PHYSICS

1. The displacement of a particle executing simple harmonic motion is given by $y = A_0 + A\sin\omega t + B\cos\omega t$. Then the amplitude of its oscillation is given by

(a) $A + B$ (b) $A_0 + \sqrt{A^2 + B^2}$

(c) $\sqrt{A^2 + B^2}$ (d) $\sqrt{A_0^2 + (A + B)^2}$

2. In which of the following devices, the eddy current effect is not used?

(a) electric heater (b) induction furnace

(c) magnetic braking in train

(d) electromagnet

3. Average velocity of a particle executing SHM in one complete vibration is

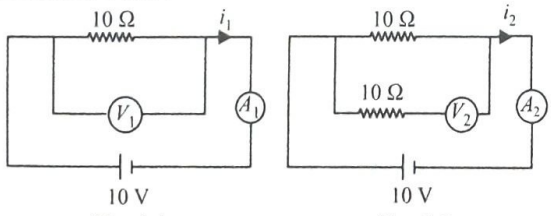
(a) zero (b) $\frac{A\omega}{2}$ (c) $A\omega$ (d) $\frac{A\omega^2}{2}$

4. The speed of a swimmer in still water is 20 m/s. The speed of river water is 10 m/s and is flowing due east. If he is standing on the south bank and wishes to cross the river along the shortest path, the angle at which he should make his strokes w.r.t. north is, given by

(a) 45° west (b) 30° west

(c) 0° (d) 60° west

5. In the circuits shown below, the readings of the voltmeters and the ammeters will be



(a) $V_2 > V_1$ and $i_1 > i_2$ (b) $V_2 > V_1$ and $i_1 = i_2$

(c) $V_1 = V_2$ and $i_1 > i_2$ (d) $V_1 = V_2$ and $i_1 = i_2$

6. A copper rod of 88 cm and an aluminium rod of unknown length have their increase in length independent of increase in temperature. The length of aluminium rod is ($\alpha_{Cu} = 1.7 \times 10^{-5}\ K^{-1}$ and $\alpha_{Al} = 2.2 \times 10^{-5}\ K^{-1}$)

(a) 68 cm (b) 6.8 cm

(c) 113.9 cm (d) 88 cm

7. The unit of thermal conductivity is

(a) $W\ m^{-1}\ K^{-1}$ (b) $J\ m\ K^{-1}$

(c) $J\ m^{-1}\ K^{-1}$ (d) $W\ m\ K^{-1}$

8. For a p-type semiconductor, which of the following statements is true?

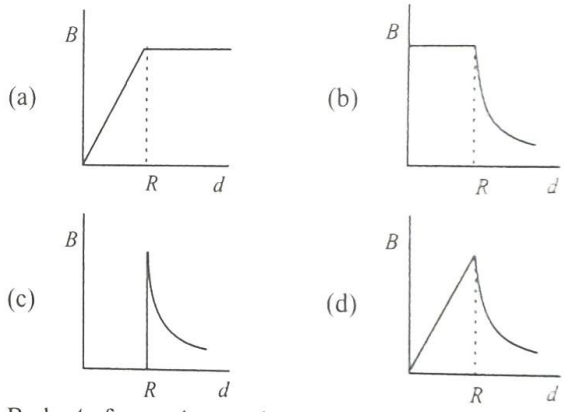
(a) Electrons are the majority carriers and pentavalent atoms are the dopants.

(b) Electrons are the majority carriers and trivalent atoms are the dopants.

(c) Holes are the majority carriers and trivalent atoms are the dopants.

(d) Holes are the majority carriers and pentavalent atoms are the dopants.

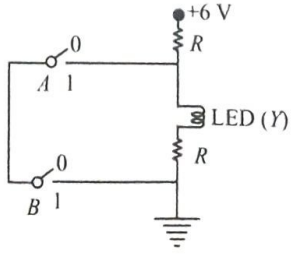
9. A cylindrical conductor of radius R is carrying a constant current. The plot of the magnitude of the magnetic field, B with the distance, d from the centre of the conductor, is correctly represented by the figure



10. Body A of mass $4m$ moving with speed u collides with another body B of mass $2m$, at rest. The collision is head on and elastic in nature. After the collision the fraction of energy lost by the colliding body A is

(a) 5/9 (b) 1/9 (c) 8/9 (d) 4/9

11. The correct Boolean operation represented by the circuit diagram drawn is



(a) NOR (b) AND (c) OR (d) NAND

12. When an object is shot from the bottom of a long smooth inclined plane kept at an angle 60° with horizontal, it can travel a distance x_1 along the plane. But when the inclination is decreased to 30° and the same object is shot with the same velocity, it can travel x_2

distance. Then $x_1 : x_2$ will be

(a) $1:2\sqrt{3}$ (b) $1:\sqrt{2}$ (c) $\sqrt{2}:1$ (d) $1:\sqrt{3}$

13. The work done to raise a mass m from the surface of the earth to a height h, which is equal to the radius of the earth, is

(a) $\frac{3}{2}mgR$ (b) mgR (c) $2mgR$ (d) $\frac{1}{2}mgR$

14. The total energy of an electron in an atom in an orbit is – 3.4 eV. Its kinetic and potential energies are, respectively

(a) 3.4 eV, 3.4 eV (b) – 3.4 eV, – 3.4 eV
(c) – 3.4 eV, – 6.8 eV (d) 3.4 eV, – 6.8 eV

15. In which of the following processes, heat is neither absorbed nor released by a system?

(a) isochoric (b) isothermal
(c) adiabatic (d) isobaric

16. A hollow metal sphere of radius R is uniformly charged. The electric field due to the sphere at a distance r from the centre

(a) decreases as r increases for $r < R$ and for $r > R$
(b) increases as r increases for $r < R$ and for $r > R$
(c) zero as r increases for $r < R$, decreases as r increases for $r > R$
(d) zero as r increases for $r < R$, increases as r increases for $r > R$

17. Pick the wrong answer in the context with rainbow.

(a) Rainbow is a combined effect of dispersion, refraction and reflection of sunlight.
(b) When the light rays undergo two internal reflections in a water drop, a secondary rainbow is formed.
(c) The order of colours is reversed in the secondary rainbow.
(d) An observer can see a rainbow when his front is towards the sun.

18. A small hole of area of cross-section 2 mm^2 is present near the bottom of a fully filled open tank of height 2 m. Taking $g = 10\ m/s^2$, the rate of flow of water through the open hole would be nearly

(a) $6.4 \times 10^{-6}\ m^3/s$ (b) $12.6 \times 10^{-6}\ m^3/s$
(c) $8.9 \times 10^{-6}\ m^3/s$ (d) $2.23 \times 10^{-6}\ m^3/s$

19. Which of the following acts as a circuit protection device?

(a) fuse (b) conductor
(c) inductor (d) switch

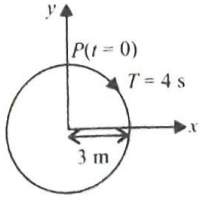
20. Two point charges A and B, having charges $+Q$ and $-Q$ respectively, are placed at certain distance apart and force acting between them is F. If 25% charge of A is transferred to B, then force between the charges becomes

(a) $\frac{4F}{3}$ (b) F (c) $\frac{9F}{16}$ (d) $\frac{16F}{9}$

21. Which colour of the light has the longest wavelength?

(a) violet (b) red (c) blue (d) green

22. The radius of circle, the period of revolution, initial position and sense of revolution are indicated in the figure. y-projection of the radius vector of rotating particle P is



