited at the electrode is equal to which of the following?

1	One gram equivalent weight
2	One gram atomic weight
3	Electrochemical equivalent
4	None of the above

Botany

1 By which of the following the megasporangium proper of an angiosperm ovule is represented?

1	Funicle

2	Integument
3	Nucellus
4	Micropyle

---

2 The inherent capacity of a cell to regenerate a new whole organism is known as

1	Totipotency
2	Ontogeny
3	Phycogeny
4	Differentiation

---

3 On the margins of leaves of a plant termed as Bryophyllum, tiny plants grow complete with roots. These tiny plants fall of and continue to grow. This is a form of

1	Hermophroditism
2	Vegetative reproduction

3	Reproduction by fission
4	Sexual reproduction

4 A cross between plants having RRYY and rryy composition will yield plants with ____ and ____ seeds.

1	round, green
2	round, yellow
3	wrinkled, yellow
4	wrinkled, green

5 It has not escaped our notice that the specific pairing we have postulated immediately suggests a possible copying mechanism for genetic material. This is written by ____.

1	Severo Ochoa
2	Watson and Crick
3	Archibold Garrod

4

Meselson and Stahl

6

Satement 1: Endothecium layer of anther wall plays an important role in dehiscence of anther.
Statement 2: The presence of fibrous bands and differential expansion of inner and outer tangential walls of endothecial cells responsible for dehiscence of anther.

1

Both statement 1 and statement 2 are true and statement 2 is the correct explanation of statement 1

2

Both statement 1 and statement 2 are true but statement 2 is not the correct explanation of statement 1

3

Both statement 1 and statement 2 are false

4

statement 1 is true but statement 2 is false

7

Synergids of polygonum type embryo sac are ___.

1

triploid

2

haploid

3

diploid

4	polyploid

8 In B-DNA, ____ type of coiling is present.

1	left-handed
2	right-handed
3	zig-zag
4	opposite

9 Strobilanthus kunthiana differs from bamboo in _____.

1	being polycarpic
2	length of juvenile phase
3	being monocarpic
4	none of these

10

Secondary productivity is rate of formation of new organic matter by which of the folloiwng componant?

1		Consumers
2		Decomposers
3		Parasites
4		Producers

11

In a particular climatic condition, if _____, decomposition rate is slower.

1		detritus is rich in humus
2		detritus is rich in nitrogen
3		detritus is rich in sugars
4		detritus is rich in lignin and chitin

12

If a genotype consists of different types of alleles, it is known as

1	uniallelic
2	heterozygous
3	monoallelic
4	homozygous

13
DNA strands are antiparallel due to the presence of

1	Peptide bonds
2	H-bonds
3	Disulfied bonds
4	Phosphate-diester bonds

14
Genes which code for a pair of contrasting characters are known as

1	traits
2	factors

3	alleles
4	gametes

---

15 Grafting experiments are not possible in monocotyledonous plants as

1	they have less number of vascular bundles
2	they have conjoint vascular bundles
3	they have scattered vascular bundles
4	they lack cambium cells in the vascular bundles.

---

16 Pollen grains are shed at _____ stage.

1	2-celled
2	3-celled
3	1-celled

4	2 or 3-celled

17

_____ enzyme present in retroviruses converts single stranded RNA into a double stranded viral DNA.

1	Transcriptase
2	Reverse transcriptase
3	RNA polymerase
4	DNA polymerase

18

Male gametophyte in angiosperms possesses

1	three sperm nuclei
2	single sperm and two vegetative cells
3	two sperm nuclei and a vegetative cell
4	single sperm and a vegetative cell

19 Who out of the following was of the strong opinion that acquired characteristics are inherited?

1	Lamarck
2	Lysenko
3	Mendel
4	Huxley

20 Identify the true statements about productivity.

1	The annual net primary productivity of the whole of the biosphere is 17 billion tons (dry weight) or organic matter.
2	Primary productivity of all ecosystems is a constant
3	Net primary productivity is the amount of biomass available for consumption by carnivores
4	Primary productivity depends on the plant species inhabiting a particular area

21

Pod character that is green colour in pea is _____.

1	dominant
2	incompletely dominant
3	recessive character
4	abnormal character

22

_____ is the most important cause of animals and plants being driven to extinction.

1	Habitat loss and fragmentation
2	Co- extinctions
3	Alien species invasion
4	Over-exploitation

23

Development of new individual from female gamete without fertilization is known as ____.

1	oogamy
2	parthenogenesis
3	syngamy
4	embryogenesis

24 Find the correct statement from following.

1	Each test cross is a back cross
2	Each back cross is a test cross
3	Both tests have the same meaning
4	Reappearence of similar characters in a test cross is called a back cross

25 When two unrelated individuals or lines are crossed, the performance of F_1 hybrid is often superior to both its parents. This phenomenon is known as

1	heterosis

2	metamorphosis
3	splicing
4	transformation

26

Tikka disease of groundnut is caused by

1	Phytophthora
2	Cercospora
3	Albugo
4	Colletotrichum

27

Choose the ratio is constant in DNAs of different species.

1	A + T / C + G
2	A + G / T + C
3	A + C / U + G

4	A + U / C + G

28

By which of the following the egg in female gametophyte is accompanied?

1	Tube nucleus
2	Synergids
3	Definitive nucleus
4	Antipodal cells

29

_____ causes amoebic dysentery.

1	Amoeba proteus
2	Entamoeba histolytica
3	Entamoeba coli
4	Entamoeba gingivalis

30

Beta (β) diversity is

1. diversity within a population

2. diversity between communities

3. diversity within a community

4. diversity between two ecozones

31

Species listed in Red list which presently have sufficient population but are facing the risk of extinction in medium term future are known as

1. endangered species

2. vulnerable species

3. extinct species

4. rare species

32

Which organization publishes the Red list of species?

1	ICFRE
2	IUCN
3	WWF
4	UNEP

33

Informosomes are ____.

1	special types of tRNA
2	eukaryotic rRNA
3	more stable forms of eukaryotic mRNA
4	both (2) and (3)

34

Breeding for disease resistance requires which of the following phenomena?

1	Planned hybridization

2	A good source of resistance
3	Disease test
4	All of these

35 What is the statues of Red Panda (Ailurus fulgens) as per the IUCN Red List?

1	Extinct species
2	Critically endangered species
3	Vulnerable species
4	Endangered species

36 Aims of plant breeding are to obtain

1	high yielding varieties
2	early maturing varieties

3	disease free varieties
4	all of the above

37

In the given figures, there are 3 different types of fission. Find the option that correctly matches them with organism.
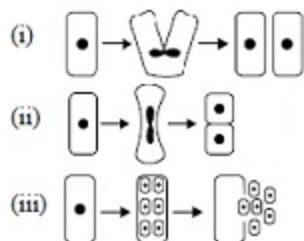
1

(i)	(ii)	(iii)
Euglena	Plasmodium	Amoeba

2

(i)	(ii)	(iii)
Plasmodium	Paramecium	Euglena

3

(i)	(ii)	(iii)
Euglena	Paramecium	Escherichia

4

(i)	(ii)	(iii)
Euglena	Paramecium	Amoeba

38

_____ methods is commonly used to maintain the genetic traits of a given plant.

1

By propagating through seed germination

2	By propagating though vegetative multiplication
3	By treating the seeds with gamma radiation
4	By generating hybrids through inter- generic pollination

---

39 A few plants exhibit unusual flowering phenomenon, _____ of them flower only once in their life time, generally after 50-100 years and produce large number of fruits.

