NEET (2024)

PRACTICE TEST-02

DURATION : 200 Minutes | **M. MARKS : 720**

Topics Covered

Physics :	Electric Potential and capacitance, Current Electricity (up to power topic)
Chemistry :	Complete 12th physical chemistry
Biology :	**(Botany):** Principles of Inheritance and Variation, Pedigree Analysis, Disorder-Mendelian & Chromosomal Disorder-Mendelian & Chromosomal, Mutation-3, Mutation-4, Pedigree Analysis-1
	(Zoology): Reproductive health + human health and diseases (immunity, types of immunity vaccination, allergy up to lymphoid organs.

General Instructions:

1. Immediately fill in the particulars on this page of the test booklet.
2. The test is of **3 hours 20 min**. duration.
3. The test booklet consists of **200** questions. The maximum marks are **720**.
4. There are four Section in the Question Paper, Section I, II, III & IV consisting of Section-I **(Physics)**, Section-II **(Chemistry)**, Section-III **(Botany)** & Section IV **(Zoology)** and having **50 Questions** in each Subject and each subject is divided in two Section, **Section A** consisting 35 questions (all questions all compulsory) and **Section B** consisting 15 Questions (Any 10 questions are compulsory).
5. There is only one correct response for each question.
6. Each correct answer will give 4 marks while 1 Mark will be deducted for a wrong MCQ response.
7. No student is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc. inside the examination room/hall.
8. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator on duty in the Room/Hall. However, the candidates are allowed to take away this Test Booklet with them.

OMR Instructions:

1. Use blue/black dark ballpoint pens.
2. Darken the bubbles completely. Don't put a tick mark or a cross mark where it is specified that you fill the bubbles completely. Half-filled or over-filled bubbles will not be read by the software.
3. Never use pencils to mark your answers.
4. Never use whiteners to rectify filling errors as they may disrupt the scanning and evaluation process.
5. Writing on the OMR Sheet is permitted on the specified area only and even small marks other than the specified area may create problems during the evaluation.
6. Multiple markings will be treated as invalid responses.
7. **Do not fold or make any stray mark on the Answer Sheet (OMR).**

SECTION-I (PHYSICS)

SECTION - A

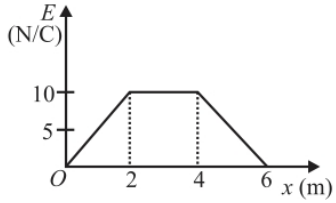
1. Four charges of same magnitude q are placed at four comers of a square of side a. The value of electric potential at the centre of the square will be

(Where $k = \frac{1}{4\pi\varepsilon_0}$)

(1) $\frac{4kq}{a}$ (2) $4\sqrt{2}\frac{kq}{a}$

(3) $\frac{4kq}{\sqrt{2}a}$ (4) $\frac{kq}{a\sqrt{2}}$

2. Figure shows the variation of electric field intensity E versus distance x. What is the potential difference between the points at $x = 2$ m and $x = 6$ m from O?



(1) 30 V (2) 60 V

(3) 40 V (4) 80 V

3. The electric potential in volts due to an electric dipole of dipole moment 2×10^{-8} coulomb-metre at a distance of 3 m on a line making an angle of 60° with the axis of the dipole is

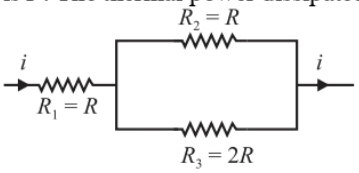
(1) Zero

(2) 10

(3) 20

(4) 40

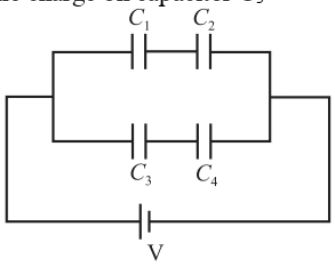
4. In the circuit shown, the thermal power dissipated in R_1 is P. The thermal power dissipated in R_2 is



(1) P (2) $4P/9$

(3) $2P/3$ (4) $P/9$

5. Find the charge on capacitor C_3



Given, that $C_1 = C_2 = C$ and $C_3 = C_4 = 3C$.

(1) $\frac{3}{2}CV$ (2) $\frac{CV}{2}$

(3) $3CV$ (4) $2CV$

6. A potential difference of 10 V is applied across a conductor of 1000 Ω. The number of electrons flowing through the conductor in 300 s is

(1) 1.875×10^{16}

(2) 1.875×10^{17}

(3) 1.875×10^{22}

(4) 1.875×10^{19}

7. The temperature co-efficient of resistance of a wire at 0°C is 0.00125 °C^{-1}. At 25°C its resistance is one ohm. The resistance of the wire will be 1.2 ohm at

(1) 225 K (2) 190°C

(3) 260°C (4) 185 K

8. A wire has resistance 12 Ω. It is bent in the form of a circle. The effective resistance between the two points on any diameter of the circle is:

(1) 12 Ω (2) 24 Ω

(3) 3 Ω (4) 6 Ω

9. The work done against electric forces in increasing the potential difference of a condenser from 20 V to 40 V is W. The work done in increasing its potential difference from 40 V to 50 V will be (consider capacitance of capacitor remain constant)

(1) $4W$ (2) $3W/4$

(3) $2W$ (4) $W/2$

10. 20 μA current flows for 30 seconds in a wire, transfer of charge will be

(1) 2×10^{-4} C (2) 4×10^{-4} C

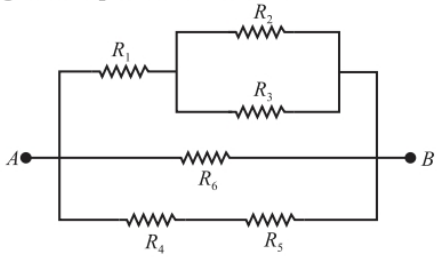
(3) 6×10^{-4} C (4) 8×10^{-4} C

11. A parallel plate condenser is connected to a battery of emf 4 volt. If a plate of dielectric constant 8 is inserted into it, then the potential difference across the condenser plate will be:

(1) 1/2 V (2) 2 V

(3) 4 V (4) 32 V

12. Consider the combination of resistors as shown in figure and pick out the correct statement



(1) R_1 and R_4 are connected in parallel

(2) R_2 and R_1 are connected in parallel

(3) R_2 and R_3 are connected in parallel

(4) R_6 and R_4 are connected in parallel

13. Given a current carrying wire of non-uniform cross section. Which of the following quantity or quantities are constant throughout the length of the wire?

(1) Current, electric field and drift speed
(2) Drift speed only
(3) Current and drift speed
(4) Current only

14. A piece of silver and another of Silicon semiconductor heated from room temperature. The resistance of

(1) Each of them increases
(2) Each of them decreases
(3) Silver increases and Silicon decreases
(4) Silver decreases and Silicon increases

15. Work done in carrying an electric charge Q_1 once round a circle of radius R with a charge Q_2 at the center of the circle is

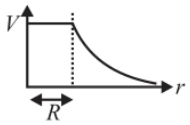
(1) $\frac{Q_1Q_2}{4\pi\varepsilon_0 R}$

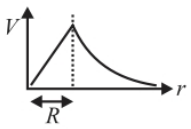
(2) ∞

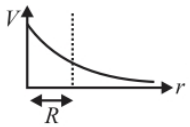
(3) $\frac{Q_1Q_2}{5\pi\varepsilon_0 R}$

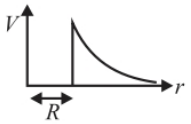
(4) Zero

16. The variation of electrostatic potential with radial distance r from the centre of a positive charged metallic thin shell of radius R is given by the graph.