(a) $y(t) = 3\cos\left(\frac{\pi t}{2}\right)$, where y in m

(b) $y(t) = -3\cos 2\pi t$, where y in m

(c) $y(t) = 4\sin\left(\frac{\pi t}{2}\right)$, where y in m

(d) $y(t) = 3\cos\left(\frac{3\pi t}{2}\right)$, where y in m

23. α-particle consists of

(a) 2 protons only
(b) 2 protons and 2 neutrons only
(c) 2 electrons, 2 protons and 2 neutrons
(d) 2 electrons and 4 protons only

24. A solid cylinder of mass 2 kg and radius 4 cm rotating about its axis at the rate of 3 rpm. The torque required to stop after 2π revolutions is

(a) 2×10^{6} N m (b) 2×10^{-6} N m
(c) 2×10^{-3} N m (d) 12×10^{-4} N m

25. In a double slit experiment, when light of wavelength 400 nm was used, the angular width of the first minima formed on a screen placed 1 m away, was found to be 0.2°. What will be the angular width of the first minima, if the entire experimental apparatus is immersed in water? ($\mu_{water} = 4/3$)

(a) 0.1° (b) 0.266° (c) 0.15° (d) 0.05°

26. At a point A on the earth's surface the angle of dip, $\delta = +25°$. At a point B on the earth's surface the angle of dip, $\delta = -25°$. We can interpret that

(a) A and B are both located in the southern hemisphere.
(b) A and B are both located in the northern hemisphere.
(c) A is located in the southern hemisphere and B is located in the northern hemisphere.
(d) A is located in the northern hemisphere and B is located in the southern hemisphere.

27. A force $F = 20 + 10y$ acts on a particle in y-direction where F is in newton and y in meter. Work done by this force to move the particle from $y = 0$ to $y = 1$ m is

(a) 20 J (b) 30 J (c) 5 J (d) 25 J

28. When a block of mass M is suspended by a long wire of length L, the length of the wire becomes $(L + l)$. The elastic potential energy stored in the extended wire is

(a) $\frac{1}{2}MgL$ (b) Mgl (c) MgL (d) $\frac{1}{2}Mgl$

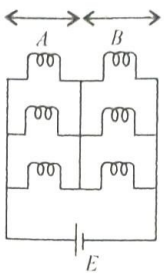
29. A parallel plate capacitor of capacitance 20 μF is being charged by a voltage source whose potential is changing at the rate of 3 V/s. The conduction current through the connecting wires, and the displacement current through the plates of the capacitor, would be, respectively

(a) zero, zero (b) zero, 60 μA
(c) 60 μA, 60 μA (d) 60 μA, zero

30. A mass m is attached to a thin wire and whirled in a vertical circle. The wire is most likely to break when

(a) inclined at an angle of 60° from vertical
(b) the mass is at the highest point
(c) the wire is horizontal
(d) the mass is at the lowest point

31. Six similar bulbs are connected as shown in the figure with a DC source of emf E, and zero internal resistance. The ratio of power consumption by the bulbs when (i) all are glowing and (ii) in the situation when two from section A and one from section B are glowing, will be



(a) 2 : 1 (b) 4 : 9
(c) 9 : 4 (d) 1 : 2

32. In total internal reflection when the angle of incidence is equal to the critical angle for the pair of media in contact, what will be angle of refraction?
(a) 90° (b) 180°
(c) 0°
(d) equal to angle of incidence

33. Two similar thin equi-convex lenses, of focal length f each, are kept coaxially in contact with each other such that the focal length of the combination is F_1. When the space between the two lenses is filled with glycerin (which has the same refractive index ($\mu = 1.5$) as that of glass) then the equivalent focal length is F_2. The ratio $F_1 : F_2$ will be
(a) 3 : 4 (b) 2 : 1 (c) 1 : 2 (d) 2 : 3

34. Ionized hydrogen atoms and α-particles with same momenta enters perpendicular to a constant magnetic field, B. The ratio of their radii of their paths $r_H : r_\alpha$ will be
(a) 1 : 4 (b) 2 : 1 (c) 1 : 2 (d) 4 : 1

35. In an experiment, the percentage of error occurred in the measurement of physical quantities A, B, C and D are 1%, 2%, 3% and 4% respectively. Then the maximum percentage of error in the measurement X, where $X = \dfrac{A^2B^{1/2}}{C^{1/3}D^3}$, will be
(a) 10% (b) $\left(\dfrac{3}{13}\right)\%$ (c) 16% (d) –10%

36. A block of mass 10 kg is in contact against the inner wall of a hollow cylindrical drum of radius 1 m. The coefficient of friction between the block and the inner wall of the cylinder is 0.1. The minimum angular velocity needed for the cylinder to keep the block stationary when the cylinder is vertical and rotating about its axis, will be ($g = 10$ m/s^2)
(a) 10π rad/s (b) $\sqrt{10}$ rad/s
(c) $\dfrac{10}{2\pi}$ rad/s (d) 10 rad/s

37. A 800 turn coil of effective area 0.05 m^2 is kept perpendicular to a magnetic field 5×10^{-5} T. When the plane of the coil is rotated by 90° around any of its coplanar axis in 0.1 s, the emf induced in the coil will be
(a) 0.02 V (b) 2 V
(c) 0.2 V (d) 2×10^{-3} V

38. Two particles A and B are moving in uniform circular motion in concentric circles of radii r_A and r_B with speed v_A and v_B respectively. Their time period of rotation is the same. The ratio of angular speed of A to that of B will be
(a) 1 : 1 (b) $r_A : r_B$ (c) $v_A : v_B$ (d) $r_B : r_A$

39. A soap bubble, having radius of 1 mm, is blown from a detergent solution having a surface tension of 2.5×10^{-2} N/m. The pressure inside the bubble equals at a point Z_0 below the free surface of water in a container. Taking $g = 10$ m/s^2, density of water = 10^3 kg/m^3, the value of Z_0 is
(a) 0.5 cm (b) 100 cm (c) 10 cm (d) 1 cm

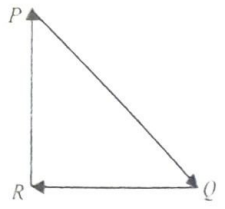
40. A body weighs 200 N on the surface of the earth. How much will it weigh half way down to the centre of the earth ?
(a) 100 N (b) 150 N (c) 200 N (d) 250 N

41. An electron is accelerated through a potential difference of 10,000 V. Its de Broglie wavelength is, (nearly) ($m_e = 9 \times 10^{-31}$ kg)
(a) 12.2 nm (b) 12.2×10^{-13} m
(c) 12.2×10^{-12} m (d) 12.2×10^{-14} m

42. Two parallel infinite line charges with linear charge densities $+\lambda$ C/m and $-\lambda$ C/m are placed at a distance of $2R$ in free space. What is the electric field mid-way between the two line charges ?
(a) $\dfrac{\lambda}{2\pi\varepsilon_0 R}$ N/C (b) zero
(c) $\dfrac{2\lambda}{\pi\varepsilon_0 R}$ N/C (d) $\dfrac{\lambda}{\pi\varepsilon_0 R}$ N/C

43. Increase in temperature of a gas filled in a container would lead to
(a) decrease in intermolecular distance
(b) increase in its mass
(c) increase in its kinetic energy
(d) decrease in its pressure

