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<th>PHYSICS</th>
<th>BIOLOGY</th>
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<td>60 3 75 2 90 2</td>
<td>105 1 120 3 135 1 150 1 165 3 180 4</td>
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1. Which of the following amine will give the carbylamine test?

- (a) \( \text{NH}_2 \)
- (b) \( \text{NHCH}_3 \)
- (c) \( \text{N(CH}_3)_2 \)
- (d) \( \text{NHC}_2\text{H}_5 \)

2. Match the following and identify the correct option.

- (a) \( \text{CO(g)} + \text{H}_2\text{(g)} \)
- (b) \( \text{Mg(HCO}_3)_2 + \text{Ca(HCO}_3\text{)}_2 \)
- (c) \( \text{B}_2\text{H}_6 \)
- (d) \( \text{H}_2\text{O}_2 \)

   - (i) An electron deficient hydride
   - (ii) Temporary hardness of water
   - (iii) Synthesis gas
   - (iv) Non-planar structure

3. The freezing point depression constant \( K_f \) of benzene is \( 5.12 \text{ K kg mol}^{-1} \). The freezing point depression for the solution of molality \( 0.078 \text{ m} \) containing a non-electrolyte solute in benzene is (rounded off upto two decimal places):

   - (1) 0.20 K
   - (2) 0.40 K
   - (3) 0.80 K
   - (4) 0.60 K

4. An alkene on ozonolysis gives methanal as one of the product. Its structure is:

- (1) \( \text{CH} = \text{CH} - \text{CH}_3 \)
- (2) \( \text{CH}_2 - \text{CH} - \text{CH}_3 \)
- (3) \( \text{CH}_2 - \text{CH} = \text{CH}_2 \)
- (4) \( \text{CH}_2\text{CH}_2\text{CH}_3 \)

5. On electrolysis of dil. sulphuric acid using Platinum (Pt) electrode, the product obtained at anode will be:

- (1) Hydrogen gas
- (2) Oxygen gas
- (3) \( \text{H}_2\text{S} \) gas
- (4) \( \text{SO}_2 \) gas
Identify compound X in the following sequence of reactions:

\[
\text{CH}_3\text{Cl}_2 \xrightarrow{\text{hv}} X \xrightarrow{373 \text{ K}} \text{CHO}
\]

(1) [Diagram of benzene ring with Cl and CHO groups]

(2) [Diagram of benzene ring with Cl and Cl groups]

(3) [Diagram of benzene ring with Cl and H groups]

(4) [Diagram of benzene ring with Cl groups]

Identify the correct statement from the following:

(1) Wrought iron is impure iron with 4% carbon.

(2) Blister copper has blistered appearance due to evolution of CO₂.

(3) Vapour phase refining is carried out for Nickel by Van Arkel method.

(4) Pig iron can be moulded into a variety of shapes.

A tertiary butyl carbocation is more stable than a secondary butyl carbocation because of which of the following?

(1) -I effect of -CH₃ groups

(2) +R effect of -CH₃ groups

(3) -R effect of -CH₃ groups

(4) Hyperconjugation

Urea reacts with water to form A which will decompose to form B. B when passed through Cu²⁺ (aq), deep blue colour solution C is formed. What is the formula of C from the following?

(1) CuSO₄

(2) [Cu(NH₃)₄]²⁺

(3) Cu(OH)₂

(4) CuCO₃·Cu(OH)₂

A mixture of N₂ and Ar gases in a cylinder contains 7 g of N₂ and 8 g of Ar. If the total pressure of the mixture of the gases in the cylinder is 27 bar, the partial pressure of N₂ is:

[Use atomic masses (in g mol⁻¹): N = 14, Ar = 40]

(1) 9 bar

(2) 12 bar

(3) 15 bar

(4) 18 bar
An element has a body centered cubic (bcc) structure with a cell edge of 288 pm. The atomic radius is:

\[ a = \frac{2r}{3} \]

4. Match the following:

<table>
<thead>
<tr>
<th>Oxide</th>
<th>Nature</th>
</tr>
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<tbody>
<tr>
<td>CO</td>
<td>Basic</td>
</tr>
<tr>
<td>BaO</td>
<td>Neutral</td>
</tr>
<tr>
<td>Al₂O₃</td>
<td>Acidic</td>
</tr>
<tr>
<td>Cl₂O₇</td>
<td>Amphoteric</td>
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</tbody>
</table>

Which of the following is correct option?

(a) (b) (c) (d)

Which of the following is not correct about carbon monoxide?

1. It forms carboxyhaemoglobin.
2. It reduces oxygen carrying ability of blood.
3. The carboxyhaemoglobin (haemoglobin bound to CO) is less stable than oxyhaemoglobin.
4. It is produced due to incomplete combustion.

Which of the following set of molecules will have zero dipole moment?

1. Ammonia, beryllium difluoride, water, 1,4-dichlorobenzene
2. Boron trifluoride, hydrogen fluoride, carbon dioxide, 1,3-dichlorobenzene
3. Nitrogen trifluoride, beryllium difluoride, water, 1,3-dichlorobenzene
4. Boron trifluoride, beryllium difluoride, carbon dioxide, 1,4-dichlorobenzene

Which of the following is the correct order of increasing field strength of ligands to form coordination compounds?