(1) 

(2) 

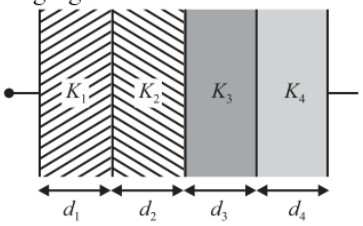
(3) 

(4) 

17. When a test charge is brought in from infinity along the perpendicular bisector of an electric dipole, the work done is

(1) Positive
(2) Zero
(3) Negative
(4) None of these

18. The effective capacitance of the system in adjoining figure will be:



(1) $C=\frac{\varepsilon_0 A}{\left[\frac{d_1}{K_1}+\frac{d_2}{K_2}+\frac{d_3}{K_3}+\frac{d_4}{K_4}\right]}$

(2) $C=\frac{\varepsilon_0 A}{4d}$

(3) $C=\frac{4d}{\varepsilon_0 A}$

(4) $C=\frac{K_1K_2K_4K_3}{4d}$

19. Which of the following is not true?

(1) For a point charge, the electrostatic potential varies as $1/r$
(2) For a dipole, the potential depends on the position vector and dipole moment vector
(3) The electric dipole potential varies as $1/r$ at large distance
(4) For a point charge, the electrostatic field varies as $1/r^2$

20. An infinite conducting sheet has surface charge density σ. The distance between two equipotential surface is r. The potential difference between these two surfaces is

(1) $\frac{\sigma r}{2\varepsilon_0}$ (2) $\frac{\sigma r}{\varepsilon_0}$

(3) $\frac{\sigma}{\varepsilon_0 r}$ (4) $\frac{\sigma}{2\varepsilon_0 r}$

21. Electron and proton is moving away from each other then potential energy of system

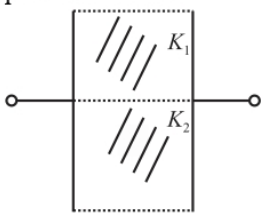
(1) Remains same (2) Increasing
(3) Decreasing (4) None of these

22. A parallel plate air capacitance C. Now half of the space is filled with a dielectric material with dielectric constant K as shown in figure. The new capacitance is C'. Then

(1) $C'=\frac{C}{2}[1+K]$ (2) $C'=C[1+K]$

(3) $C'=C[1+\frac{K}{2}]$ (4) $C'=C[\frac{1}{2}+K]$

23. A capacitor of plate area A and separation d is filled with two dielectric constant $K_1 = 6$ and $K_2 = 4$. New capacitance will be



(1) $4\frac{A\varepsilon_0}{d}$ (2) $4.8\frac{A\varepsilon_0}{d}$

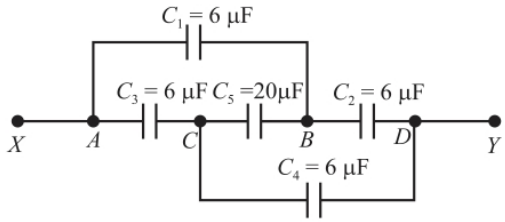
(3) $5\frac{A\varepsilon_0}{d}$ (4) $2.4\frac{A\varepsilon_0}{d}$

24. A hollow spherical conductor of radius r and potential of 100 V at its outer surface. The potential inside the hollow at a distance of $r/2$ from its centre is

(1) 100 V (2) 50 V

(3) 200 V (4) Zero

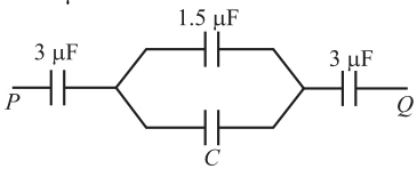
25. What is the effective capacitance between point X and Y?



(1) 12 μF (2) 18 μF

(3) 24 μF (4) 6 μF

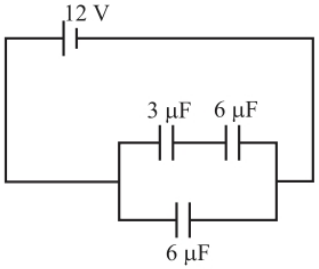
26. The equivalent capacitance of the network given below 1 μF. The value of 'C' is:



(1) 3 μF (2) 1.5 μF

(3) 2. 5μF (4) 1 μF

27. Charge Q taken from the battery of 12 V in the circuit is



(1) 96 μC (2) 36 μC

(3) 156 μC (4) 20 μC

28. Eight drops of mercury of same radius and having same charge coalesce to form a big drop. Capacitance of big drop relative to that of small drop will be

(1) 16 times

(2) 8 times

(3) 4 times

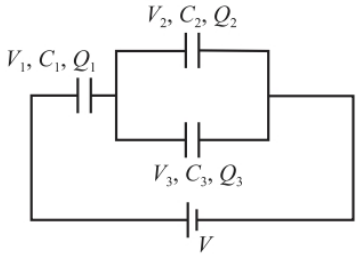
(4) 2 times

29. A capacitor of 30 μF charged to 100 V is connected in parallel to capacitor of 20 μF charged to 50 volt. The common potential is

(1) 75 V (2) 50 V

(3) 150 V (4) 80 V

30. The correct combination is: (symbols have their usual meanings)



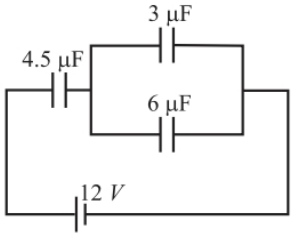
(1) $Q_1 = Q_2 = Q_3$ and $V_1 = V_2 = V_3 = V$

(2) $Q_1 = Q_2 + Q_3$ and $V = V_1 + V_2 + V_3$

(3) $Q_1 = Q_2 + Q_3$ and $V = V_1 + V_2$

(4) $Q_2 = Q_3$ and $V = V_2 + V_3$

31. In the circuit the potential difference across the 4.5 μF capacitor is



(1) 8/3 volt (2) 4 volt

(3) 6 volt (4) 8 volt

32. Two copper wires of length L and $2L$ have radii R and $2R$ respectively. What is ratio of their specific resistance?