44. A particle moving with velocity $\vec{v}$ is acted by three forces shown by the vector triangle PQR. The velocity of the particle will



(a) change according to the smallest force $\overrightarrow{QR}$
(b) increase
(c) decrease
(d) remain constant

45. A disc of radius 2 m and mass 100 kg rolls on a horizontal floor. Its centre of mass has speed of 20 cm/s. How much work is needed to stop it ?
(a) 1 J (b) 3 J (c) 30 kJ (d) 2 J

CHEMISTRY

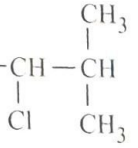
46. For the cell reaction :
$2Fe^{3+}_{(aq)} + 2I^-_{(aq)} \longrightarrow 2Fe^{2+}_{(aq)} + I_{2(aq)}$
$E^\circ_{cell} = 0.24$ V at 298 K. The standard Gibbs energy ($\Delta_r G^\circ$) of the cell reaction is
[Given that Faraday constant $F = 96500$ C mol^{-1}]
(a) 23.16 kJ mol^{-1} (b) –46.32 kJ mol^{-1}
(c) –23.16 kJ mol^{-1} (d) 46.32 kJ mol^{-1}

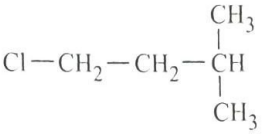
47. The compound that is most difficult to protonate is
(a) Ph–O–H (b) H–O–H
(c) H_3C–O–H (d) H_3C–O–CH_3

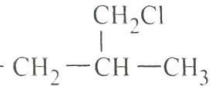
48. The manganate and permanganate ions are tetrahedral, due to
(a) the π-bonding involves overlap of *d*-orbitals of oxygen with *d*-orbitals of manganese
(b) the π-bonding involves overlap of *p*-orbitals of oxygen with *d*-orbitals of manganese
(c) there is no π-bonding
(d) the π-bonding involves overlap of *p*-orbitals of oxygen with *p*-orbitals of manganese.

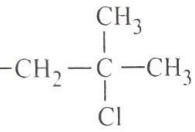
49. The correct order of the basic strength of methyl substituted amines in aqueous solution is
(a) $CH_3NH_2 > (CH_3)_2NH > (CH_3)_3N$
(b) $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N$
(c) $(CH_3)_3N > CH_3NH_2 > (CH_3)_2NH$
(d) $(CH_3)_3N > (CH_3)_2NH > CH_3NH_2$

50. An alkene *A* on reaction with O_3 and $Zn—H_2O$ gives propanone and ethanal in equimolar ratio. Addition of HCl to alkene *A* gives *B* as the major product. The structure of product *B* is

(a) 

(b) 

(c) 

(d) 

51. For the second period elements the correct increasing order of first ionization enthalpy is
(a) Li < Be < B < C < O < N < F < Ne
(b) Li < Be < B < C < N < O < F < Ne
(c) Li < B < Be < C < O < N < F < Ne
(d) Li < B < Be < C < N < O < F < Ne

52. A gas at 350 K and 15 bar has molar volume 20 percent smaller than that for an ideal gas under the same conditions. The correct option about the gas and its compressibility factor (*Z*) is
(a) $Z < 1$ and repulsive forces are dominant
(b) $Z > 1$ and attractive forces are dominant
(c) $Z > 1$ and repulsive forces are dominant
(d) $Z < 1$ and attractive forces are dominant.

53. For a cell involving one electron, $E^\circ_{cell} = 0.59$ V at 298 K, the equilibrium constant for the cell reaction is

[Given that $\frac{2.303RT}{F} = 0.059$ V at $T = 298$ K]

(a) 1.0×10^{30} (b) 1.0×10^{2}
(c) 1.0×10^{5} (d) 1.0×10^{10}

54. Which will make basic buffer?
(a) 100 mL of 0.1 M HCl + 100 mL of 0.1 M NaOH
(b) 50 mL of 0.1 M NaOH + 25 mL of 0.1 M CH_3COOH
(c) 100 mL of 0.1 M CH_3COOH + 100 mL of 0.1 M NaOH
(d) 100 mL of 0.1 M HCl + 200 mL of 0.1 M NH_4OH

55. Which is the correct thermal stability order for H_2E (*E* = O, S, Se, Te and Po) ?
(a) $H_2Se < H_2Te < H_2Po < H_2O < H_2S$
(b) $H_2S < H_2O < H_2Se < H_2Te < H_2Po$
(c) $H_2O < H_2S < H_2Se < H_2Te < H_2Po$
(d) $H_2Po < H_2Te < H_2Se < H_2S < H_2O$

56. For an ideal solution, the correct option is
(a) $\Delta_{mix}G = 0$ at constant *T* and *P*
(b) $\Delta_{mix}S = 0$ at constant *T* and *P*
(c) $\Delta_{mix}V \neq 0$ at constant *T* and *P*
(d) $\Delta_{mix}H = 0$ at constant *T* and *P*

57. The biodegradable polymer is
(a) buna-S (b) nylon-6,6
(c) nylon-2-nylon 6 (d) nylon-6.

58. Enzymes that utilize ATP in phosphate transfer require an alkaline earth metal (*M*) as the cofactor. *M* is
(a) Sr (b) Be (c) Mg (d) Ca

59. If the rate constant for a first order reaction is *k*, the time (*t*) required for the completion of 99% of the reaction is given by
(a) $t = 2.303/k$ (b) $t = 0.693/k$
(c) $t = 6.909/k$ (d) $t = 4.606/k$

60. Which of the following diatomic molecular species has only π bonds according to Molecular Orbital Theory?
(a) Be_2 (b) O_2 (c) N_2 (d) C_2

61. pH of a saturated solution of $Ca(OH)_2$ is 9. The solubility product (K_{sp}) of $Ca(OH)_2$ is
(a) 0.5×10^{-10} (b) 0.5×10^{-15}
(c) 0.25×10^{-10} (d) 0.125×10^{-15}

62. The mixture that forms maximum boiling azeotrope is
(a) heptane + octane (b) water + nitric acid
(c) ethanol + water (d) acetone + carbon disulphide.

63. 4*d*, 5*p*, 5*f* and 6*p* orbitals are arranged in the order of decreasing energy. The correct option is
(a) $5f > 6p > 4d > 5p$ (b) $5f > 6p > 5p > 4d$
(c) $6p > 5f > 5p > 4d$ (d) $6p > 5f > 4d > 5p$

64. Which of the following is an amphoteric hydroxide?
(a) $Be(OH)_2$ (b) $Sr(OH)_2$ (c) $Ca(OH)_2$ (d) $Mg(OH)_2$

65. Which of the following is incorrect statement?
(a) SnF_4 is ionic in nature.
(b) PbF_4 is covalent in nature.
(c) $SiCl_4$ is easily hydrolysed.
(d) GeX_4 (X = F, Cl, Br, I) is more stable than GeX_2.

66. Under isothermal conditions, a gas at 300 K expands from 0.1 L to 0.25 L against a constant external pressure of 2 bar. The work done by the gas is
[Given that 1 L bar = 100 J]
(a) 30 J (b) −30 J (c) 5 kJ (d) 25 J

67. The number of sigma (σ) and pi (π) bonds in pent-2-en-4-yne is
(a) 13 σ bonds and no π bond
(b) 10 σ bonds and 3 π bonds
(c) 8 σ bonds and 5 π bonds
(d) 11 σ bonds and 2 π bonds.