1. SCN⁻ < F⁻ < C₂O₄²⁻ < CN⁻
2. SCN⁻ < F⁻ < CN⁻ < C₂O₄²⁻
3. F⁻ < SCN⁻ < C₂O₄²⁻ < CN⁻
4. CN⁻ < C₂O₄²⁻ < SCN⁻ < F⁻

What is the change in oxidation number of carbon in the following reaction?

\[ CH₄(g) + 4Cl₂(g) \rightarrow CCl₄(l) + 4HCl(g) \]

1. +4 to +4
2. 0 to +4
3. -4 to +4
4. 0 to -4

The rate constant for a first order reaction is \(4.606 \times 10^{-3} \text{ s}^{-1}\). The time required to reduce 2.0 g of the reactant to 0.2 g is:

1. 100 s
2. 200 s
3. 500 s
4. 1000 s

Reaction between acetone and methylmagnesium chloride followed by hydrolysis will give:

1. Isopropyl alcohol
2. Sec. butyl alcohol
3. Tert. butyl alcohol
4. Isobutyl alcohol

Which property of colloidal solution is useful in determining Measuring Zeta potential?

1. Viscosity
2. Solubility
3. Stability of the colloidal particles
4. Size of the colloidal particles
Reaction between benzaldehyde and E2

1. Reaction between benzaldehyde and E2

5. Pennation reaction of 2-Bromo-pentane to form pent-2-ene in presence of dilu NaOH is Aldol condensation known as 21. Elimination

(a) Cross Cannizzaro's reaction
(b) Cross Aldol condensation
(c) Which of the following oxoacid of sulphur has -0-0-linkage?
(d) Dehydrohalogenation reaction

Follow Zaitsev rule

(d) Dehydration reaction

The correct option for free expansion of an ideal gas under adiabatic conditions: 27. HCl was passed through a solution of CaCl₂, MgCl₂, and NaCl. Which of the following compound(s) crystallise?

(a) Both MgCl₂ and CaCl₂
(b) Only NaCl
(c) Only MgCl₂
(d) Only CaCl₂

The oxidation states of chromium in CrO₃ and Cr₂O₇²⁻ are not the same.

Identify the incorrect statement. Anisole on cleavage with HI gives:

(a) Cr₂⁺ is a stronger reducing agent than Cr⁺
(b) Cr⁺ is a stronger reducing agent than Cr₂⁺
(c) Cr⁺ is a stronger reducing agent than Cr⁺
(d) Cr₂⁺ is a stronger reducing agent than Cr⁺

The transition metals and their compounds are known for their catalytic activity due to their ability to adopt multiple oxidation states and to form complexes when small atoms like H, C or N are trapped inside the crystal lattices of metals.

The oxidation states of chromium in CrO₃ are not the same.

Identify the incorrect statement. Anisole on cleavage with HI gives:

(a) Cr₂⁺ is a stronger reducing agent than Cr⁺
(b) Cr⁺ is a stronger reducing agent than Cr₂⁺
(c) Cr⁺ is a stronger reducing agent than Cr⁺
(d) Cr₂⁺ is a stronger reducing agent than Cr⁺
Identify the correct statements from the following:

(a) CO$_2$(g) is used as refrigerant for ice-cream and frozen food.
(b) The structure of C$_{60}$ contains twelve six carbon rings and twenty five carbon rings.
(c) ZSM-5, a type of zeolite, is used to convert alcohols into gasoline.
(d) CO is colorless and odorless gas.

(1) (a), (b) and (c) only
(2) (a) and (c) only
(3) (b) and (c) only
(4) (c) and (d) only

33. An increase in the concentration of the reactants of a reaction leads to change in:
   (1) activation energy
   (2) heat of reaction
   (3) threshold energy
   (4) collision frequency

34. The number of Faradays($F$) required to produce 20 g of calcium from molten CaCl$_2$ (Atomic mass of Ca = 40 g mol$^{-1}$) is:
   (1) 1
   (2) 2
   (3) 3
   (4) 4

35. The mixture which shows positive deviation from Raoult’s law is:
   (1) Ethanol + Acetone
   (2) Benzene + Toluene
   (3) Acetone + Chloroform
   (4) Chloroethane + Bromoethane

36. Hydrolysis of sucrose is given by the following reaction.

   Sucrose + H$_2$O $\rightleftharpoons$ Glucose + Fructose

   If the equilibrium constant ($K_e$) is $2 \times 10^{13}$ at 300 K, the value of $\Delta_r G^\circ$ at the same temperature will be:
   (1) $-8.314$ J mol$^{-1}$K$^{-1} \times 300$ K $\times \ln(2 \times 10^{13})$
   (2) $8.314$ J mol$^{-1}$K$^{-1} \times 300$ K $\times \ln(2 \times 10^{13})$
   (3) $8.314$ J mol$^{-1}$K$^{-1} \times 300$ K $\times \ln(3 \times 10^{13})$
   (4) $-8.314$ J mol$^{-1}$K$^{-1} \times 300$ K $\times \ln(4 \times 10^{13})$

Which of the following alkanes cannot be made in good yield by Wurtz reaction?

(1) n-Hexane
(2) 2,3-Dimethylbutane
(3) n-Heptane
(4) n-Butane
The calculated spin only magnetic moment of Cr $^{2+}$ ion is:

1. 3.87 BM
2. 4.90 BM
3. 5.92 BM
4. 2.84 BM

Which of the following is a natural polymer?
1. cis-1,4-polyisoprene
2. poly (Butadiene-styrene)
3. polybutadiene
4. poly (Butadiene-acrylonitrile)

Which of the following is a basic amino acid?
1. Serine
2. Alanine
3. Tyrosine
4. Lysine

Which of the following is a cationic detergent?
1. Sodium lauryl sulphate
2. Sodium stearate
3. Cetyltrimethyl ammonium bromide
4. Sodium dodecylbenzene sulphonate

Find out the solubility of Ni(OH)$_2$ in 0.1 M NaOH. Given that the ionic product of Ni(OH)$_2$ is $2 \times 10^{-15}$.

1. $2 \times 10^{-13}$ M
2. $2 \times 10^{-8}$ M
3. $1 \times 10^{-13}$ M
4. $1 \times 10^{-8}$ M

Identify a molecule which does not exist.
1. He$_2$
2. Li$_2$
3. C$_2$
4. O$_2$

The following metal ion activates many enzymes, participates in the oxidation of glucose to produce ATP and with Na, is responsible for the transmission of nerve signals.