(1) 1 : 2 (2) 2 : 1

(3) 1 : 1 (4) 1 : 3

33. Current density $\vec{J}$ at an area $\vec{A} = \left(2\hat{i} + 3\hat{j}\right)\text{mm}^2$ is $\vec{J} = \left(3\hat{j} + 4\hat{k}\right)\text{A/m}^2$. Current through the area is

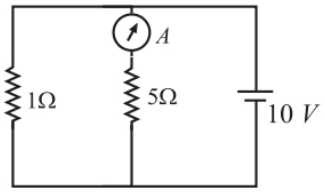
(1) 9 μA (2) Zero

(3) 18 μA (4) 12 μA

34. The distance between the plates of a parallel plate condenser is d. If a copper plate of same area but thickness $d/2$ placed between the plates then the new capacitance will become:

(1) Half (2) Double
(3) One fourth (4) Unchanged

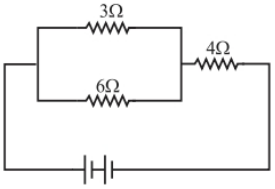
35. In the given diagram, the reading of the ammeter is (when the internal resistance of the battery is zero)



(1) 40/29 A (2) 10/9
(3) 5/3 (4) 2 A

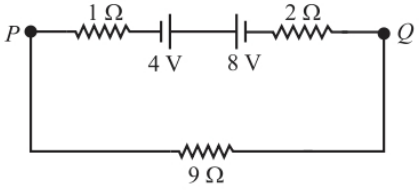
SECTION – B

36. If the current through 3 Ω resistor is 0.8 A, then potential drop across 4 Ω resistor is



(1) 1.2 V (2) 2.6 V
(3) 4.8 V (4) 9.6 V

37. Two batteries of emf 4 V and 8 V having the internal resistance of 1 Ω and 2 Ω respectively are connected in circuit with a resistance of 9 Ω as shown in figure. The current and potential difference between the points P and Q are



(1) $\frac{1}{2}$ A and 12 V

(2) $\frac{1}{9}$ A and 9 V

(3) $\frac{1}{6}$ A and 4 V

(4) $\frac{1}{3}$ A and 3 V

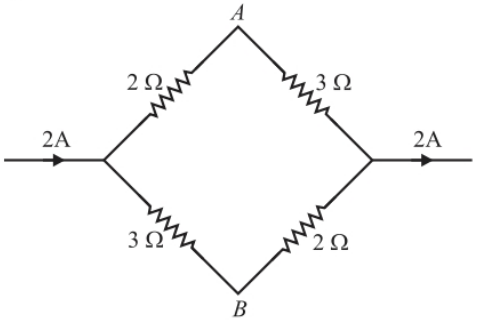
38. Two wire A and B of the same material, having radii in the ratio 1 : 2 carry currents in the ratio 4 : 1. The ratio of drift speed of electrons in A and B is

(1) 16 : 1 (2) 1 : 4
(3) 1 : 16 (4) 4 : 1

39. Two electric bulbs whose resistance are in the ratio of 1 : 2 are connected in parallel to a constant voltage source. The power dissipated in them has the ratio

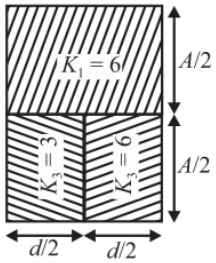
(1) 2 : 1 (2) 1 : 1
(3) 1 : 4 (4) 1 : 2

40. Potential difference $V_A - V_B$ in the network shown is



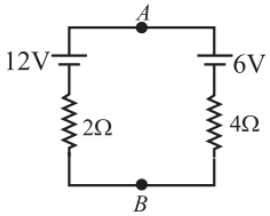
(1) 1 V (2) –1 V
(3) 2 V (4) –2 V

41. Three different dielectrics are filled in a parallel plate capacitor as shown. What would be the dielectric constant of a material, which when fully filled between the plates produces same capacitance?



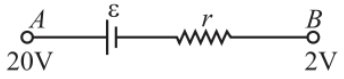
(1) 4 (2) 6
(3) 5 (4) 9

42. Potential difference across AB i.e., $V_A - V_B$ is



(1) 10 V (2) 8 V
(3) 6 V (4) Zero

43. In the figure a part of circuit is shown:



(1) Current will flow from A to B
(2) Current may flow from A to B
(3) Current will flow from B to A
(4) The direction of current will depend on r.

44. A parallel plate capacitor is charged and then Battery is removed. On increasing the plate separation:

	Charge	Potential	Capacitance
(1)	Remains constant	Remains constant	Decreases
(2)	Remains constant	Increases	Decreases
(3)	Remains constant	Decreases	Increases
(4)	Increases	Increases	Decreases

45. A parallel plate capacitor is charged and the charging battery is then disconnected. The plates of capacitor are now moved, farther apart. The following things happen:

(1) The charge on the capacitor increases
(2) The electrostatics energy stored in the capacitor increases
(3) The voltage between the plates decreases
(4) The capacitance increases

46. Two parallel plate condensers of capacity of 20 μF and 30 μF are charged to the potential of 30 V and 20 V respectively. If likely charged plates are connected together then the common potential difference will be:

(1) 100 V (2) 50 V
(3) 24 V (4) 10 V

47. An equipotential surface and an electric line of force:

(1) Never intersect each other
(2) Intersect at 45°
(3) Intersect at 60°
(4) Intersect at 90°

48. You are given an arrangement of three point charges q, $2q$ and xq separated by equal finite distances that electric potential energy of the system is zero. Then the value of x is:

(1) –2/3
(2) –1/3
(3) 2/3
(4) 3/2

49. A uniformly charged sphere of radius 1 cm has potential of 8000 V at surface. The energy density near the surface of sphere will be:

(1) 64×10^5 J/m^3
(2) 8×10^3 J/m^3
(3) 32 J/m^3
(4) 2.83 J/m^3

50. The electric potential V as a function of distance x (in metre) is given by $V = (5x^2 + 10x - 9)$ volt. The value of electric field at $x = 1$ m would be:

(1) –20 volt/m
(2) 6 volt/m
(3) 11 volt/m
(4) –23 volt/m

SECTION-II (CHEMISTRY)

SECTION - A

51. Which of the following is not the example of crystalline solids?

(1) KCl (2) CsCl
(3) Glass (4) Rhombic sulphur

52. The number of atoms per unit cell of bcc structure is:

(1) 1 (2) 2
(3) 4 (4) 6

53. A compound of "A" and "B" crystallises in a cubic lattice in which the 'A' atoms occupy the lattice points at the corners of the cube. The 'B' atoms occupy the centre of each face of the cube. The probable empirical formula of the compound is:

(1) A_3B (2) AB
(3) AB_3 (4) AB_2

54. Co-ordination number of [Cs^+] and [Cl^-] in CsCl crystal are:

(1) 8, 8 (2) 4, 4
(3) 6, 6 (4) 8, 4

55. The radii of [Na^+] and [Cl^-] ions are 95 pm and 181 pm respectively. The edge length of NaCl unit cell is:

(1) 276 pm (2) 138 pm
(3) 552 pm (4) 415 pm

56. An element crystalizes in a structure having fcc unit cell of an edge 200 pm. Calculate the density if 200 gm of it contains 24×10^{23} atoms:

(1) 41.6 gm/cm^3
(2) 42.6 gm/cm^3
(3) 43.6 gm/cm^3
(4) 44.6 gm/cm^3

57. When electrons are trapped into the crystal in anion vacancy, the defect is known as:
(1) Schottky defect (2) Frenkel defect
(3) Stoichiometric (4) F-centres

58. The correct order of the packing efficiency in different types of unit cells is:
(1) fcc < bcc < simple cubic
(2) fcc > bcc > simple cubic
(3) fcc < bcc > simple cubic
(4) bcc < fcc > simple cubic