68. Match the Xenon compounds in Column-I with its structure in Column-II and assign the correct code.

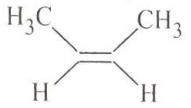
Column-I		Column-II	
(A)	XeF_4	(i)	pyramidal
(B)	XeF_6	(ii)	square planar
(C)	$XeOF_4$	(iii)	distorted octahedral
(D)	XeO_3	(iv)	square pyramidal

	(A)	(B)	(C)	(D)
(a)	(iii)	(iv)	(i)	(ii)
(b)	(i)	(ii)	(iii)	(iv)
(c)	(ii)	(iii)	(iv)	(i)
(d)	(ii)	(iii)	(i)	(iv)

69. In which case change in entropy is negative?

(a) $2H_{(g)} \longrightarrow H_{2(g)}$ (b) Evaporation of water
(c) Expansion of a gas at constant temperature
(d) Sublimation of solid to gas

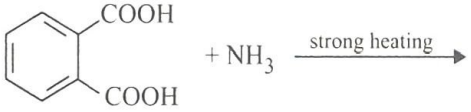
70. The most suitable reagent for the following conversion, is

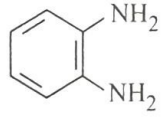
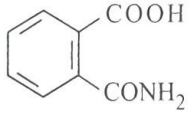
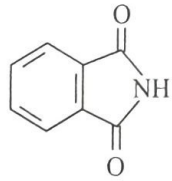
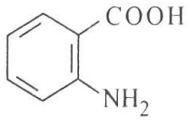
$H_3C-C\equiv C-CH_3 \longrightarrow$ 

cis-2-butene

(a) $Hg^{2+}/H^+, H_2O$ (b) Na/liquid NH_3
(c) H_2, Pd/C, quinoline (d) Zn/HCl

71. The major product of the following reaction is



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

72. Match the following :

(A) Pure nitrogen (i) Chlorine
(B) Haber process (ii) Sulphuric acid
(C) Contact process (iii) Ammonia
(D) Deacon's process (iv) Sodium azide or Barium azide

Which of the following is the correct option ?

	(A)	(B)	(C)	(D)
(a)	(iv)	(iii)	(ii)	(i)
(b)	(i)	(ii)	(iii)	(iv)
(c)	(ii)	(iv)	(i)	(iii)
(d)	(iii)	(iv)	(ii)	(i)

73. Which of the following series of transitions in the spectrum of hydrogen atom falls in visible region?

(a) Brackett series (b) Lyman series
(c) Balmer series (d) Paschen series

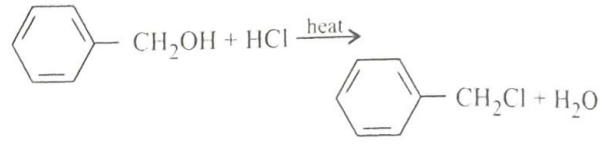
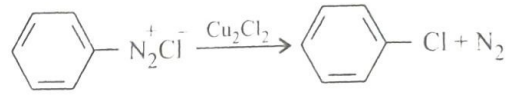
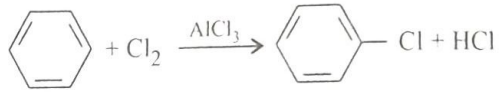
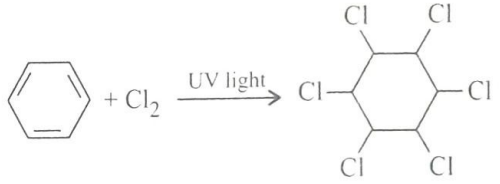
74. Among the following, the narrow spectrum antibiotic is

(a) chloramphenicol (b) penicillin G
(c) ampicillin (d) amoxycillin.

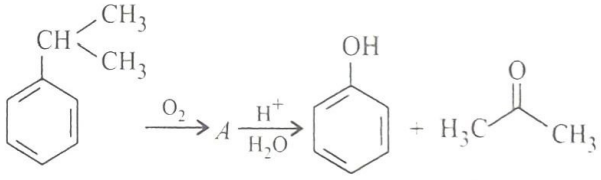
75. Which mixture of the solutions will lead to the formation of negatively charged colloidal [AgI]I^- sol?

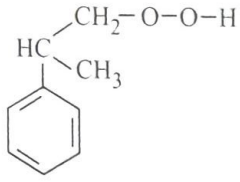
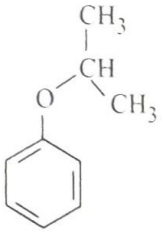
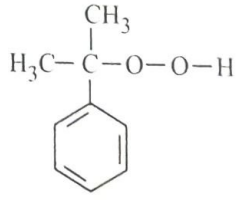
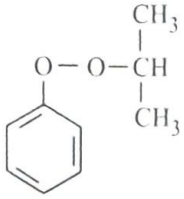
(a) 50 mL of 0.1 M $AgNO_3$ + 50 mL of 0.1 M KI
(b) 50 mL of 1 M $AgNO_3$ + 50 mL of 1.5 M KI
(c) 50 mL of 1 M $AgNO_3$ + 50 mL of 2 M KI
(d) 50 mL of 2 M $AgNO_3$ + 50 mL of 1.5 M KI

76. Among the following the reaction that proceeds through an electrophilic substitution is

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

77. The structure of intermediate *A* in the following reaction is



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

78. What is the correct electronic configuration of the central atom in $K_4[Fe(CN)_6]$ based on crystal field theory?

(a) $e^4t_2^2$ (b) $t_{2g}^4e_g^2$ (c) $t_{2g}^6e_g^0$ (d) $e^3t_2^3$

79. Among the following, the one that is not a greenhouse gas is

(a) sulphur dioxide (b) nitrous oxide
(c) methane (d) ozone.

80. Identify the incorrect statement related to PCl_5 from the following :

(a) PCl_5 molecule is non-reactive.
(b) Three equatorial P – Cl bonds make an angle of 120° with each other.

(c) Two axial P – Cl bonds make an angle of 180° with each other.

(d) Axial P – Cl bonds are longer than equatorial P – Cl bonds.

81. Which one is malachite from the following?

(a) $CuCO_3.Cu(OH)_2$ (b) $CuFeS_2$

(c) $Cu(OH)_2$ (d) Fe_3O_4

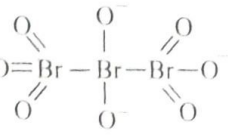
82. Which of the following species is not stable?

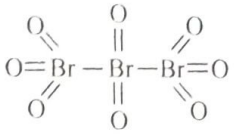
(a) $[SiCl_6]^{2-}$ (b) $[SiF_6]^{2-}$ (c) $[GeCl_6]^{2-}$ (d) $[Sn(OH)_6]^{2-}$

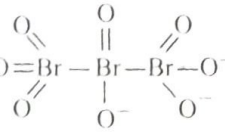
83. A compound is formed by cation *C* and anion *A*. The anions form hexagonal close packed (*hcp*) lattice and the cations occupy 75% of octahedral voids. The formula of the compound is

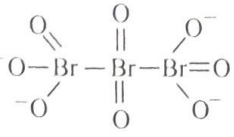
(a) C_4A_3 (b) C_2A_3 (c) C_3A_2 (d) C_3A_4

84. The correct structure of tribromooctaoxide is

(a) 

(b) 

(c) 

(d) 

85. The method used to remove temporary hardness of water is

(a) synthetic resins method (b) Calgon's method

(c) Clark's method (d) ion-exchange method.