1. Iron
2. Copper
3. Calcium
4. Potassium

The number of protons, neutrons and electrons in $^{175}_7$Lu, respectively, are:

1. 71, 104 and 71
2. 104, 71 and 71
3. 71, 71 and 104
4. 175, 104 and 71

Light with an average flux of 20 W/cm$^2$ falls on a non-reflecting surface at normal incidence having surface area 20 cm$^2$. The energy received by the surface during time span of 1 minute is:

1. $10 \times 10^3$ J
2. $12 \times 10^3$ J
3. $24 \times 10^3$ J
4. $48 \times 10^3$ J

For transistor action, which of the following statements is correct?

1. Base, emitter and collector regions should have same doping concentrations.
2. Base, emitter and collector regions should have same size.
3. Both emitter junction as well as the collector junction are forward biased.
4. The base region must be very thin and lightly doped.
48. Which of the following graph represents the variation of resistivity ($\rho$) with temperature ($T$) for copper?

\[\text{(1)} \quad \rho \propto T \]

\[\text{(2)} \quad \rho \propto \frac{1}{T} \]

\[\text{(3)} \quad \rho \propto T^2 \]

\[\text{(4)} \quad \rho \propto T \]

49. In a certain region of space with volume 0.2 m$^3$, the electric potential is found to be 5 V throughout. The magnitude of electric field in this region is:

(1) zero
(2) 0.5 N/C
(3) 1 N/C
(4) 5 N/C

50. For the logic circuit shown, the truth table is:

\begin{tabular}{cccc}
A & B & Y \\
0 & 0 & 0 \\
0 & 1 & 0 \\
1 & 0 & 1 \\
1 & 1 & 1 \\
\end{tabular}

\begin{tabular}{cccc}
A & B & Y \\
0 & 0 & 0 \\
0 & 1 & 1 \\
1 & 0 & 1 \\
1 & 1 & 1 \\
\end{tabular}

\begin{tabular}{cccc}
A & B & Y \\
0 & 0 & 1 \\
0 & 1 & 1 \\
1 & 0 & 1 \\
1 & 1 & 0 \\
\end{tabular}

\begin{tabular}{cccc}
A & B & Y \\
0 & 0 & 1 \\
0 & 1 & 0 \\
1 & 0 & 0 \\
1 & 1 & 0 \\
\end{tabular}

51. A 40 $\mu$F capacitor is connected to a 200 V, 50 Hz ac supply. The rms value of the current in the circuit is, nearly:

(1) 1.7 A
(2) 2.05 A
(3) 2.5 A
(4) 25.1 A

52. A cylinder contains hydrogen gas at pressure of 249 kPa and temperature 27°C. Its density is: $\text{\(R=8.3 J \text{ mol}^{-1} \text{ K}^{-1}\)}$

(1) 0.5 kg/m$^3$
(2) 0.2 kg/m$^3$
(3) 0.1 kg/m$^3$
(4) 0.02 kg/m$^3$
54. Taking into account of the significant figures, what is the value of 9.99 m - 0.0099 m?

(1) 9.9801 m  
(2) 9.98 m  
(3) 9.980 m  
(4) 9.9 m

55. The mean free path for a gas, with molecular diameter d and number density n can be expressed as:

(1) \( \frac{1}{\sqrt{2} \pi \alpha d} \)  
(2) \( \frac{1}{\sqrt{2} \pi \alpha d^2} \)  
(3) \( \frac{1}{\sqrt{2} \pi \alpha^2 d^2} \)  
(4) \( \frac{1}{\sqrt{2} \pi \alpha^2 d} \)

56. The solids which have the negative temperature coefficient of resistance are:

(1) metals  
(2) insulators only  
(3) semiconductors only  
(4) insulators and semiconductors

57. Light of frequency 1.5 times the threshold frequency is incident on a photosensitive material. What will be the photoelectric current if the frequency is halved and intensity is doubled?

(1) doubled  
(2) four times  
(3) one-fourth  
(4) zero

58. An iron rod of susceptibility 599 is subjected to a magnetising field of 1200 A m\(^{-1}\). The permeability of the material of the rod is:

(1) \( 2.4 \times 10^{-7} \text{T m A}^{-1} \)  
(2) \( 2.4 \times 10^{-4} \text{T m A}^{-1} \)  
(3) \( 8.0 \times 10^{-5} \text{T m A}^{-1} \)  
(4) \( 2.4 \times 10^{-7} \text{T m A}^{-1} \)

59. A series LCR circuit is connected to an ac voltage source. When L is removed from the circuit, the phase difference between current and voltage is \( \frac{\pi}{3} \). If instead C is removed from the circuit, the phase difference is again \( \frac{\pi}{3} \) between current and voltage. The power factor of the circuit is:

(1) zero  
(2) 0.5  
(3) 1.0  
(4) \(-1.0\)

60. A spherical conductor of radius 10 cm has a charge of \( 3.2 \times 10^{-7} \text{ C} \) distributed uniformly. What is the magnitude of electric field at a point 15 cm from the centre of the sphere?

(1) \( 50 \text{ V} \)  
(2) \( 200 \text{ V} \)  
(3) \( 400 \text{ V} \)  
(4) zero

61. A body weighs 72 N on the surface of the earth. What is the gravitational force on it, at a height equal to half the radius of the earth?