59. An element has body centred cubic (bcc) structure with a cell edge of 288 pm. The atomic radius is:
(1) $\frac{\sqrt{2}}{4} \times 288$ pm (2) $\frac{4}{\sqrt{3}} \times 288$ pm
(3) $\frac{4}{\sqrt{2}} \times 288$ pm (4) $\frac{\sqrt{3}}{4} \times 288$ pm

60. The number of carbon atoms per unit cell of diamond unit cell is:
(1) 4 (2) 8
(3) 6 (4) 1

61. When the volume of the solution is doubled, the following becomes exactly half:
(1) Molality (2) Mole - fraction
(3) Molarity (4) Weight percent

62. Molarity of 0.1 N oxalic acid is:
(1) 0.05 M (2) 0.1 M
(3) 0.2 M (4) 0.3 M

63. Zinc reacts with $CuSO_4$ according to the equation $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$. If excess of zinc is added to 100 mℓ, 0.05 M $CuSO_4$, the amount of copper formed in moles will be:
(1) 5 (2) 0.5
(3) 0.05 (4) 0.005

64. What weight of solute (mol. wt. 60) is required to dissolve in 180g of water to reduce the vapour pressure to $\frac{4}{5}$ th of pure water?
(1) 120 gm (2) 180 gm
(3) 160 gm (4) 140 gm

65. H_2S is a toxic gas used in qualitative analysis. If solubility of H_2S in water at STP is 0.195 m, what is the value of K_H?
(1) 0.0263 bar (2) 69.16 bar
(3) 192 bar (4) 282 bar

66. Colligative properties depend on:
(1) The nature of the solute particles dissolved in solution.
(2) The number of solute particles in solution.
(3) The physical properties of the solute particles dissolved in solution.
(4) The nature of solvent particles.

67. If α is the degree of dissociation of Na_2SO_4, the van't Hoff factor (i) used for calculating the molecular mass is:
(1) 1 + α
(2) 1 – α
(3) 1 + 2 α
(4) 1 – 2 α

68. The following solutions were prepared by dissolving 10 g of glucose ($C_6H_{12}O_6$) in 250 ml of water (P_1), 10 g of urea (CH_4N_2O) in 250 ml of water (P_2) and 10 g of sucrose ($C_{12}H_{22}O_{11}$) in 250 ml of water (P_3). The right option for the decreasing order of osmotic pressure of these solution is:
(1) $P_1 > P_2 > P_3$
(2) $P_2 > P_3 > P_1$
(3) $P_3 > P_1 > P_2$
(4) $P_2 > P_1 > P_3$

69. The mixture that forms maximum boiling azeotrope is:
(1) Water + Nitric acid
(2) Ethanol + Water
(3) Acetone + Carbon disulphide
(4) Heptane + Octane

70. For an ideal solution, the correct option is:
(1) $\Delta_{mix} S = 0$ constant T and P
(2) $\Delta_{mix} V \neq 0$ at constant T and P
(3) $\Delta_{mix} H = 0$ at constant T and P
(4) $\Delta_{mix} G = 0$ at constant T and P

71. Which of the following is not true for a galvanic cell represented in IUPAC system?
(1) Right hand electrode is a (+ve) terminal.
(2) Right hand electrode acts as cathode.
(3) Electrons are given out in the external circuit from the anode.
(4) Electrons are given out in the external circuit from the cathode.

72. For the following electrochemical cell at 298 K, $Pt(s)|H_2$ (g, 1 bar)$|H^+$ (aq, 1 M)$||M^{4+}(aq), M^{2+}(aq)|Pt(s)$;

$E_{cell} = 0.092$ V when $\frac{[M^{2+}(aq)]}{[M^{4+}(aq)]} = 10^x$.

Given: $E^\circ_{M^{4+}/M^{2+}} = 0.151V$;

$2.303\frac{RT}{F} = 0.059V$ The value of x is:

(1) –2 (2) –1
(3) 1 (4) 2

73. What will be standard cell potential of galvanic cell with the following reaction?

$2Cr(s) + 3Cd^{2+}(aq) \rightarrow 2Cr^{3+}(aq) + 3Cd(s)$

[Given: $E^\circ_{Cr^{3+}/Cr} = -0.74V$ and $E^\circ_{Cd^{2+}/Cd} = -0.4V$]

(1) 0.70 V (2) 1.14 V
(3) 0.34 V (4) –0.34 V

74. E°_{cell} for the reaction, $2H_2O \rightarrow H_3O^+ + OH^-$ at 25°C is –0.8277 V. The equilibrium constant for the reaction is:

(1) 10^{-14} (2) 10^{-23}
(3) 10^{-7} (4) 10^{-21}

75. For a certain redox reaction, E° is positive. This means that:

(1) ΔG° is positive, K_{eq} is greater than 1
(2) ΔG° is positive, K_{eq} is less than 1
(3) ΔG° is negative, K_{eq} is greater than 1
(4) ΔG° is negative, K_{eq} is less than 1

76. The molar conductivity of 0.007 M acetic acid is 20 S cm^2 mol^{-1}. What is the dissociation constant of acetic acid?

Choose the correct option.

$\left[\begin{array}{l}\Lambda^\circ_{H^+} = 350 S cm^2 mol^{-1} \\ \Lambda^\circ_{CH_3COO^-} = 50 S cm^2 mol^{-1}\end{array}\right]$

(1) 2.50×10^{-4} mol L^{-1}
(2) 1.75×10^{-5} mol L^{-1}
(3) 2.50×10^{-5} mol L^{-1}
(4) 1.75×10^{-4} mol L^{-1}

77. Zinc can be coated on iron to produce galvanized iron but the reverse is not possible. It is because:

(1) Zinc has lower negative electrode potential than iron.
(2) Zinc has higher negative electrode potential than iron.
(3) Zinc is lighter than iron.
(4) Zinc has lower melting point than iron.

78. Given, $E^\circ_{Cr^{3+}/Cr} = -0.74$ V;

$E^\circ_{MnO_4^-/Mn^{2+}} = 1.51V$ $E^\circ_{Cr_2O_7^{2-}/Cr^{3+}} = 1.33V$;

$E^\circ_{Cl/Cl^-} = 1.36V$

Based on the data given above strongest oxidising agent will be:

(1) Cl (2) Cr^{3+}
(3) Mn^{2+} (4) MnO_4^-

79. For which of the following SOP and SRP are equal:

(1) SHE (2) Mg Electrode
(3) Ni electrode (4) Cu electrode

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

(1) Oxygen gas (2) H_2S gas
(3) SO_2 gas (4) Hydrogen gas

81. $C_{12}H_{22}O_{11} + H_2O \rightarrow C_6H_{12}O_6 + C_6H_{12}O_6$
(excess) (glucose) (frutose)

Rate law is expressed as:

(1) $r = k[C_{12}H_{22}O_{11}][H_2O]$
(2) $r = k[C_{12}H_{22}O_{11}]$
(3) $r = k[H_2O]$
(4) $r = k[C_{12}H_{22}O_{11}][H_2O]^2$

82. If 60% of first order reaction was completed in 60 min, 50% of the same reaction would be completed in approximately:

(1) 45 min (2) 60 min
(3) 40 min (4) 50 min

83. The rate law for the reaction, $xA + yB \rightarrow mP + nQ$ is rate = $k[A]^c[B]^d$ what is the total order of the reaction?