1	Strobilanthus kunthiana
2	Bamboo
3	Cymbopogon reptocus
4	Calistemon linearis

---

40 Out of 16 plants obtained in dihybrid cross, the number of genotypes will be ___.

1	4
2	9

3	16
4	12

41

In which of the following, the number of individuals at the trophic level decreases from the producer level decreases to the consumer level?

1	The pyramid of energy
2	The pyramid of numbers
3	The pyramid of biomass
4	None of the above

42

What is the arrangement of nuclei in a typical female gametophyte of an angiosperm?

1	3+1+3
2	3+3+2
3	3+2+3

| 4 | 2+3+3 |

43   Which of the following will be a long term effect, if forest area is reduced to half?

1	It will be converted into large desert
2	Cattles of that area will die due to scarcity of fodder
3	To diversity in germplasm will effect the crop breeding
4	The natives (tribals) of that area will die on account of hunger

44   The plant being eaten by a herbivorous which in turn is eaten by carnivorous makes

1	food chain
2	interdependent
3	omnivorous
4	food web

45

Consider the following statements with respect to pollen grains.
A. The exine is a thin and continuous layer made up of cellulose and pectin.
B. The hard outer layer called the exine is made up of sporopollenin.
C. Sporopollenin is present in germ pores.
D. The exine exhibits a fascinating array of patterns and designs.
Find the correct option.

1	A and C alone are correct
2	A and B alone are correct
3	B and D alone are correct
4	B and C alone are correct

46

Among various categories of threatened species, what is the percentage of angiosperms categorized as vulnerable?

1	19%
2	14%
3	41%
4	51%

47

To obtain virus- free healthy plants from a diseased one by tissue culture technique, _____ part/parts of the diseased plant will be taken.

1	apical meristem only
2	palisade parenchyma
3	epidermis only
4	both apical and axillary meristems

48

During _____, Green revolution occurred in India.

1	1960's
2	1970's
3	1950's
4	1980's

49

The range of biomagnification of DDT in an aquatic food chain, if starting from 0.003 ppm level in water may go at fish- eating bird level upto _____ level.

1	5.0 ppm
2	0.5 ppm
3	15.0 ppm
4	25.0 ppm

50 The bacteria that grows on medium and the mass so formed is known as ____.

1	tissue
2	colony
3	spores
4	thallus

Zoology

1 Statement 1:Antibodies are glycoproteins.
Statement 2: Antibodies consist of four polypeptides.

1	Both Statement 1 and Statement 2 are true but Statement 2 is not the correct explanation of Statement 1
2	Both Statement 1 and Statement 2 are true and the Statement 2 is correct explanation of the Statement 1
3	This Statement 1 is true, but the Statement 2 is false
4	Both Statement 1 and Statement 2 are false

2 Which cyanobacteria is of great nutritive value?

1	Spirulina
2	Stigonema
3	Scytonema
4	Gloeocapsa

3 Mushrooms are rich in _____.

| 1 | sugars |

2	fats
3	carbohydrates
4	minerals and vitamins

---

4 Which of the following is the main cause of a sexually transmitted disease symptomized by the development of chancre on the genitals?

1	Human Immunodeficiency Virus
2	Hepatitis B virus
3	Neisseria gonorrhoeae
4	Treponema pallidum

---

5 What is FSH and LH?

1	Enzyme
2	Gonadotropin

3	Vitamin
4	Vasopressin

6 Which of the following was the contribution of Ernst Chain and Howard Florey?

1	Establishing the potential of penicillin as an effective antibiotic
2	Discovery of streptokinase
3	Discovery of DNA sequence
4	Production of genetically engineered insulin

7 Who proposed the cosmozoic theory?

1	Richter
2	E. Redi
3	Haeckel
4	Father Sudrez

8

Identify the correct statement regarding sexually transmitted diseases (STDs).

1
Haemophilia is one of the STDs.

2
A person may contact syphilis by sharing milk with one already suffering from the disease.

3
Genital herpes and sickle-cell anaemia are both STDs.

4
The chances of a 5-years boy contacting are both are very little

9

In humans, the ratio of number of gametes produced from one male primary sex cell to the number of gametes produced from one female primary sex cell is

1
1 : 1

2
1 : 4

3
4 : 1

4
1 : 3

10

Name the disease which mainly affects mucous membrane of urinogenital tract. In males, burning feeling on passing urine, after a yellow discharge occurs, that is accmpanied by fever, headache and feeling of illness.

1. AIDS

2. Phenylketonuria

3. Gonorrhoea

4. None of these

11

During secretory phase of menstrual cycle, the endometrial lining attains how much thickness?

1. 1 mm -2 mm

2. 5 mm - 6mm

3. 3 mm -4 mm

4. 10 mm-12 mm

12

Why plasmid is used as carrier?

1. as it has antibiotic resistance genes

2. as its both ends are replicating points

3. as it is circular DNA which has capacity to bind eukaryotic DNA

4. as it can go between eukaryotic and prokaryotic cells

13

Phytotron is a device through which

1. protons are liberated

2. plants are grown in controlled environment

3. mutations are produced in plants

4. leaf fall occurs on abscission layer

14

The vector requires to have very few, preferably single _____ for the commonly used restriction enzymes in order to link the alien DNA.

1	Ori
2	circular sites
3	insertional sites
4	recognition sites

---

15 What is the main function of the fimbriae of the Fallopian tube in females?

1	To make necessary changes in the endometrium for implantation
2	To release ovum from the Graanfian follicle
3	To help in the development of corpus luteum
4	To help in the collection of the ovum after ovulation

---

16 Which of the following is natural genetic engineer?

1	Escherichia coli
2	Agrobacterium tumefaciens

3	Pseudomonas sp.
4	Bacillus subtilis

17 In female, parturition duct is known as _____.

1	vagina
2	uterus
3	oviduct
4	cervix

18 Food can be kept for a longer time in cold house than in normal conditions because _____.

1	there is plasmolysis at low temperature
2	bacterial multiplication is reduced
3	bacterial multiplication stops

4	insect can not enter

---

19 A study of environment and animals relation is called as

1	phytosociology
2	ecosystem
3	biotic community
4	ecology

---

20 Regarding surgical methods of contraception, correct statements are:
i) These are generally advised to the male/female partner as a terminal method to prevent any more pregnancies.
ii) Surgical procedure in female is called vasectomy and that in the male is tubectomy.
iii) Reversibility is easily possible.
iv) They block gamete transport and thereby preventing conception.

1	(ii), (iii), (iii)
2	(ii), (iii)
3	(ii), (iv)

4	(i), (iv)

---

21 Who disproved the theory of spontaneous generation?

1	R. Koch
2	Lederberg
3	Louis Pasteur
4	Charles Darwin

---

22 Species are assumed as

1	the lowest units of classification
2	real basic units of classification
3	real units of classification devised by taxonomists
4	artificial concept of human mind which cannot be defined in absolute terms

23

An ecology takes into account _____ only.

1	plant adaptations only
2	environmental factors only
3	effect of environment on plants
4	all of the above

24

Who used the term coacervate?

1	Oparin
2	Preyer
3	Bondi
4	Haldane

25

A list of few sexually transmitted diseases is given below. Which of them are caused by bacteria?
i) Gonorrhea

ii) Chlamydiasis
iii) Trichomoniasis
iv) Chancroid
v) Syphilis

1	(i), (iv) and (v)
2	(iii) and (v)
3	(ii), (iii) and (iv)
4	(i) and (ii)

26   In manufacture of bread, it becomes porous because of release of CO_2 by the action of ___.

1	yeast
2	virus
3	bacteria
4	protozoans

27   Where do we get T and B cells other than lymph nodes?

1	Spleen
2	Tonsil
3	Kidney
4	Both (A) and (B)

28 Which important gas was absent during the formation of earth?

1	Oxygen gas
2	Hydrogen gas
3	Carbon dioxide gas
4	Nitrogen gas

29 _____ hormone level reaches peak during luteal phase of menstrual cycle.