(1) 48 N  
(2) 32 N  
(3) 30 N  
(4) 24 N

\[ \frac{9}{r^2} = \frac{G M m}{2 \pi R} \]

\[ \frac{9}{r^2} = \frac{1}{3 \pi R} \]

\[ \frac{9}{r^2} = \frac{1}{2 \pi R} \]

\[ \frac{9}{r^2} = \frac{1}{3 \pi R} \]

\[ \frac{9}{r^2} = \frac{1}{2 \pi R} \]

\[ \frac{9}{r^2} = \frac{1}{3 \pi R} \]

\[ \frac{9}{r^2} = \frac{1}{2 \pi R} \]
62. Find the torque about the origin when a force of $3\hat{j}$ N acts on a particle whose position vector is $2\hat{k}$ m.

(1) $6\hat{i}$ N m
(2) $6\hat{j}$ N m
(3) $-6\hat{i}$ N m
(4) $6\hat{k}$ N m

63. A charged particle having drift velocity of $7.5 \times 10^{-4}$ m s$^{-1}$ in an electric field of $3 \times 10^{-10}$ V m$^{-1}$, has a mobility in m$^2$ V$^{-1}$ s$^{-1}$ of:

(1) $2.25 \times 10^{15}$
(2) $2.5 \times 10^6$
(3) $2.5 \times 10^{-6}$
(4) $2.25 \times 10^{-15}$

64. A ray is incident at an angle of incidence $i$ on one surface of a small angle prism (with angle of prism $A$) and emerges normally from the opposite surface. If the refractive index of the material of the prism is $\mu$, then the angle of incidence is nearly equal to:

(1) $\frac{A}{2\mu}$
(2) $\frac{2A}{\mu}$
(3) $\mu A$
(4) $\frac{\mu A}{2}$

65. The quantities of heat required to raise the temperature of two solid copper spheres of radii $r_1$ and $r_2$ ($r_1 = 1.5 r_2$) through 1 K are in the ratio:

(1) $\frac{27}{8}$
(2) $\frac{9}{4}$
(3) $\frac{3}{2}$
(4) $\frac{5}{3}$

66. When a uranium isotope $^{235}\text{U}$ is bombarded with a neutron, it generates $^{89}\text{Kr}$, three neutrons and:

(1) $^{144}\text{Ba}$
(2) $^{91}\text{Zr}$
(3) $^{101}\text{Kr}$
(4) $^{103}\text{Kr}$

67. The phase difference between displacement and acceleration of a particle in a simple harmonic motion is:

(1) $\pi$ rad
(2) $\frac{3\pi}{2}$ rad
(3) $\frac{\pi}{2}$ rad
(4) zero

68. A resistance wire connected in the left gap of a metre bridge balances a $10$ $\Omega$ resistance in the right gap at a point which divides the bridge wire in the ratio 3 : 2. If the length of the resistance wire is 1.5 m, then the length of 1 $\Omega$ of the resistance wire is:

(1) $1.0 \times 10^{-2}$ m
(2) $1.0 \times 10^{-1}$ m
(3) $1.5 \times 10^{-1}$ m
(4) $1.5 \times 10^{-2}$ m

69. A capillary tube of radius $r$ is immersed in water and water rises in it to a height $h$. The mass of the water in the capillary is 5 g. Another capillary tube of radius 2$r$ is immersed in water. The mass of water that will rise in this tube is:

(1) 2.5 g
(2) 5.0 g
(3) 10.0 g
(4) 20.0 g

70. The ratio of contributions made by the electric field and magnetic field components to the intensity of an electromagnetic wave is: ($c = $ speed of electromagnetic waves)

(1) $c : 1$
(2) $1 : 1$
(3) $1 : c$
(4) $1 : c^2$
In Young’s double slit experiment, if the separation between coherent sources is halved and the distance of the screen from the coherent sources is doubled, then the fringe width becomes:

(1) double
(2) half
(3) four times
(4) one-fourth

Two particles of mass 5 kg and 10 kg respectively are attached to the two ends of a rigid rod of length 1 m with negligible mass.

The centre of mass of the system from the 5 kg particle is nearly at a distance of:

(1) 33 cm
(2) 50 cm
(3) 67 cm
(4) 80 cm

A long solenoid of 50 cm length having 100 turns carries a current of 2.5 A. The magnetic field at the centre of the solenoid is:

(1) $6.28 \times 10^{-4} \text{T}$
(2) $3.14 \times 10^{-4} \text{T}$
(3) $6.28 \times 10^{-5} \text{T}$
(4) $3.14 \times 10^{-5} \text{T}$

A ball is thrown vertically downward with a velocity of 20 m/s from the top of a tower. It hits the ground after some time with a velocity of 80 m/s. The height of the tower is:

(1) 360 m
(2) 340 m
(3) 320 m
(4) 300 m

For which one of the following, Bohr model is not valid?

(1) Hydrogen atom
(2) Singly ionised helium atom (He$^+$)
(3) Deuteron atom
(4) Singly ionised neon atom (Ne$^+$)

The average thermal energy for a mono-atomic gas is: (where $k_B$ is Boltzmann constant and $T$, absolute temperature)

(1) $\frac{1}{2} k_B T$
(2) $\frac{3}{2} k_B T$
(3) $\frac{5}{2} k_B T$
(4) $\frac{7}{2} k_B T$

The capacitance of a parallel plate capacitor with air as medium is 6 μF. With the introduction of a dielectric medium, the capacitance becomes 30 μF. The permittivity of the medium is:

(1) $0.44 \times 10^{-13} \text{C}^2 \text{N}^{-1} \text{m}^{-2}$
(2) $1.77 \times 10^{-12} \text{C}^2 \text{N}^{-1} \text{m}^{-2}$
(3) $0.44 \times 10^{-10} \text{C}^2 \text{N}^{-1} \text{m}^{-2}$
(4) $5.00 \text{C}^2 \text{N}^{-1} \text{m}^{-2}$
An electron is accelerated from rest through a potential difference of V volt. If the de Broglie wavelength of the electron is $1.227 \times 10^{-2}$ nm, the potential difference is:

1. $10 \text{ V}$
2. $10^2 \text{ V}$
3. $10^3 \text{ V}$
4. $10^4 \text{ V}$

A wire of length L, area of cross section A is hanging from a fixed support. If the length of the wire changes to $L_1$ when mass M is suspended from its free end. The expression for Young’s modulus is:

1. $\frac{MgL}{AL}$
2. $\frac{Mg(L_1 - L)}{AL}$
3. $\frac{MgL}{AL_1}$
4. $\frac{MgL}{A(L_1 - L)}$

The Brewster’s angle $i_b$ for an interface should be:

1. $0^\circ < i_b < 30^\circ$
2. $30^\circ < i_b < 45^\circ$
3. $45^\circ < i_b < 90^\circ$
4. $i_b = 90^\circ$

Two bodies of mass 4 kg and 6 kg are tied to the ends of a massless string. The string passes over a pulley which is frictionless (see figure). The acceleration of the system in terms of acceleration due to gravity (g) is:

Dimensions of stress are:

1. $[\text{MLT}^{-2}]$
2. $[\text{ML}^2 \text{T}^{-2}]$
3. $[\text{ML}^0 \text{T}^{-2}]$
4. $[\text{ML}^{-1} \text{T}^{-2}]$
Which of the following refer to correct example(s) of organisms which have evolved due to changes in environment brought about by anthropogenic action?

(a) Darwin's Finches of Galapagos islands.
(b) Herbicide resistant weeds.
(c) Drug resistant eukaryotes.
(d) Man-created breeds of domesticated animals like dogs.

(1) only (a)
(2) (a) and (c)
(3) (b), (c) and (d)
(4) only (d)

Select the correct events that occur during inspiration.

(a) Contraction of diaphragm
(b) Contraction of external inter-costal muscles
(c) Pulmonary volume decreases
(d) Intra pulmonary pressure increases

(1) (a) and (b)
(2) (c) and (d)
(3) (a), (b) and (d)
(4) only (d)

The oxygenation activity of RuBisCo enzyme in photosynthesis leads to the formation of:

(1) 2 molecules of 3-C compound
(2) 1 molecule of 3-C compound
(3) 1 molecule of 6-C compound
(4) 1 molecule of 4-C compound and 1 molecule of 2-C compound

The infectious stage of Plasmodium that enters the human body is:

(1) Trophozoites
(2) Sporozoites
(3) Female gametocytes
(4) Male gametocytes

Which of the following statements about inclusion bodies is incorrect?

(1) They are not bound by any membrane.
(2) These are involved in ingestion of food particles.
(3) They lie free in the cytoplasm.
(4) These represent reserve material in the cytoplasm.

Dissolution of the synaptonemal complex occurs during:

(1) Pachytene
(2) Zygotene
(3) Diplotene
(4) Leptotene

Ray florets have:

(1) Inferior ovary
(2) Superior ovary
(3) Hypogynous ovary
(4) Half inferior ovary
104. Identify the incorrect statement.

- Heart wood does not conduct water but gives mechanical support
- Heart wood is dark in colour
- Sapwood is involved in conduction of water
- Heart wood is dark in colour

105. Identify the incorrect statement with reference to DNA translation.

- Recognition of an anti-codon by tRNA
- Aminoacylation of tRNA
- Recognition of DNA molecule
- Binding of mRNA to ribosome

106. Identify the incorrect statement with reference to gene and protein expression.

- Each restriction enzyme cuts the DNA strand at specific sites
- Restriction enzymes separate the two strands
- Nucleases break the DNA into nucleotides
- Polymerases join the two DNA molecules

107. Choose the correct pair from the following:

- GIFT and ZIFT
- GIFT and ICSI
- ZIFT and ICSI
- GIFT and IUT

108. Identify the incorrect statement with reference to blood gases.

- Lower pCO₂ in alveoli favours the formation of haemoglobin
- Higher pH favours the formation of haemoglobin
- Binding of oxygen with haemoglobin is proportional to partial pressure of O₂
- Binding of oxygen with haemoglobin is proportional to partial pressure of CO₂

109. Identify the incorrect statement with reference to embryology.

- Karl Ernst von Baer
- Charles Darwin
- Alfred Wallace
- Lamarck

110. Identify the incorrect statement with reference to cellular respiration.

- Low pCO₂ in alveoli favours the formation of haemoglobin
- Higher pH favours the formation of haemoglobin
- Binding of oxygen with haemoglobin is proportional to partial pressure of O₂
- Binding of oxygen with haemoglobin is proportional to partial pressure of CO₂

111. Identify the incorrect statement with reference to plant anatomy.

- Heart wood does not conduct water but gives mechanical support
- Heart wood is dark in colour
- Sapwood is involved in conduction of water
- Heart wood is dark in colour

112. Identify the incorrect statement with reference to genetic engineering.

- Each restriction enzyme cuts the DNA strand at specific sites
- Restriction enzymes separate the two strands
- Nucleases break the DNA into nucleotides
- Polymerases join the two DNA molecules
The plant parts which consist of two generations- One within the other:

1. Montreal protocol was signed in 1987 for
2. Cone
3. Transport of Genetically modified (1) from one country too another
4. Pollen grains inside the anther
5. Germinated pollen grain with two male gametes
6. Emission of ozone depleting substances
7. Release of Green House gases