(1) x + y (2) m + n
(3) c + d (4) Two

84. The temperature dependence of the rate of a chemical reaction can be explained by Arrhenius equation which is:

(1) $k = Ae^{-E_a/RT}$ (2) $k = Ae^{E_a/RT}$
(3) $k = Ae \times \frac{E_a}{RT}$ (4) $k = Ae \times \frac{RT}{E_a}$

85. The hydrolysis of ethyl acetate is

$CH_3COOC_2H_5 + H_2O \xrightarrow{H^+} CH_3COOH + C_2H_5OH$ is the reaction of:

(1) Zero order
(2) Pseudo first order
(3) Second order
(4) Third order

SECTION - B

86. Threshold energy is equal to:
(1) Activation energy
(2) Activation energy – energy of molecules
(3) Activation energy + energy of molecules
(4) None of these

87. The rate constant for a first order reaction is $4.606 \times 10^{-3}\ s^{-1}$. The time required to reduce 2.0 g of the reactant to 0.2 g is:
(1) 200 s (2) 500 s
(3) 1000 s (4) 100 s

88. What is the activation energy for a reaction if its rate doubles when the temperature is raised from 20°C to 35°C?
($R = 8.314\ J\ mol^{-1}\ K^{-1}$)
(1) $342\ kJ\ mol^{-1}$
(2) $269\ kJ\ mol^{-1}$
(3) $34.7\ kJ\ mol^{-1}$
(4) $15.1\ kJ\ mol^{-1}$

89. The half-life for a zero order reaction having 0.02 M initial concentration of reactant is 100 s. The rate constant (in $mol\ L^{-1}\ s^{-1}$) for the reaction is:
(1) 2.0×10^{-4} (2) 2.0×10^{-3}
(3) 1.0×10^{-2} (4) 1.0×10^{-4}

90. The reaction $A \rightarrow C$ has activation energy for the forward and the backward reaction are 25 kJ and 32 kJ respectively. The ΔH for the reaction is:
(1) 57 kJ (2) –57 kJ
(3) 7 kJ (4) –7 kJ

91. Which of the following is a property of physisorption?
(1) High specificity
(2) Irreversibility
(3) Non-specificity
(4) None of these

92. If the elevation in boiling point of a solution of 10 gm of solute (mol. wt. = 100) in 100 gm of water is ΔT_b, the ebullioscopic constant of water is:
(1) 10 (2) $10\Delta T_b$
(3) ΔT_b (4) $\frac{\Delta T_b}{10}$

93. Fog is a colloidal solution of:
(1) Solid in gas (2) Gas in gas
(3) Liquid is gas (4) Gas in liquid

94. Blue colour of water in sea is due to:
(1) Refraction of blue light by impurities
(2) Refraction of blue sky by water
(3) Scattering of light by water
(4) None of above

95. One the basis of data given below predict which of the following gases shows least adsorption on a definite amount of charcoal?

Gas	CO_2	SO_2	CH_4	H_2
Critical temperature(K)	304	630	190	33

(1) CO_2 (2) SO_2
(3) CH_4 (4) H_2

96. In Freundlich adsorption isotherm, the value of $\frac{1}{n}$ is:
(1) 1 in case of chemisorption
(2) Between 0 and 1 in all cases
(3) Between 2 and 4 in all cases
(4) 1 in case of physical adsorption

97. The size of colloidal particles lie between:
(1) $10^{-7} - 10^{-9}$ cm
(2) $10^{-9} - 10^{11}$ cm
(3) $10^{-5} - 10^{-7}$ cm
(4) $10^{-2} - 10^{-3}$ cm

98. In ostwald process of manufacturing of HNO_3, catalyst used is:
(1) Mo (2) Fe
(3) Mn (4) Pt

99. On addition of 1 mL solution of 10% NaCl to 10 mL gold sol in the presence of 0.0250 g of starch, the coagulation is just prevented. Starch has the following gold number:
(1) 0.025 (2) 0.25
(3) 2.5 (4) 25

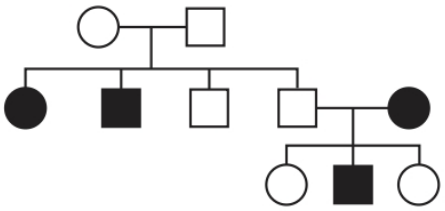
100. At the equilibrium position in the process of adsorption:
(1) $\Delta H > 0$
(2) $\Delta H = T\Delta S$
(3) $\Delta H > T\Delta S$
(4) $\Delta H < T\Delta S$

SECTION-III (BOTANY)

SECTION - A

101. Sickle cell-anaemia disorder arises due to
(1) Duplication of a segment of DNA
(2) Substitution in a single base of DNA
(3) Deletion of a segment of DNA
(4) Duplication in a base pair of RNA

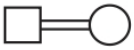
102. The Pedigree chart given below depicts



(1) Cystic fibrosis
(2) Myotonic dystrophy
(3) Haemophilia
(4) Hair pinna inheritance

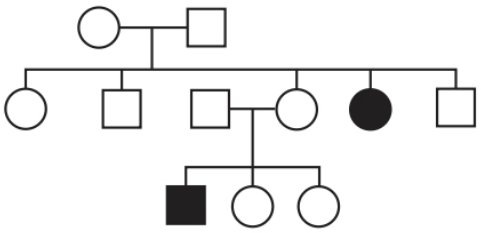
103. In pedigree analysis, symbol given for sex unspecified is

(1)  (2) 

(3)  (4) 

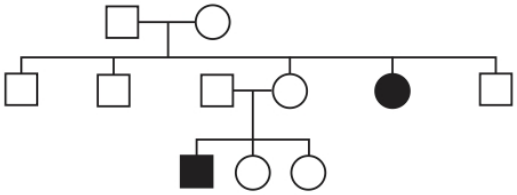
104. Cystic fibrosis, Myotonic dystrophy and Thalassemia are
(1) Chromosomal disorders
(2) Autosomal recessive disorders
(3) Mendelian disorders
(4) Autosomal dominant disorders

105. Study the pedigree chart of certain family given below and select the correct conclusion which can be drawn for the character



(1) The trait under study could be haemophilia
(2) Inheritance of a condition like sickle cell anemia as an autosomal recessive trait
(3) Both the parents is homozygous dominant
(4) Only female parent is homozygous recessive

106. Study the pedigree chart given below



What does it show?
(1) The pedigree chart is wrong as this is not possible
(2) Inheritance of recessive sex-linked disease like haemophilia
(3) Inheritance of a condition like phenyl ketonuria as an autosomal recessive trait
(4) Inheritance of a sex-linked inborn error of metabolism like phenylketonuria

107. If both the parents are carriers for cystic fibrosis (an autosomal disorder), what is the probability that the child born will be affected by the disorder?
(1) 2/4 (2) 1/4
(3) 3/4 (4) 4/4