1	Estrogen

2	Progesterone
3	Follicle stimulating hormone
4	Luteinising hormone

---

30 According to Darwin, the organic evolution is because of

1	interspecific competition
2	reduced feeding efficiency in on species due to the presence of interfering species
3	intraspecific competition
4	competition within closely related species

---

31 Which of the following statements is incorrect regarding Gonorrhoea?

1	It is caused by diplococcus bacterium
2	The bacterium passes into genital tubes
3	It is caused bu Herpes simplex virus

4	All of these

32 Causative agent of syphilis is _____.

1	Neisseria
2	Trichomonas vaginalis
3	HIV
4	Treponema pallidum

33 Thermostable DNA polymerase, which remains active during high temperature induced denaturation of double-stranded DNA is isolated from a bacterium

1	E. coli
2	Salmonella
3	Thermus coccus
4	Thermus aquaticus

34

In the early earth, water and CO_2 were produced by the combination of CO_2 with which of the following componant?

1	Ammonia and methane
2	Hydrogen
3	Sulphates and nitrates
4	Organic matter

35

_____ is a wrong matching of a microbe and its industrial product, while the remaining three are correct.

1	Acetobacter aceti - acetic acid
2	Yeast - statins
3	Clostridium butylicum - lactic acid
4	Aspergillus niger - citric acid

36

Find how does vaccination work.

1. Memory lymphocytes are produced. They remain in the body to fight off any future infection with the same pathogen

2. The immune system produces antibodies when stay in the blood

3. The dead pathogen stays in the body and constantly stimulates the immune system

4. All of the above

37

Which are the most active phagocytic white blood cells?

1. Lymphocyte and macrophages

2. Neutrophils and monocytes

3. Neutrophils and eosinophils

4. Eosinophils and lymphocytes

38

Which of the following causes Gonorrhoea?

1	Treponema pallidium
2	Neisseria gonorrhoea
3	Mycobacterium leprae
4	Entamoeba gingivalis

39 Which of the following exhibits thelytoky

1	Aphis
2	Honey bees
3	Ramphotyphlops braminus
4	Wasps

40 Which is one of the methods by which DNA cannot be transferred to the host cell?

1	Gene gun
2	Microinjection

3	Disarmed pathogen vectors
4	Polymerase chain reaction

---

41 From which of the following, lymphocytes are developed in adult B and T?

1	Stem cells
2	Bone cells
3	Hemocytoblasts
4	Bone marrow cells

---

42 Corpus luteum is maintained in a woman, under the effect of which hormne?

1	Somatomammotrophin
2	Progesterone
3	Human chorionic gonadotropin

4	Prolactin

---

43 Idntify wrongly matched pair.

1	Alcohol -Nitrogenase
2	Fruit juice - Pectinase
3	Detergents - Lipase
4	Textile - Amylase

---

44 Mark the correct order of processing of PCR.

1	Extension, primer annealing, denaturation
2	Denaturation, primer annealing, extension
3	Primer annealing, denaturation, extension
4	Denaturation, extension, primer annealing

45

_____ produce histamine.

1   Leucocytes

2   Mast cells

3   Musk cells

4   Bast cells

46

In order to induce the bacterial uptake of plasmids, firstly treating with _____ the bacteria are made 'competent'.

1   potassium chloride

2   sodium chloride

3   magnesium chloride

4   calcium chloride

47

Oparin hypotheses was supported by successful creating primitive Earth conditions by ___.

1	F. Redi
2	Haldane
3	Louis Pasteur
4	Urey and Miller

---

48 Who supported the theory of spontaneous generation?

1	Aristotle
2	N. Haeckle
3	Van Helmont
4	All of these

---

49 The testes in humans are situated outside the abdominal cavity inside a pouch called scrotum. What is the purpose?

1	For maintaining the scrotal temperature lower than the internal body temperature

2	For escaping any possible compression by the visceral organs
3	For providing a secondary sexual feature for exhibiting the male sex
4	For providing more space for the growth of epididymis

50 Identify the correct statement regarding individuals of same species?

1	They are interbreeding
2	They live in different niche
3	They live in same niche
4	They live in different habitate

Physics - Answer keys

1	2
2	1
3	3
4	4
5	3
6	4

7	2
8	4
9	1
10	3
11	1
12	1
13	2
14	2
15	3
16	1
17	1
18	2
19	1
20	2
21	2
22	2
23	1
24	1
25	3
26	4
27	3
28	3
29	4
30	1
31	4

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

Chemistry - Answer keys

1	2
2	1
3	3
4	1

5	3
6	4
7	1
8	4
9	1
10	2
11	3
12	4
13	3
14	3
15	1
16	3
17	1
18	4
19	4
20	2
21	4
22	2
23	4
24	2
25	2
26	3
27	1
28	4
29	1

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

Botany - Answer keys

1	3
2	1

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

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

Zoology - Answer keys

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

Question	Answer
26	1
27	4
28	1
29	2
30	3
31	3
32	4
33	4
34	1
35	3
36	4
37	2
38	2
39	3
40	4
41	4
42	3
43	1
44	2
45	2
46	4
47	4
48	4
49	1
50	1

Physics - Solutions

1

We know, $\tau = MB\sin\theta \Rightarrow \tau \propto \sin\theta$

$\Rightarrow \dfrac{\tau_1}{\tau_2} = \dfrac{\sin\theta_1}{\sin\theta_2} \Rightarrow \dfrac{\tau}{\tau/2} = \dfrac{\sin90}{\sin\theta_2}$

$\Rightarrow \sin\theta_2 = \dfrac{1}{2} \Rightarrow \theta_2 = 30°$

$\Rightarrow$ Angle of rotation $= 0\,A° - 30 = 60°$

2

3
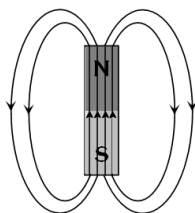
Resistance of the wire, $R = \rho\dfrac{L}{A}$

Where,

$\rho =$ Specific resistance of the wire

$L =$ Length of the wire

$A =$ Cross-sectional area of the wire

When the wire is elongated to n-fold, its length becomes $L' = nL$

As the volume of the wire remains constant

$\therefore A'L' = AL \quad \Rightarrow A' = \dfrac{AL}{L'} = \dfrac{A}{n}$

New resistance, $R' = \rho\dfrac{L'}{A'} = \rho\dfrac{(nL)}{(A/n)} = n^2\rho\dfrac{L}{A} = n^2R$

4

When the coils P and Q are brought nearer, the magnetic flux linked with each coil will increase. Thus the induced current will try to decrease the flux and hence current in both P and Q decreases.

5

According to the principle of superposition of coulomb forces, the net force on electron placed at the center of bcc structure is zero.

6

Light is electromagnetic in nature, therefore it doesn't require any material medium for its propagation.

7

We know, $B = \mu_0 ni$

$\Rightarrow \dfrac{B}{B'} = \dfrac{n}{n'} \times \dfrac{i}{i'} = \dfrac{1}{(1/2)} \times \dfrac{1}{2} = 1$

$\Rightarrow B' = B$

8

0 volt

9

As we know, $r = \dfrac{mv}{qB} \Rightarrow r \propto mv$, where q and B are constant.

Since, $r_A > r_B \Rightarrow m_A v_A > m_B v_B$.