I The QRS complex in a standard ECG represents
1. (a) Repolarisation of auricles
2. (b) Repolarisation of ventricles
3. (c) Depolarisation of auricles
4. (d) Depolarisation of ventricles
II Name the plant growth regulator which upon spraying on sugarcane crop, increases the length of stem, thus increasing the yield of sugarcane
(a) Abscisic acid
(b) Gibberellic acid
(c) Ethylene
(d) Cytokinin
III In one character with contrasting traits, Mendel selected six pairs, which were similar except in one character with contrasting traits. How many true breeding pea plant varieties did Mendel select as pairs, which were similar except in one character with contrasting traits?
1. Three
2. Two
3. One
4. Zero
IV How many substrate level phosphorylations in one turn of citric acid cycle is:
(a) Zero
(b) One
(c) Two
(d) Three
V Match the following diseases with the causative organism and select the correct option.
(a) Typhoid (i) Linea minor of intestine
(b) Pneumonia (ii) Ducts of salivary glands
(c) Filariasis (iii) J proximal convoluted tubule of nephron
(d) Malaria (iv) Eustachian tube

Name the plant growth regulator which upon spraying on sugarcane crop, increases the length of stem, thus increasing the yield of sugarcane
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The QRS complex in a standard ECG represents:
1. (a) Repolarisation of auricles
2. (b) Repolarisation of ventricles
3. (c) Depolarisation of auricles
4. (d) Depolarisation of ventricles

The Montreal protocol was signed in 1987 for control of:
(a) Monocotyledonous weeds
(b) Released of Green House gases
(c) Emission of ozone depleting substances
(d) Transport of Genetically modified organisms from one country to another

Match the following columns and select the correct option. (1)
Column -I Column-II
Column -I Column-II
(a) Male organ of Aschelminthes
(b) Female organ of Platyhelminthes
(c) Ashes of Fern (i) Head of the Humerus
(d) Scapula (ii) Acromion
(e) Glenoid cavity (iii) Head of the second and fourth ribs
(f) Clavicle (iv) Located between floating ribs and seventh ribs

Match the following diseases with the causative organism and select the correct option.
(a) Typhoid (i) Linea minor of intestine
(b) Pneumonia (ii) Ducts of salivary glands
(c) Filariasis (iii) J proximal convoluted tubule of nephron
(d) Malaria (iv) Eustachian tube

The number of substrate level phosphorylations in one turn of citric acid cycle is:
(a) Zero
(b) One
(c) Two
(d) Three

Embyro sac inside the ovule
Seed inside the fruit
Genome
Cleavage of embryo with two male
Pollination inside the flower
One with the other

1. Montreal protocol was signed in 1987 for control of:
2. The plant parts which consist of two generations- One within the other:
10. Which is the important site of formation of glycoproteins and glycolipids in eukaryotic cells?

(1) Endoplasmic reticulum
(2) Peroxisomes
(3) Golgi bodies
(4) Polysomes

11. In light reaction, plastoquinone facilitates the transfer of electrons from:

(1) PS-II to Cyt$b_{6}$ complex
(2) Cyt$b_{6}$ complex to PS-I
(3) PS-I to NADP$^{+}$
(4) PS-I to ATP synthase

12. Match the following concerning essential elements and their functions in plants:

(a) Iron (i) Photolysis of water
(b) Zinc (ii) Pollen germination
(c) Boron (iii) Required for chlorophyll biosynthesis
(d) Manganese (iv) IAA biosynthesis

Select the correct option:
(a) (b) (c) (d)
(1) (ii) (i) (iv) (iii)
(2) (iv) (iii) (ii) (i)
(3) (iii) (iv) (ii) (i)
(4) (iv) (i) (ii) (iii)

13. The roots that originate from the base of the stem are:

(1) Fibrous roots
(2) Primary roots
(3) Prop roots
(4) Lateral roots

14. From his experiments, S.L. Miller produced amino acids by mixing the following in a closed flask:

(1) CH$_{4}$, H$_{2}$, NH$_{3}$ and water vapor at 800°C
(2) CH$_{3}$H$_{2}$, NH$_{4}$ and water vapor at 800°C
(3) CH$_{4}$, H$_{2}$, NH$_{3}$ and water vapor at 600°C
(4) CH$_{3}$H$_{2}$, NH$_{3}$ and water vapor at 600°C

15. Identify the basic amino acid from the following:

(1) Tyrosine
(2) Glutamic Acid
(3) Lysine
(4) Valine

16. The process of growth is maximum during:

(1) Log phase
(2) Lag phase
(3) Senescence
(4) Dormancy

17. Presence of which of the following conditions in urine are indicative of Diabetes Mellitus?

(1) Uremia and Ketonuria
(2) Uremia and Renal Calculi
(3) Ketonuria and Glycosuria
(4) Renal calculi and Hyperglycaemia

18. Select the correct match:

(1) Haemophilia - Y linked
(2) Phenylketonuria - Autosomal dominant trait
(3) Sickle cell anaemia - Autosomal recessive trait, chromosome-11
(4) Thalassemia - X linked

19. Strobili or cones are found in:

(1) Salvinia
(2) Pteris
(3) Marchantia
(4) Equisetum

20. Identify the wrong statement with reference to the gene T that controls ABO blood groups.

(1) The gene (l) has three alleles.
(2) A person will have only two of the three alleles.
(3) When IA and IB are present together, they express same type of sugar.
(4) Allele 'i' does not produce any sugar.

21. Identify the correct statement with reference to human digestive system.

(1) Ileum opens into small intestine.
(2) Serosa is the innermost layer of the alimentary canal.
(3) Ileum is a highly coiled part.
(4) Vermiform appendix arises from duodenum.
132. Which of the following would help in prevention of diuresis?