108. Which of the following trait shows transmission from carrier female to male progeny?
(1) Autosomal dominant
(2) X-linked recessive
(3) Y-linked recessive
(4) X-linked dominant

109. Read the following statements
(i) Mendelian disorders are mainly determined by alteration of mutation in the single gene.
(ii) Chromosomal disorders are caused due to absence or excess or abnormal arrangement of one or more chromosomes
(iii) Aneuploidy arise due to chromosomal non-disjunction
(iv) Haemophilia is an autosomal recessive disorder
How many of the above statements are correct?
(1) Two (2) Three
(3) Four (4) Five

110. Which of the following abnormalities is due to autosomal dominant mutation?
(1) Colour blindness
(2) Thalassemia
(3) Myotonic dystrophy
(4) Haemophilia

111. Mark the correct match
(1) Turner's syndrome- 45 + XO
(2) Phenylketonuria- 44 + XYY
(3) Klinefelter's syndrome- 44 + XXY
(4) Thalassemia- 44 + YO

112. Physical, psychomotor and mental development is retarted in an individual affected with
(1) Down's syndrome
(2) Sickle cell-anaemia
(3) Turner's syndrome
(4) Colour blindness

113. In which of the following disorder's affected individual's possess 47 chromosomes?
(1) Turner's syndrome
(2) Klinefelter's syndrome
(3) Down's syndrome
(4) Both (2) and (3)

114. Haploids are more suitable for mutation studies than the diploids. This is because
(1) Haploids are reproductively more stable than diploids
(2) Mutagens penetrate in haploids more effectively than in diploids
(3) Haploids are more abundant in nature than diploids
(4) All mutations whether dominant or recessive are expressed in haploids

115. In which of the following disorder gynaecomastia symptom is seen in individuals?
(1) Down's syndrome
(2) Turner's syndrome
(3) Klinefelter's syndrome
(4) Phenylketonuria

116. Mark the correct option (w.r.t. monosomy)
(1) Klinefelter's syndrome
(2) Down's syndrome
(3) Turner's syndrome
(4) Haemophilia

117. Allosomic trisomy condition is seen in
(1) Turner's syndrome
(2) Klinefelter's syndrome
(3) Down's syndrome
(4) Both (2) and (3)

118. Which of the following disorder is seen in human female only?
(1) Turner's syndrome
(2) Down's syndrome
(3) Haemophilia
(4) Klinefelter's syndrome

119. In which of the following disorder a single protein that is a part of the cascade of proteins involved in blood clotting is affected?
(1) Thalassemia (2) Sickle-cell anaemia
(3) Haemophilia (4) Phenylketonuria

120. Mark the correct statement (w.r.t. sickle cell-anaemia)
(1) Homozygous individuals for Hb^S are apparently unaffected
(2) Heterozygous individuals exhibit sickle-cell trait
(3) Heterozygous individuals are affected as well as carrier
(4) Homozygous individuals for Hb^A show the diseased phenotype

121. In which genetic condition, each cell in the affected person, has three sex chromosomes XXY?
(1) Thalassemia
(2) Klinefelter's syndrome
(3) Phenylketonuria
(4) Turner's syndrome

122. What is the genetic disorder in which an individual has an overall masculine development gynaecomastia and is sterile?
(1) Klinefelter's syndrome
(2) Edward syndrome
(3) Down's syndrome
(4) Turner's syndrome

123. **Assertion (A):** Phenylketonuria is recessive hereditary disease caused by body's failure to oxidise an amino acid phenylalanine to tyrosine, because of defective enzyme.
Reason (R): It is characterised by in the presence of phenylalanine acid in urine.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is incorrect.
(4) Both A and R are incorrect.

124. Thalassemia and sickle-cell anaemia are caused due to a problem in globin molecule synthesis. Select the correct statement.
(1) Both are due to a qualitative defect in global chain synthesis
(2) Both are due to quantitative defect in globin chain synthesis
(3) Thalassemia is due to less synthesis of globin molecules
(4) Sickle-cell anaemia is due to a quantitative problem of globin molecules

125. A man whose father was colour-blind marries a woman, who had a colour-blind mother and normal father. What percentage of male children of this couple will be colour-blind?
(1) 25% (2) 0%
(3) 50% (4) 75%

126. Pick out the correct statement.
I. Haemophilia is a sex-linked recessive disease.
II. Down's syndrome is due to aneuploidy.
III. Phenylketonuria is an autosomal recessive gene disorder.
IV. Sickle-cell anaemia is an X-linked recessive gene disorder.
Choose the correct option.
(1) II and IV are correct.
(2) I, III and IV are correct.
(3) I, II and III are correct.
(4) I and IV are correct.

127. Which of the following is correctly matched?

	Column I	Column II		Column III	
(1)	Thalassemia	A.	XO	i.	Flat nose, simian crease
(2)	Down's syndrome	B.	42 AA + XY	ii.	Webbing of neck
(3)	Turner's syndrome	C.	44 AA + XXX	iii.	Anaemia, jaundice
(4)	Klinefelter's syndrome	D.	44 AA + XXY	iv.	Tall thin eunuchoid

128. The sickle-cell anaemia, the sequence of amino acid from the 1st to the 7th of the β-chain, of haemoglobin (HbS) is
(1) His, Leu, Thr, Pro, Glu, Val, Val
(2) Val, His, Leu, Thr, Pro, Glu, Glu
(3) Thr, His, Pro, Val, Pro, Val, Glu
(4) Val, His, Leu, Thr, Pro, Val, Glu

129. The genotype of a person suffering from Klinefelter's syndrome is
(1) XXX (2) XO
(3) XY (4) XXY

130. In alpha thalassemia, the gene HBAl is located on the chromosome
(1) 8 (2) 22
(3) 9 (4) 16

131. In Down's syndrome (Mongolism), each cell has how many chromosomes?
(1) 21st pair having one less
(2) 23rd pair with one less
(3) 25
(4) 47

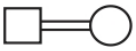
132. Haemophilia is related to
(1) Albinism
(2) Sickle-cell anaemia
(3) Colour blindness
(4) Thalassemia

133. A normal-visioned man whose father was colourblind, marries a woman whose father was also colourblind. They have their first child as a daughter. What are the chances that his child would be colourblind?
(1) 100% (2) 0%
(3) 25% (4) 50%

134. If father shows normal genotype and mother shows a carrier trait for haemophilia
(1) Female offspring has probability of 50% to have active disease
(2) All the female offspring will be normal
(3) All the female offspring will be carrier
(4) A male offspring has 50% chances of active disease

135. A hereditary disease which is never passed on from father to son is
(1) X-chromosomal linked disease
(2) Autosomal linked disease
(3) Y-chromosomal linked disease
(4) Autosomal dominant disease

SECTION - B

136. Which of the following symbols and its representation are used in human pedigree analysis is correct?
(1)  = Mating between relatives
(2)  = Unaffected male
(3)  = Unaffected female
(4)  = Affected male

137. Which of the following conditions in human is correctly matched with its chromosomal abnormality/linkage?

(1)	Klinefelter's syndrome	:	44 autosomes + XXY
(2)	Colour blindness	:	Y-linked
(3)	Erythroblastosis foetalis	:	X-linked
(4)	Down's syndrome	:	44 autosomes + XO