86. The non-essential amino acid among the following is

(a) lysine (b) valine (c) leucine (d) alanine

87. The number of moles of hydrogen molecules required to produce 20 moles of ammonia through Haber's process is

(a) 40 (b) 10 (c) 20 (d) 30

88. Which of the following reactions are disproportionation reactions?

(i) $2Cu^{+} \longrightarrow Cu^{2+} + Cu^{0}$

(ii) $3MnO_4^{2-} + 4H^{+} \longrightarrow 2MnO_4^{-} + MnO_2 + 2H_2O$

(iii) $2KMnO_4 \xrightarrow{\Delta} K_2MnO_4 + MnO_2 + O_2$

(iv) $2MnO_4^{-} + 3Mn^{2+} + 2H_2O \longrightarrow 5MnO_2 + 4H^{+}$

Select the correct option from the following :

(a) (i) and (iv) only (b) (i) and (ii) only

(c) (i), (ii) and (iii) (d) (i), (iii) and (iv)

89. For the chemical reaction, $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ the correct option is

(a) $3\frac{d[H_2]}{dt} = 2\frac{d[NH_3]}{dt}$ (b) $-\frac{1}{3}\frac{d[H_2]}{dt} = -\frac{1}{2}\frac{d[NH_3]}{dt}$

(c) $-\frac{d[N_2]}{dt} = 2\frac{d[NH_3]}{dt}$ (d) $-\frac{d[N_2]}{dt} = \frac{1}{2}\frac{d[NH_3]}{dt}$

90. Conjugate base for Bronsted acids H_2O and HF are

(a) H_3O^{+} and H_2F^{+}, respectively

(b) OH^{-} and H_2F^{+}, respectively

(c) H_3O^{+} and F^{-}, respectively

(d) OH^{-} and F^{-}, respectively.

BIOLOGY

91. Grass leaves curl inwards during very dry weather. Select the most appropriate reason from the following

(a) Tyloses in vessels (b) Closure of stomata

(c) Flaccidity of bulliform cells

(d) Shrinkage of air spaces in spongy mesophyll

92. What triggers activation of protoxin to active toxin of *Bacillus thuringiensis* in boll worm?

(a) Acidic pH of stomach (b) Body temperature

(c) Moist surface of midgut (d) Alkaline pH of gut

93. Select the correctly written scientific name of Mango which was first described by Carolus Linnaeus.

(a) *Mangifera Indica* (b) *Mangifera indica Car. Linn.*

(c) *Mangifera indica* Linn. (d) *Mangifera indica*

94. Cells in G_0 phase

(a) terminate the cell cycle (b) exit the cell cycle

(c) enter the cell cycle (d) suspend the cell cycle.

95. Phloem in gymnosperms lacks

(a) both sieve tubes and companion cells

(b) albuminous cells and sieve cells

(c) sieve tubes only (d) companion cells only.

96. Which of the following contraceptive methods involves a role of hormone ?

(a) Pills, Emergency contraceptives, Barrier methods

(b) Lactational amenorrhea, Pills, Emergency contraceptives

(c) Barrier method, Lactational amenorrhea, Pills

(d) CuT, Pills, Emergency contraceptives

97. Which of the following statements is incorrect?

(a) Yeasts have filamentous bodies with long thread like hyphae.

(b) Morels and truffles are edible delicacies.

(c) *Claviceps* is a source of many alkaloids and LSD.

(d) Conidia are produced exogenously and ascospores endogenously.

98. It takes very long time for pineapple plants to produce flowers. Which combination of hormones can be applied to artificially induce flowering in pineapple plants throughout the year to increase yield?

(a) Cytokinin and Abscisic acid

(b) Auxin and Ethylene

(c) Gibberellin and Cytokinin

(d) Gibberellin and Abscisic acid

99. Conversion of glucose to glucose-6-phosphate, the first irreversible reaction of glycolysis, is catalysed by

(a) phosphofructokinase (b) aldolase

(c) hexokinase (d) enolase.

100. Consider following features.

(A) Organ system level of organisation

(B) Bilateral symmetry

(C) True coelomates with segmentation of body

Select the correct option of animal groups which possess all the above characteristics.

(a) Annelida, Mollusca and Chordata

(b) Annelida, Arthropoda and Chordata

(c) Annelida, Arthropoda and Mollusca

(d) Arthropoda, Mollusca and Chordata

101. Which of the following muscular disorders is inherited?
(a) Botulism (b) Tetany
(c) Muscular dystrophy (d) Myasthenia gravis

102. The Earth Summit held in Rio de Janeiro in 1992 was called
(a) for immediate steps to discontinue use of CFCs that were damaging the ozone layer
(b) to reduce CO_2 emissions and global warming
(c) for conservation of biodiversity and sustainable utilization of its benefits
(d) to assess threat posed to native species by invasive weed species.

103. Which of the following can be used as a biocontrol agent in the treatment of plant disease?
(a) *Lactobacillus* (b) *Trichoderma*
(c) *Chlorella* (d) *Anabaena*

104. Extrusion of second polar body from egg occurs
(a) simultaneously with first cleavage
(b) after entry of sperm but before fertilisation
(c) after fertilisation
(d) before entry of sperm into ovum.

105. Xylem translocates
(a) water, mineral salts, some organic nitrogen and hormones
(b) water only
(c) water and mineral salts only
(d) water, mineral salts and some organic nitrogen only.

106. The concept of "*Omnis cellula-e-cellula*" regarding cell division was first proposed by
(a) Aristotle (b) Rudolf Virchow
(c) Theodore Schwann (d) Schleiden.

107. Which of the following glucose transporters is insulin-dependent?
(a) GLUT IV (b) GLUT I
(c) GLUT II (d) GLUT III

108. Which of the following statements is correct?
(a) Cornea consists of dense matrix of collagen and is the most sensitive portion of the eye.
(b) Cornea is an external, transparent and protective proteinaceous covering of the eye-ball.
(c) Cornea consists of dense connective tissue of elastin and can repair itself.
(d) Cornea is convex, transparent layer which is highly vascularised.

109. Match the following genes of the *Lac* operon with their respective products.

(A) *i* gene	(i) β-galactosidase
(B) *z* gene	(ii) Permease
(C) *a* gene	(iii) Repressor
(D) *y* gene	(iv) Transacetylase

Select the correct option.

	(A)	(B)	(C)	(D)
(a)	(iii)	(iv)	(i)	(ii)
(b)	(i)	(iii)	(ii)	(iv)
(c)	(iii)	(i)	(ii)	(iv)
(d)	(iii)	(i)	(iv)	(ii)

110. Respiratory Quotient (RQ) value of tripalmitin is
(a) 0.09 (b) 0.9 (c) 0.7 (d) 0.07.

111. Which of the following statements regarding mitochondria is incorrect?
(a) Mitochondrial matrix contains single circular DNA molecule and ribosomes.
(b) Outer membrane is permeable to monomers of carbohydrates, fats and proteins.
(c) Enzymes of electron transport are embedded in outer membrane.
(d) Inner membrane is convoluted with infoldings.

112. The shorter and longer arms of a submetacentric chromosome are referred to as
(a) m-arm and n-arm respectively
(b) s-arm and l-arm respectively
(c) p-arm and q-arm respectively
(d) q-arm and p-arm respectively.