10

Current density, $J = \dfrac{i}{A} = \dfrac{i}{\pi r^2}$

$\Rightarrow \dfrac{J_1}{J_2} = \dfrac{i_1}{i_2} \times \dfrac{r_2^2}{r_1^2}$

But the wires are in series, thus they have the same current, hence $i_1 = i_2$.

$\Rightarrow \dfrac{J_1}{J_2} = \dfrac{r_2^2}{r_1^2} = 9:1$

11

If $|\vec{F_G}| = |\vec{F_e}|$, they will not experience any force.

$\Rightarrow G\dfrac{m^2}{(16 \times 10^{-2})^2} = \dfrac{1}{4\pi\varepsilon_0} \cdot \dfrac{q^2}{(16 \times 10^{-2})^2}$

$\Rightarrow \dfrac{q}{m} = \sqrt{4\pi\varepsilon_0 G}$

12

As $r \propto n^2$, $\therefore \dfrac{r_f}{r_i} = \left(\dfrac{n_f}{n_i}\right)^2$

$\Rightarrow \dfrac{21.2 \times 10^{-11}}{5.3 \times 10^{-11}} = \left(\dfrac{n}{1}\right)^2$

$\Rightarrow n^2 = 4 \Rightarrow n = 2$

13

From, $v_d = \dfrac{i}{neA} \Rightarrow i \propto v_d A$ i.e. $i \propto v_d r^2$

14

Let at any instant, plane mirror lies at a distance 'x' from object. Image will be formed behind the mirror at the same distance 'x'.
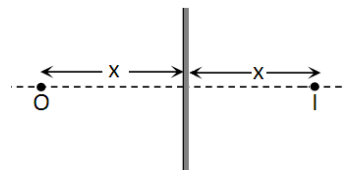
When the mirror shifts towards the object by distance 'y' the image shifts $= x + y - (x - y) = 2y$

$\therefore$ Speed of image = 2 x Speed of mirror
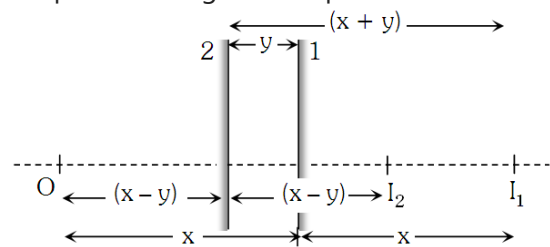
15

Diamagnetic substances are those substances in which resultant magnetic moment in an atom is zero.

A paramagnetic material tends to move from a weak magnetic field to strong magnetic field.

A magnetic material is in the paramagnetic phase above its Curie temperature.

Typical domain size of a ferromagnetic material is 1 mm.

16

As, in V-I graph, we will not get a straight line in case of liquids.

17

Here E = 13.2 keV

$$\lambda \left(\text{in } \mathring{A} \right) = \frac{hc}{E(eV)} = \frac{12400}{13.2 \times 10^3} = 0.939 \, \mathring{A} \approx 1 \, \mathring{A}$$

X-rays covers wavelengths ranging from about 10^{-8} m (10 nm) to 10^{-13} m (10^{-4} nm).

An electromagnetic radiation of energy 13.2 keV belongs to X-ray region of electromagnetic spectrum.

18

We know, Surface charge density $(\sigma) = \dfrac{\text{Charge}}{\text{Surface area}}$

$-Q + 2Q = Q$
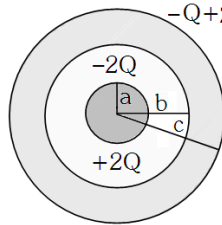
$\therefore \quad \sigma_{inner} = \dfrac{-2Q}{4\pi b^2}$ and $\sigma_{Outer} = \dfrac{Q}{4\pi c^2}$

19

$$\frac{I_{max}}{I_{min}} = \left(\frac{\sqrt{\frac{I_1}{I_2}} + 1}{\sqrt{\frac{I_1}{I_2}} - 1} \right)^2$$

Here,

$$\Rightarrow \frac{I_{max}}{I_{min}} = \left(\frac{\sqrt{\frac{9}{1}} + 1}{\sqrt{\frac{9}{1}} - 1} \right) = \frac{4}{2} = \frac{2}{1}$$

20

Length of the rod between the axis of rotation and one of the rod $= \dfrac{1}{2}$

Area swept out in one rotation $= \pi \left(\dfrac{1}{2} \right)^2 = \left(\dfrac{\pi l^2}{4} \right)$

Angular velocity $= \omega \text{ rad s}^{-1}$

Frequency of revolution $= \dfrac{\omega}{2\pi}$

Area swept out per second $= \dfrac{\pi l^2}{4}\left(\dfrac{\omega}{2\pi}\right) = \dfrac{l^2\omega}{8}$

Magnetic induction $=B$

Rate of change of magnetic flux $= \left(\dfrac{Bl^2\omega}{8}\right)$

Magnitude of induced emf $= \dfrac{Bl^2\omega}{8}$

Magnitude of induced emf between the axis and the other end is also $\left(\dfrac{Bl^2\omega}{8}\right)$. These two emfs are in opposite directions. So, the potential difference between the two ends of the rod is zero.

21

Here, $\sqrt{2}\,a = 4r$

$\Rightarrow a = \dfrac{4r}{\sqrt{2}} = \sqrt{2}\,(2r)$

$\Rightarrow a = \sqrt{2} \times 2.54 = 3.59\ \text{Å}$

22

Here, $B = \dfrac{\mu_0}{4\pi} \cdot \dfrac{2\pi(q\,v)}{r}$

$\Rightarrow B = 10^{-7} \times \dfrac{2 \times 3.14 \times (1.6 \times 10^{-19} \times 6.6 \times 10^{15})}{0.53 \times 10^{-10}}$

$\Rightarrow B = 12.5\ \text{Wb}/\text{m}^2$

23

Because specific resistance is independent of length and area.

24

The magnetic field is zero at any point on the axis of wire.

25

Wavelength, $\lambda = \dfrac{c}{v} = \dfrac{3 \times 10^8}{100}$

$\Rightarrow \lambda = 3 \times 10^6\ \text{m}$

26

Here, $W_1 = MB(\cos 0° - \cos 90°)$
$\Rightarrow W_1 = MB(1 - 0) = MB$
$W_2 = MB(\cos 0° - \cos 60°)$
$\Rightarrow W_2 = MB\left(1 - \dfrac{1}{2}\right) = \dfrac{MB}{2}$
$\therefore W_1 = 2W_2 \Rightarrow n = 2$

27

Maximum kinetic energy, $K_{max} = (|V_0|)\ eV = 2\ \text{eV}$.

28

For Balmer series, $\frac{1}{\lambda} = R\left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right]$

$\Rightarrow \frac{\lambda_{min}}{\lambda_{max}} = \frac{\left[\frac{1}{2^2} - \frac{1}{3^2}\right]}{\left[\frac{1}{2^2} - \frac{1}{\infty}\right]} = \frac{5}{9}$

29

In this case,

$B = \frac{\mu_0}{4\pi} \frac{\theta i}{r} \Rightarrow B = \frac{\mu_0}{4\pi} \times \frac{\pi}{2} \times \frac{i}{R} = \frac{\mu_0 i}{8R}$
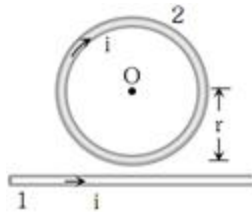
30

This is because of mutual repulsion of charges distributed on the surface of bubble.

31

Both (1) and (2)

32

Given shape is equivalent to the following diagram :

The field at O due to straight part of conductor is $B_1 = \frac{\mu_0}{4\pi} \cdot \frac{2i}{r}$.