(1) More water reabsorption due to undersecretion of ADH
(2) Reabsorption of Na+ and water from renal tubules due to aldosterone
(3) Atrial natriuretic factor causes vasoconstriction
(4) Decrease in secretion of renin by JG cells

Match the following:

(1) More water reabsorption due to undersecretion of ADH
(2) Reabsorption of Na+ and water from renal tubules due to aldosterone
(3) Atrial natriuretic factor causes vasoconstriction
(4) Decrease in secretion of renin by JG cells

Select the correct option from the following:

(a) (b) (c) (d)
(1) (iii) (iv) (i) (ii)
(2) (iv) (iii) (i) (ii)
(3) (i) (ii) (iv) (iii)
(4) (ii) (iv) (iii) (i)

133. Which of the following is not an inhibitory substance governing seed dormancy?

(1) Gibberellic acid
(2) Abscisic acid
(3) Phenolic acid
(4) Para-ascorbic acid

134. Match the following with respect to meiosis:

(a) Zygotene (i) Terminalization
(b) Pachytene (ii) Chiasmata
(c) Diplotene (iii) Crossing over
(d) Diakinesis (iv) Synapsis

Select the correct option from the following:

(a) (b) (c) (d)
(1) (iii) (iv) (i) (ii)
(2) (iv) (iii) (i) (ii)
(3) (i) (ii) (iv) (iii)
(4) (ii) (iv) (iii) (i)

135. The sequence that controls the copy number of the linked DNA in the vector, is termed:

(1) Selectable marker
(2) Ori site
(3) Palindromic sequence
(4) Recognition site

136. Snow-blindness in Antarctic region is due to:

(1) Freezing of fluids in the eye by low temperature
(2) Inflammation of cornea due to high dose of UV-B radiation
(3) High reflection of light from snow
(4) Damage to retina caused by infra-red rays

According to Robert May, the global species diversity is about:

(1) 1.5 million
(2) 20 million
(3) 50 million
(4) 7 million

By which method was a new breed 'Hisardale' of sheep formed by using Bikaneri ewes and Marino rams?

(1) Out crossing
(2) Mutational breeding
(3) Cross breeding
(4) Inbreeding

138. Which of the following regions of the globe exhibits highest species diversity?

(1) Western Ghats of India
(2) Madagascar
(3) Himalayas
(4) Amazon forests
144. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) 6-15 pairs of gill slits</td>
<td>(i) Trygon</td>
</tr>
<tr>
<td>(b) Heterocercal caudal fin</td>
<td>(ii) Cyclostomes</td>
</tr>
<tr>
<td>(c) Air Bladder</td>
<td>(iii) Chondrichthyes</td>
</tr>
<tr>
<td>(d) Poison sting</td>
<td>(iv) Osteichthyes</td>
</tr>
</tbody>
</table>

145. Which of the following statements are not correct?
(1) In man insulin is synthesised as a proinsulin.
(2) The proinsulin has an extra peptide called C-peptide.
(3) The functional insulin has A and B chains linked together by hydrogen bonds.
(4) Genetically engineered insulin is produced in E-Coli.

146. Which of the following pairs is of unicellular algae?
(1) Laminaria and Sargassum
(2) Gelidium and Gracilaria
(3) Anabaena and Volvox
(4) Chlorella and Spirulina

147. Which of the following statements are true for the phylum-Chordata?
(a) In Urochordata notochord extends from head to tail and it is present throughout their life.
(b) In Vertebrata notochord is present during the embryonic period only.
(c) Central nervous system is dorsal and hollow.
(d) Chordata is divided into 3 subphyla: Tunicata and Cephalochordata.

148. Match the organism with its use in biotechnology.
(a) Bacillus thuringiensis (i) Cloning vector
(b) Thermus aquaticus (ii) Construction of first rDNA molecule
(c) Agrobacterium tumefaciens (iii) DNA polymerase
(d) Salmonella typhimurium (iv) Cry proteins

Select the correct option from the following:
1. (a) (b) (c) (d)
2. (i) (ii) (iii) (i)
3. (ii) (iii) (i) (ii)
4. (iii) (ii) (iv) (i)

149. Meiotic division of the secondary oocyte is completed:
1. Prior to ovulation
2. At the time of copulation
3. After zygote formation
4. At the time of fusion of a sperm with an ovum

150. The product(s) of reaction catalyzed by nitrogenase in root nodules of leguminous plants is/are:
1. Ammonia alone
2. Nitrate alone
3. Ammonia and oxygen
4. Ammonia and hydrogen

151. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Pituitary gland</td>
<td>(i) Grave’s disease</td>
</tr>
<tr>
<td>(b) Thyroid gland</td>
<td>(ii) Diabetes mellitus</td>
</tr>
<tr>
<td>(c) Adrenal gland</td>
<td>(iii) Diabetes insipidus</td>
</tr>
<tr>
<td>(d) Pancreas</td>
<td>(iv) Addison’s disease</td>
</tr>
</tbody>
</table>

152. Secondary metabolites such as nicotine, strychnine, and caffeine are produced by plants for their:
(1) Nutritive value
(2) Growth response
(3) Defence action
(4) Effect on reproduction
152. Which one of the following is the most abundant protein in the animals?

(1) Haemoglobin
(2) Collagen
(3) Lectin
(4) Insulin

153. Identify the correct statement with regard to G1 phase (Gap 1) of interphase.

(1) DNA synthesis or replication takes place.
(2) Reorganisation of all cell components takes place.
(3) Cell is metabolically active, grows but does not replicate its DNA.
(4) Nuclear Division takes place.

154. Match the trophic levels with their correct species examples in grassland ecosystem.

(a) Fourth trophic level
(b) Second trophic level
(c) First trophic level
(d) Third trophic level

(i) Crow
(ii) Vulture
(iii) Rabbit
(iv) Grass

Select the correct option:
(a) (b) (c) (d)
(i) (ii) (iii) (iv)
(ii) (iii) (i) (iv)
(iii) (ii) (i) (iv)
(iv) (i) (ii) (iii)

155. The ovary is half inferior in:

(1) Brinjal
(2) Mustard
(3) Sunflower
(4) Plum

156. The body of the ovule is fused within the funicle at:

(1) Hilum
(2) Micropyle
(3) Nucellus
(4) Chalaza

157. The specific palindromic sequence which is recognized by EcoRI is:

(1) 5'- GAATTC - 3'
(2) 3'- CTAAAG - 5'
(3) 5'- GGAACC - 3'
(4) 3'- CCTTGG - 5'

158. Which of the following is correct about viroids?

(1) They have RNA with protein coat.
(2) They have free RNA without protein coat.
(3) They have DNA with protein coat.
(4) They have free DNA without protein coat.