138. XO chromosomal abnormality in human causes
(1) Turner's syndrome
(2) Down's syndrome
(3) Darwin's syndrome
(4) Klinefelter's syndrome

139. Which of the following is not related to sex chromosome X or Y?
(1) Turner's syndrome
(2) Klinefelter's syndrome
(3) Down's syndrome
(4) Haemophilia and colour blindness

140. A woman has a haemophilic son and three normal children. Genotype of woman and her husband with respect to this gene would be
(1) XX and X^hY (2) X^hX^h and X^hY
(3) X^hX^h and XY (4) X^hX and XY

141. The defect sickle-cell anaemia is caused by the _____ of glutamic acid by valine at the 6^{th} position of the ____ globin chain of the hamoglobin molecule.
(1) Substitution, β
(2) Deletion, α
(3) Duplication, β
(4) Translocation, α

142. Which of these is not a Mendelian disorder?
(1) Cystic fibrosis
(2) Sickle-cell anaemia
(3) Colour blindness
(4) Turner's syndrome

143. Gene for colour blindness is located on
(1) Y-chromosome
(2) 13^{th} chromosome
(3) X-chromosome
(4) 21^{st} chromosome

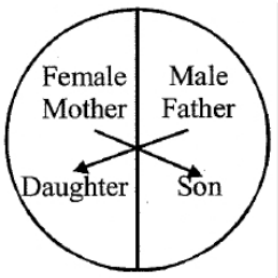
144. In which of the following disorders, blood has a defective haemoglobin?
(1) Haemophilia
(2) Haematuria
(3) Haematoma
(4) Sickle-cell anaemia

145. More men suffer from colour blindness than women because
(1) Women are more resistant to disease than men
(2) The male sex hormone testosterone causes the disease
(3) The colourblind gene is carried on the Y-chromosome
(4) Men are hemizygous and one defective gene is enough to make them colourblind

146. Colour blindness is caused due to
(1) Recessive female chromosome
(2) Dominant female chromosome
(3) Dominant male chromosome
(4) Linkage

147. Which of the following conditions is called monosomic?
(1) 2n + 1 (2) 2n + 2
(3) n + 1 (4) 2n – 1

148. Represented below is the inheritance pattern of a certain type of traits in humans. Which one of the following conditions could be an example of this pattern?



(1) Phenylketonuria
(2) Sickle cell anaemia
(3) Haemophilia
(4) Thalassemia

149. Genetic variation in a population arises due to
(1) Mutations only
(2) Recombination only
(3) Mutations as well as recombination
(4) Reproduction isolation and selection

150. Mutations are generally
(1) Recessive (2) Polymorphic
(3) Lethal (4) Dominant

SECTION-IV (ZOOLOGY)

SECTION-A

151. Which of the following is trapped in the lymph nodes and responsible for the activation of lymphocytes present there and cause the immune response?
(1) Antigen (2) Antibody
(3) Interferon (4) Drugs

152. Name the vaccine which is produced by using recombinant DNA technology-
(1) OPV
(2) BCG
(3) Hepatitis B
(4) Small pox vaccine

153. All of the following drugs are used to quickly reduce the symptoms of allergy except
(1) Serotonin (2) Anti-histamine
(3) Adrenalin (4) Steroids

154. Given below are two statements. One is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion: If a person is infected with some deadly microbes to which quick immune response is required, we need to directly inject the preformed antibodies or antitoxin.
Reason: Artificially acquired passive immunity results when antibodies produced outside the host are introduced into a host.
In the light of the above statements, choose the correct answer from the option given below.
(1) Both (A) and (R) are correct but (R) is not the correct explanation of (A).
(2) (A) is correct but (R) is not correct.
(3) (A) is not correct but (R) is correct.
(4) Both (A) and (R) are correct and (R) is the correct explanation of (A).

155. Choose the incorrect statement from the following.
(1) T-cells help B-cells to produce antibodies.
(2) Each antibody molecule has two heavy and two light chains linked with each other by peptide bonds.
(3) Primary immune response is produced when our body encounters a pathogen for the first time.
(4) lgA antibodies present in colostrum provide natural passive immunity to protect the infant.

156. Match the column I and II and choose the correct option.

	(Column I) Method		(Column II) Mode of Action
(A)	Pills	(i)	Prevents sperms reaching cervix during coitus
(B)	Condom	(ii)	Suppress sperm motility
(C)	Vasectomy	(iii)	Prevents ovulation
(D)	Copper T	(iv)	Semen contains no sperms

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

157. Choose the incorrect statement about spleen.
(1) It is a primary lymphoid organ.
(2) It is commonly called as "Graveyard of RBCs".
(3) It has a large reservoir of erythrocytes.
(4) It is a large bean shaped organ.

158. Aggregates of lymphoid tissue present in the distal portion of the small intestine are known as
(1) Villi (2) Peyer's patches
(3) MALT (4) Tonsils

159. Lactational amenorrhea is effective only up to a maximum period of _____ months.
(1) Two (2) Four
(3) Six (4) Eight

160. Which of the following acts as a physiological barrier to the entry of micro-organism in human body?
(1) Tears
(2) Monocytes
(3) Skin
(4) Epithelium of urogenital tract

161. Consider the following four statements (a-d) regarding kidney transplant and select the two correct ones out of these
(a) Even if a kidney transplant is proper the recipient may need to take immuno suppressants for a long time
(b) The cell-mediated immune response is responsible for the graft rejection
(c) The B-lymphocytes are responsible for rejection of the graft
(d) The acceptance or rejection of a kidney transplant depends on specific interferons
The two correct statements are
(1) a & b
(2) b & c
(3) c & d
(4) a & c

162. Graft rejection may be prevented by using
(1) Antibodies
(2) Anti-allergy drugs
(3) Immuno-suppressive drugs
(4) Immuno-stimulatory drugs

163. Read following statements A and B
Statement A : Bone marrow and thymus are primary lymphoid organs
Statement B : Rheumatoid arthritis is an autoimmune disorder
In the light of the above statements, choose the most appropriate answer from the options given below
(1) Both statements A and B are incorrect
(2) Only statement A is correct
(3) Only statement A is incorrect
(4) Both statements A and B are correct

164. Antigen binding site in an antibody is found between
(1) Two light chains
(2) Two heavy chains
(3) One heavy and one light chain
(4) Either between two light chains or between one heavy and one light chain depending upon the nature of antigen.

165. Inflammatory response in allergy is caused by the release of-
(1) Histamine (2) Antigen
(3) Adrenalin (4) Interferons

166. Choose the correct statement from the following.
(1) After maturation, the T-lymphocytes migrate to primary lymphoid organs like thymus and spleen.
(2) Both bone-marrow and thymus provide micro-environments for the development and maturation of T-lymphocytes.
(3) Lymph nodes serve to trap micro-organisms, which happen to get into the blood and brain.
(4) Spleen act as filter of lymph by trapping lymph borne micro-organisms.