The field at O due to circular coil is $B_2 = \frac{\mu_0}{4\pi} \cdot \frac{2\pi i}{r}$.

Both fields will act in the opposite direction, thus the total field at O.

$\Rightarrow B = B_2 - B_1 = \left(\frac{\mu_0}{4\pi}\right) \times (\pi - 1)\frac{2i}{r} \Rightarrow B = \frac{\mu_0}{4\pi} \cdot \frac{2i}{r}(\pi - 1)$

33

The position of the balls in the satellite will become as follows,
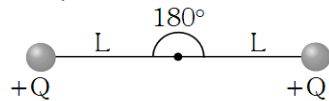
∴ Angle $\theta = 180°$ and Force $= \frac{1}{4\pi\varepsilon_0} \cdot \frac{Q^2}{(2L)^2}$

34

Semi-conductor possess covalent bonding.

35

Here, distance between object and image = 0.5 + 0.5 = 1 m
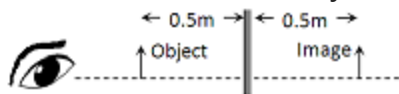
36

Rectification

37

Magnetic flux, $\phi = NBA \cos \theta$

$\Rightarrow \phi = 100 \times 0.2 \times 5 \times 10^{-4} \cos 60°$
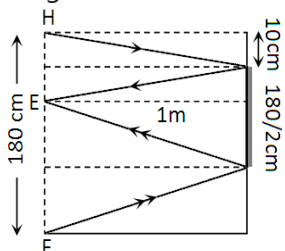
$\Rightarrow \phi = 5 \times 10^{-3}$ Wb

38

Magnetic lines of force are always closed.

39

From the following ray diagram,

Length of mirror $= \dfrac{1}{2}(10 + 170) = 90$ cm

40

Here, $V_0 = \sqrt{2} V_{rms} = 10\sqrt{2}$

41

Here resonance frequency,

$\omega = \dfrac{1}{\sqrt{LC}} = \dfrac{1}{\sqrt{8 \times 10^{-3} \times 20 \times 10^{-6}}} = 2500$ rad/s

And resonance current, $i = \dfrac{V}{R} = \dfrac{220}{44} = 5$ A

42

As we know, $P = Vi \cos \phi$ i.e. $P \propto \cos \phi$

43

The e.m.f. induces in ring and it will oppose the motion. Thus all energy dissipates due to the resistance of the ring.

44

We know, when put 1 cm apart in air, the force between Na and Cl ions $= F$. When put in water, the force between Na and Cl ions $= \dfrac{F}{K}$.

45

Here, gravitational force between electrons, $F_G = \dfrac{G(m_e)^2}{r^2}$

Electrostatics force between electrons $F_e = k.\dfrac{e^2}{r^2}$

$\therefore \dfrac{F_G}{F_e} = \dfrac{G(m_e)^2}{k.e^2}$

$\Rightarrow \dfrac{F_G}{F_e} = \dfrac{6.67 \times 10^{-11} \times (9.1 \times 10^{-31})^2}{9 \times 10^9 \times (1.6 \times 10^{-19})^2} = 2.39 \times 10^{-43}$

46

Using, $N_E = \dfrac{n(n-1)}{2}$

$\Rightarrow N_E = \dfrac{4(4-1)}{2} = 6$

47

As we know, $R = \rho \dfrac{l}{A} = \dfrac{m}{ne^2\tau} \cdot \dfrac{l}{A}$

48

Magnetic flux, $\phi = \mu_0 niA$

$\Rightarrow \phi = 4\pi \times 10^{-7} \times \dfrac{3000}{1.5} \times 2 \times \pi (2 \times 10^{-2})^2$
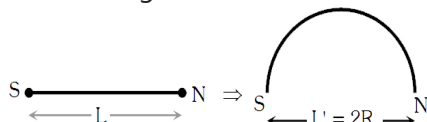
$\Rightarrow \phi = 6.31 \times 10^{-6} \, Wb$

49

EM waves carry momentum and thus can exert pressure on surfaces. They also transfer energy to the surface, therefore $P \neq 0$ and $E \neq 0$.

50

On bending a rod, it's pole strength remains same while its magnetic moment changes.

$\therefore$ New magnetic moment, $M' = m(2R) = m\left(\dfrac{2L}{\pi}\right) = \dfrac{2M}{\pi}$

Chemistry - Solutions

1

Aldehydes and ketones.

2

Freezing point is the temperature at which the liquid as well as the solid form of the same substance are in equilibrium and thus have the same vapour pressure. Because of lower vapour pressure of the solution, solid form of a solution separates out at a lower temperature. The decrease is termed as depression in freezing point. When solid is the solute, it is solvent that freezes. Thus, water will be separated out first.
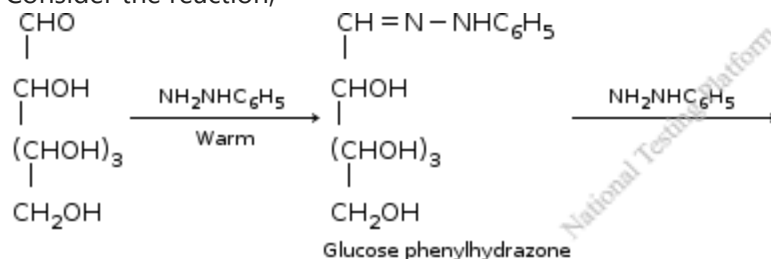
3

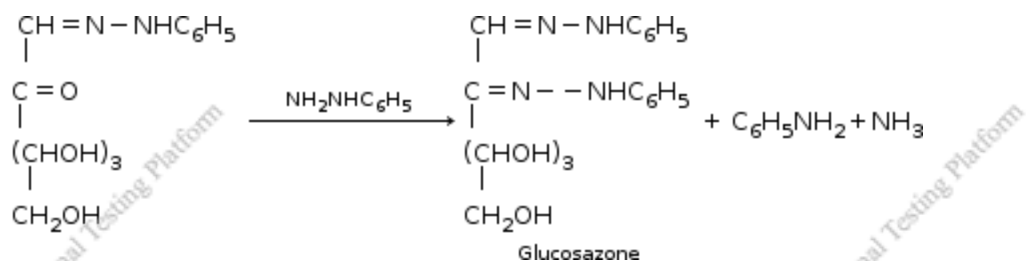There should not be any chemical interaction between the gas and liquid.

4

Catalyst decreases the energy of activation.
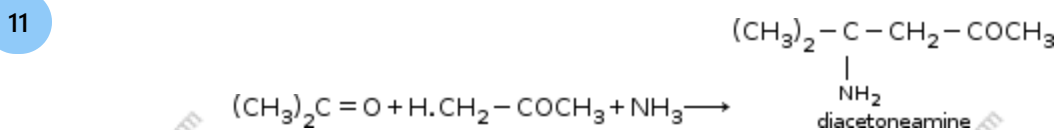
5

Consider the reaction,

$$
\begin{array}{l}
\underset{|}{CH=N-NHC_6H_5} \\
\underset{|}{C=O} \\
\underset{|}{(CHOH)_3} \\
CH_2OH
\end{array}
\xrightarrow{NH_2NHC_6H_5}
\begin{array}{l}
\underset{|}{CH=N-NHC_6H_5} \\
\underset{|}{C=N--NHC_6H_5} \\
\underset{|}{(CHOH)_3} \\
CH_2OH \\
\text{Glucosazone}
\end{array}
+ C_6H_5NH_2 + NH_3
$$

6

With $\beta-1, 4-$ linkages, cellulose are linear polymers of $\beta-$glucose molecules.