113. Purines found both in DNA and RNA are
(a) cytosine and thymine (b) adenine and thymine
(c) adenine and guanine (d) guanine and cytosine.

114. Which of the following methods is the most suitable for disposal of nuclear waste?
(a) Bury the waste within rocks deep below earth's surface
(b) Shoot the waste into space
(c) Bury the waste under Antarctic ice-cover
(d) Dump the waste within rocks under ocean

115. The ciliated epithelial cells are required to move particles or mucus in a specific direction. In humans, these cells are mainly present in
(a) bronchioles and fallopian tubes
(b) bile duct and bronchioles
(c) fallopian tubes and pancreatic duct
(d) eustachian tube and salivary duct.

116. Variations caused by mutation, as proposed by Hugo de Vries, are
(a) small and directionless (b) random and directional
(c) random and directionless (d) small and directional.

117. How does steroid hormone influence the cellular activities?
(a) Using aquaporin channels 'as second messenger'
(b) Changing the permeability of the cell membrane
(c) Binding to DNA and forming a gene-hormone complex
(d) Activating cyclic AMP located on the cell membrane

118. In *Antirrhinum* (Snapdragon), a red flower was crossed with a white flower and in F_1 generation all pink flowers were obtained. When pink flowers were selfed, the F_2 generation showed white, red and pink flowers. Choose the incorrect statements from the following.
(a) Law of segregation does not apply in this experiment.
(b) This experiment does not follow the Principle of Dominance.
(c) Pink colour in F_1 is due to incomplete dominance.
(d) Ratio of F_2 is $\frac{1}{4}$(red) : $\frac{2}{4}$(pink) : $\frac{1}{4}$(white).

119. Placentation in which ovules develop on the inner wall of the ovary or in peripheral part, is
(a) free central (b) basal
(c) axile (d) parietal.

120. Select the correct group of biocontrol agents.
(a) *Nostoc*, *Azospirillum*, *Nucleopolyhedrovirus*
(b) *Bacillus thuringiensis*, Tobacco mosaic virus, Aphids
(c) *Trichoderma*, Baculovirus, *Bacillus thuringiensis*
(d) *Oscillatoria*, *Rhizobium*, *Trichoderma*

121. The correct sequence of phases of cell cycle is
(a) $G_1 \rightarrow S \rightarrow G_2 \rightarrow M$ (b) $M \rightarrow G_1 \rightarrow G_2 \rightarrow S$
(c) $G_1 \rightarrow G_2 \rightarrow S \rightarrow M$ (d) $S \rightarrow G_1 \rightarrow G_2 \rightarrow M$.

122. Which part of the brain is responsible for thermoregulation?
(a) Medulla oblongata (b) Cerebrum
(c) Hypothalamus (d) Corpus callosum

123. Which one of the following is not a method of *in situ* conservation of biodiversity ?
(a) Sacred grove (b) Biosphere reserve
(c) Wildlife sanctuary (d) Botanical garden

124. Which of the following pairs of gases is mainly responsible for greenhouse effect?
(a) Carbon dioxide and methane
(b) Ozone and ammonia (c) Oxygen and nitrogen
(d) Nitrogen and sulphur dioxide

125. Persistent nucellus in the seed is known as
(a) tegmen (b) chalaza
(c) perisperm (d) hilum.

126. Match the Column - I with Column - II.

	Column-I		Column-II
(A)	P-wave	(i)	Depolarisation of ventricles
(B)	QRS complex	(ii)	Repolarisation of ventricles
(C)	T-wave	(iii)	Coronary ischemia
(D)	Reduction in the size of T- wave	(iv)	Depolarisation of atria
		(v)	Repolarisation of atria

Select the correct option.

	(A)	(B)	(C)	(D)
(a)	(ii)	(iii)	(v)	(iv)
(b)	(iv)	(i)	(ii)	(iii)
(c)	(iv)	(i)	(ii)	(v)
(d)	(ii)	(i)	(v)	(iii)

127. Following statements describe the characteristics of the enzyme restriction endonuclease. Identify the incorrect statement.
(a) The enzyme recognises a specific palindromic nucleotide sequence in the DNA.
(b) The enzyme cuts DNA molecule at identified position within the DNA.
(c) The enzyme binds DNA at specific sites and cuts only one of the two strands.
(d) The enzyme cuts the sugar-phosphate backbone at specific sites on each strand.

128. Which of the following is true for Golden rice?
(a) It has yellow grains, because of a gene introduced from a primitive variety of rice.
(b) It is vitamin A enriched, with a gene from daffodil.
(c) It is pest resistant, with a gene from *Bacillus thuringiensis*.
(d) It is drought tolerant, developed using *Agrobacterium* vector.

129. Match Column -I with Column - II.

	Column-I		Column-II
(A)	Saprophyte	(i)	Symbiotic association of fungi with plant roots
(B)	Parasite	(ii)	Decomposition of dead organic materials
(C)	Lichens	(iii)	Living on living plants or animals
(D)	Mycorrhiza	(iv)	Symbiotic association of algae and fungi

Choose the correct answer from the options given below.

	(A)	(B)	(C)	(D)
(a)	(ii)	(iii)	(iv)	(i)
(b)	(i)	(ii)	(iii)	(iv)
(c)	(iii)	(ii)	(i)	(iv)
(d)	(ii)	(i)	(iii)	(iv)

130. What would be the heart rate of a person if the cardiac output is 5 L, blood volume in the ventricles at the end of diastole is 100 mL and at the end of ventricular systole is 50 mL ?
(a) 125 beats per minute (b) 50 beats per minute
(c) 75 beats per minute (d) 100 beats per minute

131. Which of the following statements is incorrect?
(a) Prions consist of abnormally folded proteins.
(b) Viroids lack a protein coat.
(c) Viruses are obligate parasites.
(d) Infective constituent in viruses is the protein coat.

132. Match the following structures with their respective location in organs.

(A)	Crypts of Lieberkuhn	(i)	Pancreas
(B)	Glisson's Capsule	(ii)	Duodenum
(C)	Islets of Langerhans	(iii)	Small intestine
(D)	Brunner's Glands	(iv)	Liver

Select the correct option from the following:

	(A)	(B)	(C)	(D)
(a)	(iii)	(ii)	(i)	(iv)
(b)	(iii)	(i)	(ii)	(iv)
(c)	(ii)	(iv)	(i)	(iii)
(d)	(iii)	(iv)	(i)	(ii)

133. Which of the following immune response is responsible for rejection of kidney graft ?
(a) Cell-mediated immune response
(b) Auto-immune response (c) Humoral immune response
(d) Inflammatory immune response

134. Identify the cells whose secretion protects the lining of gastro-intestinal tract from various enzymes.
(a) Duodenal cells (b) Chief cells
(c) Goblet cells (d) Oxyntic cells

135. Under which of the following conditions there will be no change in the reading frame of following *m*RNA?
5' AACAGCGGUGCUAUU 3'
(a) Deletion of GGU from 7^{th}, 8^{th} and 9^{th} positions
(b) Insertion of G at 5^{th} position
(c) Deletion of G from 5^{th} position
(d) Insertion of A and G at 4^{th} and 5^{th} position respectively

136. Which of the following is a commercial blood cholesterol lowering agent?
(a) Lipases (b) Cyclosporin A
(c) Statin (d) Streptokinase

137. Select the incorrect statement.
(a) Human males have one of their sex-chromosome much shorter than other.
(b) Male fruit fly is heterogametic.
(c) In male grasshoppers, 50% of sperms have no sex-chromosome.
(d) In domesticated fowls sex of progeny depends on the type of sperm rather than egg.