159. In water hyacinth and water lily, pollination takes place by:

(1) insects or wind
(2) water currents only
(3) wind and water
(4) insects and water

160. The transverse section of a plant shows following anatomical features:

(a) Large number of scattered vascular bundles surrounded by bundle sheath.
(b) Large conspicuous parenchymatous ground tissue.
(c) Vascular bundles conjoint and closed.
(d) Phloem parenchyma absent.

Identify the category of plant and its part:

(1) Monocotyledonous stem
(2) Monocotyledonous root
(3) Dicotyledonous stem
(4) Dicotyledonous root

161. Which of the following statements is correct?

(1) Adenine pairs with thymine through two H-bonds.
(2) Adenine pairs with thymine through one H-bond.
(3) Adenine pairs with thymine through three H-bonds.
(4) Adenine does not pair with thymine.

162. Select the correct statement.

(1) Glucocorticoids stimulate gluconeogenesis.
(2) Glucagon is associated with hypoglycemia.
(3) Insulin acts on pancreatic cells and adipocytes.
(4) Insulin is associated with hyperglycemia.
163. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Gregarious, polyphagous (i)</td>
<td>Asterias</td>
</tr>
<tr>
<td>(b) Adult with radial symmetry and larva with bilateral symmetry (ii)</td>
<td>Scorpion</td>
</tr>
<tr>
<td>(c) Book lungs (iii)</td>
<td>Ctenoplana (iv)</td>
</tr>
<tr>
<td>(d) Bioluminescence (a)</td>
<td>Locusta</td>
</tr>
</tbody>
</table>

164. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>Column - I</th>
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</tr>
</thead>
<tbody>
<tr>
<td>(a) Eosinophils (i)</td>
<td>Immune response</td>
</tr>
<tr>
<td>(b) Basophils (ii)</td>
<td>Phagocytosis</td>
</tr>
<tr>
<td>(c) Neutrophils (iii)</td>
<td>Release histaminase, destructive enzymes</td>
</tr>
<tr>
<td>(d) Lymphocytes (iv)</td>
<td>Release granules containing histamine</td>
</tr>
</tbody>
</table>

165. If the head of cockroach is removed, it may live for few days because:
1. the supra-oesophageal ganglia of the cockroach are situated in ventral part of abdomen.
2. the cockroach does not have nervous system.
3. the head holds a small proportion of a nervous system while the rest is situated along the ventral part of its body.
4. the head holds a 1/3rd of a nervous system while the rest is situated along the dorsal part of its body.

166. Name the enzyme that facilitates opening of DNA helix during transcription.
1. DNA ligase
2. DNA helicase
3. DNA polymerase
4. RNA polymerase

167. Flippers of Penguins and Dolphins are examples of:
1. Adaptive radiation
2. Convergent evolution
3. Industrial melanism
4. Natural selection

168. Which of the following hormone levels will cause release of ovum (ovulation) from the Graffian follicle?
1. High concentration of Estrogen
2. High concentration of Progesterone
3. Low concentration of LH
4. Low concentration of FSH

169. If the distance between two consecutive base pairs is 0.34 nm and the total number of base pairs of a DNA double helix in a typical mammalian cell is 6.6 x 10^9 bp, then the length of the DNA is approximately:
1. 2.0 meters
2. 2.5 meters
3. 2.2 meters
4. 2.7 meters

170. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>Column - I</th>
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</tr>
</thead>
<tbody>
<tr>
<td>(a) Placenta</td>
<td>Androgens</td>
</tr>
<tr>
<td>(b) Zona pellucida</td>
<td>Human Chorionic Gonadotropin (hCG)</td>
</tr>
<tr>
<td>(c) Bulbo-urethral glands (ii)</td>
<td>Layer of the ovum</td>
</tr>
<tr>
<td>(d) Leydig cells</td>
<td>Lubrication of the Penis</td>
</tr>
</tbody>
</table>

171. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Clostridium</td>
<td>Butyric Acid</td>
</tr>
<tr>
<td>(b) Trichoderma</td>
<td>Citric Acid</td>
</tr>
<tr>
<td>(c) Monascus</td>
<td>Blood cholesterol lowering agent</td>
</tr>
<tr>
<td>(d) Aspergillus niger</td>
<td>Cyclosporin-A</td>
</tr>
</tbody>
</table>

172. Name the enzyme that facilitates opening of DNA helix during transcription.
1. DNA ligase
2. DNA helicase
3. DNA polymerase
4. RNA polymerase
173. Experimental verification of the chromosomal theory of inheritance was done by:
(1) Mendel
(2) Sutton
(3) Boveri
(4) Morgan

174. The process responsible for facilitating loss of water in liquid form from the tip of grass blades at night and in early morning is:
(1) Transpiration
(2) Root pressure
(3) Imbibition
(4) Plasmolysis

175. Identify the substances having glycosidic bond and peptide bond, respectively in their structure:
(1) Chitin, cholesterol
(2) Glycerol, trypsin
(3) Cellulose, lecithin
(4) Inulin, insulin

176. Which of the following is not an attribute of a population?
(1) Sex ratio
(2) Natality
(3) Mortality
(4) Species interaction

177. The enzyme enterokinase helps in conversion of:
(1) Protein into polypeptides
(2) Trypsinogen into trypsin
(3) Caseinogen into casein
(4) Pepsinogen into pepsin