7

We know, wax is a molecular solid.

8

All the above

9

Allyl isocyanide i.e. $CH_2=CH-CH_2-N\overset{\rightarrow}{=}C$

10

Wax are long chain, which belongs to ester.

11

$$(CH_3)_2C=O + H.CH_2-COCH_3 + NH_3 \longrightarrow \underset{\underset{\text{diacetoneamine}}{\underset{NH_2}{|}}}{(CH_3)_2-C-CH_2-COCH_3}$$

12

All of these

13

5

14

Consider the reactions,
$$Ag_2S + 4NaCN \rightleftharpoons \underset{\text{Sodium dicyno argentate}}{2Na\left[Ag(CN)_2\right] + Na_2S}$$
$$2Na[Ag(CN)_2] + Zn \rightarrow \underset{\text{Sodium tetracyno zincate (ppt)}}{Na_2[Zn(CN)_4] + 2Ag\downarrow}$$

15

Step growth polymerization involves condensation reaction between two difunctional monomer to form dimer which in turn, produce tetramer and so on with the loss of simple molecules like H_2O, NH_3, HCl etc.

16

$C_6H_5CHCl_2$

17

Among carbonyl compounds, reactivity for Nucleophilic Addition decreases with increase in alkyl groups because alkyl (+I effect) decrease the positive character on C- atom. Hence, the correct order of reactivity is $HCHO > CH_3CHO > C_6H_5CHO$.

18

$$
\underset{|}{CHOHCOOH}
$$
CHOHCOOH is tartaric acid and its potassium salt is known as tartar emetic.

19

Isopropyl chloride i.e. $CH_3 - \overset{2°}{\underset{Cl}{CH}} - CH_3$, here chlorine atom is attached to $2°$ carbon atom.

20

Hard and brittle.

21

Both Fe^{+2} and Ni^{2+} give green hydrated ion.

22

Rate of reaction is given by $= \dfrac{dx}{dt} = \left[\dfrac{0.2 - 0.1}{10} \right] = \dfrac{0.1}{10}$

$\Rightarrow \dfrac{dx}{dt} = 0.01 \ mol \ dm^{-3} \, min^{-1}$

23

An ester.

24

Free molecules

25

A strong electrolyte in aqueous solution exhibit:

hydration and almost completely dissociated

26

Dissolution of a gas in a liquid is an exothermic process.
Gas + liquid solvent $\rightleftharpoons$ solution + heat
Therefore reaction is favoured at low temperature.

27

Solubility of NaCl in it is more than H_2O.

28

Rate of the reaction is dependent upon the concentration of the reactant.

29

Henry's law

30

$CH_3 - N = C = O$

31

Temperature coefficient, $\dfrac{K_{35°C}}{K_{25°C}} = \dfrac{K_{308\,k}}{K_{298\,k}} = 2$ and 3 for most of the chemical reactions.

32

Williamson's synthesis.

33

3-chliro-2,2,3-trimethyl pentane

34

Calcium is produced, once molten anhydrous calcium chloride is electrolyzed.

35

Water is reduced at the cathode while oxidized at the anode instead of Na^+ and SO_4^{2-}.

At cathode : $2\,H_2O + 2\,e^- \rightarrow H_2 + 2\,OH^-$

At anode : $H_2O \rightarrow 2\,H^+ + \dfrac{1}{2}O_2 + 2\,e^-$

36

Thermosetting.

37

All of these

38

We know, $Ti_{22} = 3d^2\,4s^2$; $Ti^{2+} = 3d^2$
$V_{23} = 3d^3\,4s^2$; $V^{3+} = 3d^2$
$Cr_{24} = 3d^4\,4s^2$; $Cr^{4+} = 3d^2$
$Mn_{25} = 3d^5\,4s^2$; $Mn^{5+} = 3d^2$

39

1 mole of electrons = 1 F
$Mg^{2+} + 2e^- \rightarrow Mg$;
So, 2 moles of electrons = 2F.

40

$NaCl \rightleftharpoons Na^+ + Cl^-$
Free ions are responsible for electrical conduction of molten sodium chloride.

41

Because of C-Mg bond.

42

General formula for alum is $M_2SO_4 \cdot R_2(SO_4)_3 \cdot 24H_2O$.
M = mono valent cation $(K^+, Na^+ ....)$
R = Trivalent cation (Al^{+3}, Fe^{+3})
Thus, $K_2SO_4Al_2(SO_4)_2 \cdot 24H_2O$ represents an alum.

43

The rate of reaction nearly doubles for 10 K rise in temperature.
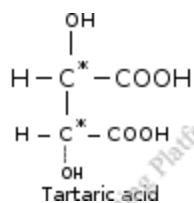
44

As lanthanide contraction takes place.

45

Trichloroacetaldehyde

46

Tartaric acid contains the chiral carbon (*) atom. Thus, it is optically active.

OH
|
H – C* – COOH
|
H – C* – COOH
|
OH
Tartaric acid

47

Butanone.

48

Primary valency can be ionized.

49

Given, $R = K[RCl]$

If [RCl] = 1/2, then rate = R/2.

50

On passing 1 faraday of electricity, one gram equivalent of the substance gets deposited at electrode.

Botany - Solutions

1

Nucellus represents the megasporangium proper of an ovule. In this megasporogenesis and development of female gametophyte (embryo sac) takes place.

2

Totipotency

3

In some plants the vegetative propagation is carried out by the production of epiphyllous buds on leaves. Such leaves are called as reproductive leaves. e.g. Bryophyllum.

4

In this cross YYRR is responsible for dominant yellow and round seeds and yyrr for recessive green and wrinkled seeds. Hence, in F_1 generation yellow and round seeds are formed.

5

Watson and Crick

6

Microsporangial wall has four types of layers-epidermis (common anther covering), endothecium, 1-3 middle layers and tapetum. In a typical anther the endothecial cells develop fibrous thickening of α-cellulose on the inner and radial walls. Due to the presence of fibrous thickenings, the endothecium is also known as fibrous layer. The mature anther dries up. The sterile strip present between the two pollen sacs of each anther lobe disintegrates to form a single cavity. With the loss of water the differentially thickened cells of endothecium contract from their outer thin walls. The latter become concave. It brings their outer radial walls nearer. As a result the endothecium shortens and ruptures the anther lobe wall in the region of stomium.

7

All cells in ovule (integument, nucellus, funicle, hilum) are diploid (2x) whereas embryo sac (synergids, antipodal cells, egg cell) is haploid.

8 Right-handed

9 Strobilanthus kunthiana (Neelakuranji) flower once in 12 years, its juvenile phase is very long. The last time this plant flowered was during September - October 2006. It is found in hilly areas of Kerala, Karnataka and Tamil Nadu as well as attract a large number of tourists.

10 The rate of resynthesis of organic matter by the consumers is called as secondary productivity. It depends upon the loss while transferring energy containing organic matter from the previous trophic level and the consumption due to respiration and predation. Therefore, net productivity decreases with each trophic level.

11 Decomposition is an oxygen-requiring process. Decomposition rate is controlled by chemical composition of detritus and climatic factors. In a specific climate condition, decomposition rate is slower if detritus is rich in lignin and chitin, and quicker, if detritus is rich in nitrogen and water-soluble substances like sugars.

12 Factors representing the alternate or same form of a character are known as alleles. In heterozygous individuals or hybrids, a character is represented by two contrasting alleles. Out of the two contrasting alleles, only one is able to express its effect in the individual. It is known as dominant allele. The other allele which does not show its effect in the heterozygous individual is known as or recessive allele, e.g., in case of hybrid tall pea plants (Tt). 'T' is dominant alleles whereas 't' is recessive allele.