138. Tidal Volume and Expiratory Reserve Volume of an athlete is 500 mL and 1000 mL respectively. What will be his expiratory capacity if the Residual Volume is 1200 mL?
(a) 2700 mL (b) 1500 mL (c) 1700 mL (d) 2200 mL

139. Select the correct sequence for transport of sperm cells in male reproductive system.
(a) Testis → Epididymis → Vasa efferentia → Vas deferens → Ejaculatory duct → Inguinal canal → Urethra → Urethral meatus
(b) Testis → Epididymis → Vasa efferentia → Rete testis → Inguinal canal → Urethra
(c) Seminiferous tubules → Rete testis → Vasa efferentia → Epididymis → Vas deferens → Ejaculatory duct → Urethra → Urethral meatus
(d) Seminiferous tubules → Vasa efferentia → Epididymis → Inguinal canal → Urethra

140. Colostrum, the yellowish fluid, secreted by mother during the initial days of lactation is very essential to impart immunity to the new born infants because it contains
(a) immunoglobulin A (b) natural killer cells
(c) monocytes (d) macrophages.

141. In some plants, the female gamete develops into embryo without fertilisation. This phenomenon is known as
(a) parthenogenesis (b) autogamy
(c) parthenocarpy (d) syngamy.

142. Identify the correct pair representing the causative agent of typhoid fever and the confirmatory test for typhoid.
(a) *Salmonella typhi* / Widal test
(b) *Plasmodium vivax* / UTI test
(c) *Streptococcus pneumoniae* / Widal test
(d) *Salmonella typhi* / Anthrone test

143. Expressed Sequence Tags (ESTs) refers to
(a) novel DNA sequences (b) genes expressed as RNA
(c) polypeptide expression (d) DNA polymorphism.

144. Match the following hormones with their respective disease.

(A) Insulin	(i) Addison's disease
(B) Thyroxin	(ii) Diabetes insipidus
(C) Corticoids	(iii) Acromegaly
(D) Growth hormone	(iv) Goitre
	(v) Diabetes mellitus

Select the correct option.

	(A)	(B)	(C)	(D)
(a)	(ii)	(iv)	(i)	(iii)
(b)	(v)	(i)	(ii)	(iii)
(c)	(ii)	(iv)	(iii)	(i)
(d)	(v)	(iv)	(i)	(iii)

145. Which of the following factors is responsible for the formation of concentrated urine?
(a) Hydrostatic pressure during glomerular filtration
(b) Low levels of antidiuretic hormone
(c) Maintaining hyperosmolarity towards the medullary interstitium in the kidneys
(d) Secretion of erythropoietin by Juxtaglomerular complex

146. Select the hormone-releasing Intra-Uterine Devices.
(a) Lippe's Loop, Multiload 375
(b) Vaults, LNG-20
(c) Multiload 375, Progestasert
(d) Progestasert, LNG-20

147. Match the following organisms with respective characteristics

(A) *Pila*	(i) Flame cells
(B) *Bombyx*	(ii) Comb plates
(C) *Pleurobrachia*	(iii) Radula
(D) *Taenia*	(iv) Malpighian tubules

Select the correct option from the following.

	(A)	(B)	(C)	(D)
(a)	(iii)	(ii)	(iv)	(i)
(b)	(iii)	(ii)	(i)	(iv)
(c)	(iii)	(iv)	(ii)	(i)
(d)	(ii)	(iv)	(iii)	(i)

148. Which of the following sexually transmitted diseases is not completely curable?
(a) Chlamydiasis (b) Gonorrhoea
(c) Genital warts (d) Genital herpes

149. Drug called 'Heroin' is synthesised by
(a) nitration of morphine (b) methylation of morphine
(c) acetylation of morphine (d) glycosylation of morphine.

150. What is the site of perception of photoperiod necessary for induction of flowering in plants?
(a) Leaves (b) Lateral buds
(c) Pulvinus (d) Shoot apex

151. A gene locus has two alleles A, a. If the frequency of dominant allele A is 0.4, then what will be the frequency of homozygous dominant, heterozygous and homozygous recessive individuals in the population?
(a) 0.16 (AA); 0.36 (Aa); 0.48 (aa)
(b) 0.36 (AA); 0.48 (Aa); 0.16 (aa)
(c) 0.16 (AA); 0.24 (Aa); 0.36 (aa)
(d) 0.16 (AA); 0.48 (Aa); 0.36 (aa)

152. What map unit (Centimorgan) is adopted in the construction of genetic maps?
(a) A unit of distance between genes on chromosomes, representing 50% cross over.
(b) A unit of distance between two expressed genes, representing 10% cross over.
(c) A unit of distance between two expressed genes, representing 100% cross over.
(d) A unit of distance between genes on chromosomes, representing 1% cross over.

153. Concanavalin A is
(a) a pigment (b) an alkaloid
(c) an essential oil (d) a lectin.

154. *Pinus* seed cannot germinate and establish without fungal association. This is because
(a) its seeds contain inhibitors that prevent germination
(b) its embryo is immature

(c) it has obligate association with mycorrhizae
(d) it has very hard seed coat.

155. The frequency of recombination between gene present on the same chromosome as a measure of the distance between genes was explained by
(a) Sutton Boveri (b) T.H. Morgan
(c) Gregor J.Mendel (d) Alfred Sturtevant.

156. In a species, the weight of newborn ranges form 2 to 5 kg. 97% of the newborn with an average weight between 3 to 3.3 kg survive whereas 99% of the infants born with weights from 2 to 2.5 or 4.5 to 5 kg die. Which type of selection process is taking place? .
(a) Cyclical selection (b) Directional selection
(c) Stabilising selection (d) Disruptive selection

157. Match the hominids with their correct brain size.
(A) *Homo habilis* (i) 900cc
(B) *Homo neanderthalensis* (ii) 1350 cc
(C) *Homo erectus* (iii) 650-800cc
(D) *Homo sapiens* (iv) 1400cc
Select the correct option.

	(A)	(B)	(C)	(D)
(a)	(iv)	(iii)	(i)	(ii)
(b)	(iii)	(i)	(iv)	(ii)
(c)	(iii)	(ii)	(i)	(iv)
(d)	(iii)	(iv)	(i)	(ii)

158. Select the correct option.
(a) There are seven pairs of vertebrosternal, three pairs of vertebrochondral and two pairs of vertebral ribs.
(b) 8^{th}, 9^{th} and 10^{th} pairs of ribs articulate directly with the sternum.
(c) 11^{th} and 12^{th} pairs of ribs are connected to the sternum with the help of hyaline cartilage.
(d) Each rib is a flat thin bone and all the ribs are connected dorsally to the thoracic vertebrae and ventrally to the sternum.

159. What is the direction of movement of sugars in phloem?
(a) Bi-directional (b) Non-multidirectional
(c) Upward (d) Downward

160. Polyblend, a fine powder of recycled modified plastic, has proved to be a good material for
(a) making tubes and pipes (b) making plastic sacks
(c) use as a fertiliser (d) construction of roads.