13 Two strands of DNA molecules run in opposite or antiparallel direction due to the presence of hydrogen bond because two base i.e. one in each chain of DNA molecule, joined together by hydrogen bonds.

14 Genes which code for a pair of contrasting characters are termed as alleles or allelomorphs. Out of the two alleles representing the alternate traits of a character (e.g. T and t for height), one is dominant (T for tallness) and expresses itself in the hybrid or F_1 generation. The other allele (t for dwarfness) is recessive and does not show its effect in the presence of het dominant allele.

15 Grafting is horticultural process of vegetative plant propagation in which a segment of plant to be propagated is grafted or joined to another plant with the help of cambium. It has a shoot called scion and a root known as stock. It is done only in dicot plant and not in monocot because in monocots cambium is absent as the whole procambium is consumed in the formation of vascular tissues.

16 Pollen grains are shed at 2 or 3-celled stage. In majority of angiosperms, the pollen grains are shed from the anther at the bicelled (2-celled) stage but in some genera (both the monocots

and dicots), the generative cell divides prior to the dehiscence of the anther and pollen grain is shed at 3-celled stage. Approx. 70% species shed their pollen at the 2-celled stage and 30% at 3-celled stage.

17 Reverse transcriptase enzyme present in retroviruses converts single stranded RNA into a double stranded viral DNA.

18 The protoplast of the male gametophyte divides mitotically to produce two unequal cells __a small generative cell and a large vegetative cell. The generative cell divides later into two non-motile male gametes (or sperms). So, the male gametophyte in angiosperms produces two sperms and a vegetative cell and the vegetative cell, later on, grows to produce pollen tube.

19 The characters acquired by an individual through use and disuse of organs and through environmental influences are transmitted by heredity to the next generation.

20 Primary productivity refere to the rate of biomass production per unit area over a time period by plants during photosynthesis and is expressed as weight $\left(gm^{-2}yr^{-1}\right)$ or energy $\left(Kcal\,m^{-2}yr^{-1}\right)$. Primary productivity depends on the photosynthetic efficiency of the plants gown in an area and thus on the plant species.

21 The yellow colour in pea is recessive character of pod colour.

22 Destruction of natural habitat responsible for the most serious threat to the biodiversity. Over-population urbanization and industrialisation lead to the destruction or fragmentation of natural habitats to fulfill the requirement of additional land. Loss of habitat results in annihilation of plants, microorganisms and forcing out of animals which in alien lands die out after some time. Fragmentation of habitats results in disruption of complex interactions amongst species, destruction of species in the cleared regions, annihilation of species restricted to deeper undisturbed parts of forests and decreased biodiversity in the habitat fragments.

23 Parthenogenesis

24 Each test cross is a back cross however each back cross is not a test cross.

25 heterosis

26 Tikka disease of groundnut is a world- wide disease caused by a pathogenic fungus, Cercospora personata (Deuteromycetes). The disease occurs on all above ground plant parts, more severely on the leaves. Circular, necrotic, dark brown or blankish leaf spots develop on the plant parts. The lesions coalesce is infection develops and severely spotted leaves shed prematurely.

27 A + G/T + C ratio is constant in DNAs of different species however it is variable in organism of different genus.

28 Egg in female gametophyte is accompanied by synergids. Fully developed embryo sac of angiosperm is 8 nucleated and 7 celled structure i.e., egg apparatus at micropylar end is having 3 cells (2 synergids +1 egg cell), 3 antipodal cells at chalazal end and a central cell having two polar nuclei at centre.

29 Amoebic dysentery or amoebiasis is caused by E. histolytica.

30 Beta diversity (β-index diversity between community diversity) appears in a range of communities because of replacement of species with the change of community/habitat because of presence of different micro-habitats, niches and difference in environmental conditions.

31 vulnerable species

32 IUCN (International Union of Conservation of Nature and Natural Resources) is now called World Conservation Union (WCU). It has its headquarters at Morges, Switzerland. It publishes and maintain a red data book or red list which is a catalogue of taxa facing risk of extinction. Red data book or red list was initiated in 1963. The Red list of year 2000 has made assessment of 18,000 species.

33 More stable forms of eukaryotic mRNA

34 A successful breeding for diseases resistance depends mainly on three factors: a good source of resistance planned hybridization and a dependable disease test respectively. In disease test, all the plants are grown under conditions in which a susceptible plant is expected to develop disease. So, disease resistant crop plants should be produced to avoid infection.

35 Endangered species

36 All of the above

37 Fig. 1 shows longitudinal binary fission in Euglena, ii fig. is a transverse binary fission in Paramecium and iii shows multiple fission in uncysted Amoeba.

38 The propagation through vegetative multiplication is used to maintain the genetic traits of a given plant and it gives rise to genetically uniform population or clone. In case of plants propagated through seeds, variations creep in because of chance segregation and recombination during fertilisation.

39 Monocarpic plants eg. bamboo are the plants that flower only once in their life and after flowering, they produce fruits and die. All annual (e.g. wheat, rice) and biennial (e.g. carrot, radish) plants and a few perennial plants are monocarpic. A few monocarpic plants exhibit unusual flowering phenomenon e.g. certain bamboo species (Bambusa tulda) flower only once in their life time, generally after 50-100 years, produce large number of fruits and die.

40 9

41 Pyramid of energy shows the rate of energy flow or productivity at successive trophic levels. The number and weight of organisms at any level do not depends on the amount of fixed energy present at any one time in the level just below but depend on the rate at which food is being produced. In shape it is always upright, as in most of the cases there is always a gradual decrease in the energy content at successive trophic levels from the producers to various consumers.

42 In angiosperms, the female gametophyte is known as embryo sac. It is formed by three micropylar cells collectively known as egg apparatus (one middle cell called egg or oosphere and two nuclei are called synergids, cooperative cells or help cells), three chalazal cells antipodals and large central cell which has 2 polar nuclei and it contain 8 nuclei but 7 cells -3 micropylar, one central and 3 chalazal i.e., (3+2+3).

43 Habitats of a large variety of organisms would be destroyed as well the food chains would be disturbed leading to population and ecological imbalance.

44 Food chain

45 B and D alone are correct

46 Vulnerable species refer to those species whose present population is sufficient but is under-going depletion because of some factor, or factors so that, it is facing risk of extinction in medium term future. Out of the total threatened species, 34-51% are vulnerable (34% mammals, 36% birds, 43% reptiles, 48% amphibians and 51% angiosperms).

47 Meristem is a localized group of cells, that are actively dividing and undifferentiated but ultimately giving rise to permanent tissue. Although the plant is infected with a virus, yet the meristem is free of virus. So, meristem can be removed and grown in vitro to obtain virus free plants. Cultivation of axillary or apical shoot meristems is called meristem culture. The apical or axillary meristems are generally free from virus.

48 The development and usage of several high yield varieties of wheat and rice, better irrigation facilities, fertilizer application, weed, pest and pathogen control and better agricultural

management in 1960s, increased the yields per unit area. This phase is often known as green revolution. In India, it was witnessed during mid 1960s.

49   25.0 ppm

50   Colony

Zoology - Solutions

1   Antibodies are member of immuno globulin superfamily of glycoproteins secreted by mature vertebrate B cells, binding selectively to epitopes of antigens and clumping them (agglutination) prior to phagocytic engulfment. Each antibody contains two heavy chains (H-chains) and two light chains (L-chains) i.e., four-polypeptides.

2   Spirulina is a rich source of proteins as well as vitamin B-complex.

3   Minerals and vitamins

4   Treponema pallidum causes syphilis which is a sexually transmitted disease. Chancre appears on the genitals and swelling of lymph nodes occur, in the first stage of this disease.

5   Gonadotropin

6   The first antibiotioc Penicillin is discovered by Alexander Fleming in 1928. He observed that fungus Penicillium notatum or its extract could inhibit the growth of bacterium Staphylococcus aureus. However, Ernst Chain and Howard Florey established the potential of penicillin as an effective antibiotic. Penicillium antibiotic was extensively used to treat American soldiers wounded in the World War II. These scientist were awarded the Nobel prize in 1945, for this discovery.

7   Theory of cosmozoa was developed by Richter in 1870 and supported by Thomson, Helmholtz etc.

8   Treponema pallidum is a causetive agent of Syphilis. It is a sexually transmitted disease (STD) which is transferred through sexual intercourse with infected person. Hemophilia is a X-linked genetic disorder of blood. It is not transmitted sexually. Genital herpes is an autosomal hereditary disorder. The chances of a 5 year boy contacting a STD are very little since, he is unlikely t have sex at this age.

9   From a diploid, primary spermatocyte, four haploid spermatozoa are produced through the process of meiosis. While, from a diploid primary oocyte, only one haploid ovum is formed, rest

are polar bodies. So, the ratio between male gametes and female gametes produced from respective primary sex cells is 4 : 1.

10

Neisseria gonorrhoeae bacteria causes gonorrhoea. It spreads through sexual contact, common toilets and under-clothes. Both male and female genitals are affected by gonorrhoea. The bacterium lives in genital tubes, produces pus-containing discharge, pain around genitalia and burning sensation during urination. It damages the eyes of babies born of infected mothers.

11

During secretory phaseof menstrual cycle, progesterone is secreted in large amount by the corpus luteum. Progesterone causes growth of endometrial glands or secretory development of endometrium. So, further increases in thickness (5 to 6 mm) of endometrium takes place.

12

Plasmid is used in biotechnology or genetic engineering for making the multiple copies of desired genes (DNA segment) as it has the capacity to bind with eukaryotic DNA.

13

Plants are grown in controlled environment

14

Recognition sites

15

Fallopian tube (oviduct, uterine tube) is either of a pair of tubes that conduct ova (egg cells) from the ovary to the uterus and the ovarian end opens into the abdominal cavity via a funnel-shaped structure with finger like projection (fimbriae) surrounding the opening. Movements of the fimbriae at ovulation assist in directing the ovum to the Fallopian tube.

16

Agrobacterium tumefaciens

17

Vagina serves as birth canal during parturition.

18

Bacterial multiplication is reduced

19

Ecology

20

Surgical (sterilization) methods of contraception prevent pregnancy by blocking gamete transport and hence their fertilization. Surgical methods in female is called vasectomy and that in the male is tubectomy. Both methods are very effective but their reversibility is very poor. They are generally regarded as terminal methods to prevent any more pregnancies.

21

Louis Pasteur disproved theory of spontaneous generation through Swan Neck Flask experiment.

22

The species is the basic unit of classification. Only the species has a real existence, other units of classification are man made artificial groups.

23 Ecology is the branch of biology which deals with the inter relationships amongst organisms and interactions between organisms and their environment.

24 Oparin, in 1924, used the term coacervate to a colloidal mixture of large proteins, polysaccharides and water. Oparin believed coacervates as pre-cells.

25 Gonorrhea is caused by Neisseria gonorrhea. Chancroid is caused by Haemophilus ducreyl. Syphilis is caused by Treponema pallidum. While Giardiasis and Trichomoniasis are protozoan diseases.

26 Yeast

27 Both (A) and (B)

28 Oxygen gas was absent during the formation of earth.

29 Progesterone hormone level reaches peak during luteal phase of menstrual cycle. Luteal phase/secretory phase usually includes days 15-28 in a 28 days cycle. After ovulation, LH stimulates the development of the corpus luteum and the corpus luteum then secretes increasing quantities of progesterone and smaller amount of estrogens. The progesterone prepares the endometrium for receiving the blastocyst and its implantation.

30 Intraspecific competition trigger the evolution. Variations arise naturally in a growing population because of crossing over etc. Organisms with variations better suited to their environment are favoured by natural selection, while less fitted ones are eliminated. Eventually this continued process of natural selection leads to evolution. Interspecific struggle also plays a role in evolution but intraspecific struggle is more intense and prominent one.
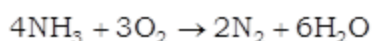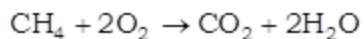
31

32 Treponema pallidum

33 Thermus aquaticus

34 In the early earth, ammonia and methane reacted with O_2 to form H_2O and CO_2.
$$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$$
$$4NH_3 + 3O_2 \rightarrow 2N_2 + 6H_2O$$

35

Microorganisms are used for commercial and industrial production of some chemicals such as organic acids, alcohols and enzymes. Examples of acid producers are Aspergillus niger (a fungus) of citric acid, Acetobacter aceti(a bacterium) of acetic acid; Clostridium butylicum (a bacterium) of butyric acid and Lactobacillus (a bacterium) of lactic acid.

36

All of the above

37

Phagocytes refer to the cells capable of engulf and breakdown foreign particles, cell debris and disease producing microorganisms. Neutrophils and monocytes (type of white blood cells) are the most active phagocytic cells.

38

Neisseria gonorrhoea

39

Ramphotyphlops braminus

40

Gene gun, microinjection method and use of disarmed pathogen vectors are the methods of transfer of DNA or genes into the host cell.
Polymerase chain reaction (PCR) refers to DNA replication in vitro. It is a method that results in selective amplification of a specific region of a DNA molecule.

41

Bone marrow cells

42

Corpus luteum (yellow body) is a temporary endocrine structure in female mammals which secretes significant amount of progesterone and moderate amount of hormones estradiol and relaxin. Human chorionic gonadotropin (hCG) hormone maintains corpus luteum to secrete progesterone during pregnancy.

43

Because of the presence of zymase enzyme, yeast species are used in alcoholic fermentation. It was known that the yeast extract contained an enzyme zymase, which is nondialyzable and a coenzyme which is dialyzable. It was established later that extracellular enzyme zymase, secreted by yeast cells, carry out the process of fermentation.

44

Polymerase chain reaction is a technique to amplify a selected DNA sequence by a million fold or more. In this procedure, the DNA containing the sequence to be amplified and denatured by heating. This denatured DNA is then annealed to the synthetic oligonucleotide primers then Taq polymerase is used to replicate the DNA segment between the sites complementary to oligonucleotide primer and extend it.

45

Mast cells

46

In order to induce the bacterial uptake of plasmids the bacteria are made competent by first treating with calcium chloride. Calcium salts increase the efficiency so that DNA enters the bacterium through pores in its cell wall. Recombinant DNA can then be forced into such cells by incubating cells in the recombinant DNA on ice, followed by placing them briefly at high temperature i.e. $42°$ C (heat shock) and then putting them back on ice.

47

In 1953 miller and Urey provided experimental proof to chemical evolution

48

Anaximander€™s theory of spontaneous generation was supported by Aristotle, Empedocles, Van Helmont, N. Haeckel, Needham etc.

49

The purpose is for maintaining the scrotal temperature lower than the internal body temperature. The testes are situated outside the abdominal cavity within a pouch called scrotum. The scrotum helps in maintaining the low temperature of the testes ($2-2.5°C$ lower than the normal internal body temperature) necessary for spermatogenesis.

50

Uniform interbreeding population or group of individuals that freely interbreed among themselves, constitute a species.