161. Which of the following ecological pyramids is generally inverted?
(a) Pyramid of biomass in a sea
(b) Pyramid of numbers in grassland
(c) Pyramid of energy
(d) Pyramid of biomass in a forest

162. Use of an artificial kidney during hemodialysis may result in
(A) nitrogenous waste build-up in the body
(B) non-elimination of excess potassium ions
(C) reduced absorption of calcium ions from gastro-intestinal tract
(D) reduced RBC production.
Which of the following options is the most appropriate?
(a) (A) and (D) are correct. (b) (A) and (B) are correct.
(c) (B) and (C) are correct. (d) (C) and (D) are correct.

163. Which of the following pairs of organelles does not contain DNA?
(a) Nuclear envelope and Mitochondria
(b) Mitochondria and Lysosome
(c) Chloroplast and Vacuoles
(d) Lysosomes and Vacuoles

164. Which of the following is the most important for animals and plants being driven to extinction?
(a) Alien species invasion
(b) Habitat loss and fragmentation
(c) Drought and floods (d) Economic exploitation

165. What is the fate of the male gametes discharged in the synergid?
(a) One fuses with the egg and other fuses with central cell nuclei.
(b) One fuses with the egg, other(s) degenerates in the synergid.
(c) All fuse with the egg.
(d) One fuses with the egg, other(s) fuse(s) with synergid nucleus.

166. Which of the following protocols did aim reducing emission of chlorofluorocarbons into atmosphere?
(a) Geneva Protocol (b) Montreal Protocol
(c) Kyoto Protocol (d) Gothenburg Protocol

167. Due to increasing air-borne allergens and pollutants, many people in urban areas are suffering from respiratory disorder that cause wheezing due to
(a) reduction in the secretion of surfactant by pneumocytes
(b) benign growth on mucous lining of nasal cavity
(c) inflammation of bronchi and bronchioles
(d) proliferation of fibrous tissues and damage of the alveolar walls.

168. From evolutionary point of view, retention of the female gametophyte with developing young embryo on the parent sporophyte for some time, is first observed in
(a) gymnosperms (b) liverworts
(c) mosses (d) pteridophytes.

169. What is the genetic disorder in which an individual has an overall masculine development, gynaecomastia, and is sterile?
(a) Down's syndrome (b) Turner's syndrome
(c) Klinefelter's syndrome (d) Edward syndrome

170. Which of the following features of genetic code does allow bacteria to produce human insulin by recombinant DNA technology?
(a) Genetic code is specific.
(b) Genetic code is not ambiguous.
(c) Genetic code is redundant.
(d) Genetic code is nearly universal.

171. Match the following organisms with the products they produce.
(A) *Lactobacillus* (i) Cheese
(B) *Saccharomyces cerevisiae* (ii) Curd
(C) *Aspergillus niger* (iii) Citric acid
(D) *Acetobacter aceti* (iv) Bread
(v) Acetic acid
Select the correct option.

	(A)	(B)	(C)	(D)
(a)	(ii)	(i)	(iii)	(v)
(b)	(ii)	(iv)	(v)	(iii)
(c)	(ii)	(iv)	(iii)	(v)
(d)	(iii)	(iv)	(v)	(i)

172. DNA precipitation out of a mixture of biomolecules can be achieved by treatment with
(a) chilled chloroform (b) isopropanol
(c) chilled ethanol
(d) methanol at room temperature.

173. *Thiobacillus* is a group of bacteria helpful in carrying out
(a) denitrification (b) nitrogen fixation
(c) chemoautotrophic fixation
(d) nitrification.

174. Which of the following statements is not correct?
(a) Lysosomes are formed by the process of packaging in the endoplasmic reticulum.
(b) Lysosomes have numerous hydrolytic enzymes.
(c) The hydrolytic enzymes of lysosomes are active under acidic pH.
(d) Lysosomes are membrane-bound structures.

175. Select the incorrect statement.
(a) Inbreeding helps in accumulation of superior genes and elimination of undesirable genes.
(b) Inbreeding increases homozygosity.
(c) Inbreeding is essential to evolve purelines, in any animal.
(d) Inbreeding selects harmful recessive gene that reduce fertility and productivity.

176. Select the correct sequence of organs in the alimentary canal of cockroach starting from mouth.
(a) Pharynx → Oesophagus → Ileum → Crop → Gizzard → Colon → Rectum
(b) Pharynx → Oesophagus → Crop → Gizzard → Ileum → Colon → Rectum
(c) Pharynx → Oesophagus → Gizzard → Crop → Ileum → Colon → Rectum
(d) Pharynx → Oesophagus → Gizzard → Ileum → Crop → Colon → Rectum

177. Consider the following statements.
(A) Coenzyme or metal ion that is tightly bound to enzyme protein is called prosthetic group.
(B) A complete catalytic active enzyme with its bound prosthetic group is called apoenzyme.
Select the correct option.
(a) (A) is false but (B) is true.
(b) Both (A) and (B) are true.
(c) (A) is true but (B) is false.
(d) Both (A) and (B) are false.

178. Which of the statements given below is not true about formation of annual rings in trees?
(a) Annual rings are not prominent in trees of temperate region.
(b) Annual ring is a combination of spring wood and autumn wood produced in a year.
(c) Differential activity of cambium causes light and dark bands of tissue-early and late wood respectively.
(d) Activity of cambium depends upon variation in climate.

179. Which one of the following statements regarding post-fertilisation development in flowering plants is incorrect?
(a) Ovules develop into embryo sac.
(b) Ovary develops into fruit.
(c) Zygote develops into embryo.
(d) Central cell develops into endosperm.

180. Which one of the following equipments is essentially required for growing microbes on a large scale, for industrial production of enzymes?
(a) Bioreactor (b) BOD incubator
(c) Sludge digester (d) Industrial oven

answer key

PHYSICS

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

CHEMISTRY

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

BIOLOGY

91.	(c)	92.	(d)	93.	(c)	94.	(b)	95.	(a)	96.	(b)	97.	(a)	98.	(b)	99.	(c)	100.	(b)
101.	(c)	102.	(c)	103.	(b)	104.	(b)	105.	(a)	106.	(b)	107.	(a)	108.	(a)	109.	(d)	110.	(c)
111.	(c)	112.	(c)	113.	(c)	114.	(a)	115.	(a)	116.	(c)	117.	(c)	118.	(a)	119.	(d)	120.	(c)
121.	(a)	122.	(c)	123.	(d)	124.	(a)	125.	(c)	126.	(b)	127.	(c)	128.	(b)	129.	(a)	130.	(d)
131.	(d)	132.	(d)	133.	(a)	134.	(c)	135.	(a)	136.	(c)	137.	(d)	138.	(b)	139.	(c)	140.	(a)
141.	(a)	142.	(a)	143.	(b)	144.	(d)	145.	(c)	146.	(d)	147.	(c)	148.	(d)	149.	(c)	150.	(a)
151.	(d)	152.	(d)	153.	(d)	154.	(c)	155.	(d)	156.	(c)	157.	(d)	158.	(a)	159.	(a)	160.	(d)
161.	(a)	162.	(d)	163.	(d)	164.	(b)	165.	(a)	166.	(b)	167.	(c)	168.	(d)	169.	(c)	170.	(d)
171.	(c)	172.	(c)	173.	(a)	174.	(a)	175.	(d)	176.	(b)	177.	(d)	178.	(a)	179.	(a)	180.	(a)