167. The principle of vaccination is based upon which property of immune system?
(1) Memory (2) Diversity
(3) Specificity (4) All of these

168. In which year were the 'family planning programmes' initiated in our country?
(1) 1981 (2) 1961
(3) 1983 (4) 1951

169. Surgical method or terminal method of contraception work on which of the following grounds?
(1) Blocks gamete transport
(2) Blocks gamete formation
(3) Alters biochemical nature of gamete
(4) Destroys gamete

170. Which of the following is a non-specific type of defense that is present at the time of birth?
(1) Acquired immunity
(2) Humoral immunity
(3) Cell mediated immunity
(4) Innate immunity

171. Select the examples of active immunity.
(a) Immunoglobulin transmitted through mother's milk
(b) Immunoglobulin injected in a patient
(c) Attenuated pathogens introduced in the body
(d) Administration of anti-venom
(1) a, b, c and d (2) a, b and d
(3) a and d only (4) c only

172. In which of the following techniques does fusion of gametes occurs inside female's reproductive tract?
(1) GIFT (2) ZIFT
(3) ICSI (4) IUT

173. Which of the following statement is correct?
(1) Injecting microbes during immunisation induces passive immunity.
(2) The antibodies produced in allergy are of IgE type.
(3) Colostrum during initial days of lactation provides active immunity to infant.
(4) T-lymphocytes produce an army of proteins in response to pathogens into our blood to fight with them.

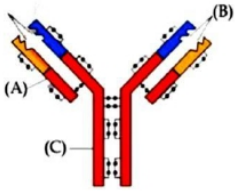
174. Neutrophils and monocytes are important cells participating in:
(1) Phagocytosis
(2) Perforin production
(3) Passive immunity
(4) Antibody production

175. How many among following can be transmitted by sharing of needles?

Syphilis, Genital herpes, Chlamydiasis, Hepatitis-B, Genital warts, HIV

(1) One (2) Three
(3) Two (4) Five

176. In the below given diagram (A), (B) and (C) are:



(1) (A) → Light chain, (B) → Disulphide bonds,
(C) → Heavy chain.
(2) (A) → Light chain, (B) → Antigen bindingsite, (C) → Heavy chain.
(3) (A) → Heavy chain, (B) → Antigen bindingsite, (C)→ Light chain.
(4) (A) → Heavy chain, (B) → Disulphide bonds, (C)→ Light chain.

177. How many of the following given in the box below are not primary lymphoid organs?

Lymph nodes, Spleen, Thymus, Tonsils, Peyer'spatches

(1) One (2) Two
(3) Three (4) Four

178. MALT:
(1) Stands for mucosa-associated lymphoid tissue
(2) Is the lymphoid tissue located within the mucosal lining
(3) Constitutes about 50% of the lymphoid tissuein human body
(4) All of the above

179. Which of the following is included in 'Test Tube Baby' programme?
(1) Ova and sperms are collected and mixed in test tube to form zygote.
(2) Ova and sperms are centrifuged in test tube to form zygote.
(3) Ova and sperms are induced to form zygote under controlled condition.
(4) Embryogenesis is allowed to continue in test tube under controlled conditions.

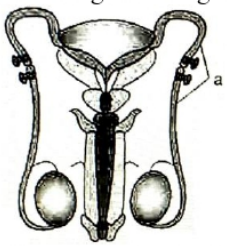
180. Match the column I with column II and choose the correct answer.

	Column I		Column II
A	T-lymphocytes	I.	Allergy
B.	Macrophages	II.	Cellular barrier of innate immunity
C.	Anti-tetanus injection	III	Rejection of transplanted organ
D.	Mast cells	IV	Passive immunity

(1) A-(I), B-(II), C-(III), D-(IV)
(2) A -(IV), B -(I), C-(II), D-(III)
(3) A -(II), B -(III), C-(IV), D-(I)
(4) A -(III), B -(II), C-(IV), D-(I)

181. Given below are two statements. One is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion : Active immunity is slow and takes time to give its full effective response.
Reason : The antibodies are found in blood, so the response is called humoral immune response
In the light of the above statements, choose the correct answer from the option given below.
(1) Both (A) and (R) are correct but (R) is not the correct explanation of (A).
(2) (A) is correct but (R) is not correct.
(3) (A) is not correct but (R) is correct.
(4) Both (A) and (R) are correct and (R) is the correct explanation of (A)

182. Which portion of male reproductive system has been cut and ligated in figure?



(1) Vasa efferentia (2) Urethra
(3) Vas deferens (4) Rete testis

183. In vaccination, a preparation of
(1) Antigenic proteins of pathogen are introduced in the body
(2) Inactivated pathogens are introduced in the body
(3) Weakened pathogens are introduced into the body
(4) All of the above

184. The agents which cause allergy are known as:
(1) Allergens (2) Antigens
(3) Analgesics (4) Narcotics

185. Artificial immunity can be acquired by:
(1) Penicillin (2) Vaccination
(3) Serious illness (4) All of these

SECTION-B

186. Which of the following practice would help the adolescent age group to lead a reproductive healthy life?
(1) Safe and hygienic sexual practices
(2) Proper information about reproductive organs, adolescence and related changes
(3) Introduction of sex education in schools
(4) All of the above

187. Which of the following prevent microbial growth in our body?
(1) Tears
(2) Saliva
(3) Acid in stomach
(4) All of the above

188. Select the mismatch w.r.t. methods of contraception.

(1) Coitus interruptus - Natural method
(2) Condom - Physical barrier
(3) Tubectomy - Sterilisation method
(4) Lippes loop - Medicated IUDs

189. Which IUDs is shown in the given figure?

(1) Lippe's loop
(2) Progestasert
(3) Copper T
(4) LNG-20

190. An exaggerated response to some foreign substances when they gain entry into the body is called

(1) Allergy or hypersensitivity
(2) A protozoan infection
(3) Secondary immune response
(4) Auto-immune disease

191. Primary exposure to antigenic proteins of the pathogen may result in the production of all except

(1) Antibodies
(2) B-memory cells
(3) T-memory cells
(4) Acid in stomach

192. Consider the following statements:

(i) Innate immunity is accomplished by providing different types of barriers to the entry of foreign agents into our body.
(ii) Acquired Immunity is pathogen specific and is characterised by memory.
(iii) Memory based acquired immunity developed in higher vertebrates based on ability to distinguish self from non-self

Which of the following statements are true?

(1) (i) and (ii) only
(2) (i) and (iii) only
(3) (ii) and (iii) only
(4) (i), (ii) and (iii)

193. Match the column I and II and choose the correct option.

	Column-I (Components of body defense)		**Column-II (Description)**
A.	Active natural immunity	I.	Antibodies transferred through the placenta
B.	PMNL-neutrophils	II.	Physiological barriers
C.	Passive natural immunity	III.	Direct contact with the pathogens that have entered inside the body
D.	Acid in stomach	IV.	Cellular barriers

(1) A-IV ; B-III ; C-I ; D-II
(2) A-III ; B-IV ; C-II ; D-I
(3) A-III ; B-IV ; C-I ; D-II
(4) A-IV ; B-III ; C-II ; D-I

194. Read following statements A and B

Statement A: When some human organs like heart, eye, liver, kidney fail to function satisfactorily, transplantation is the only remedy to enable to patient to live normal life.

Statement B: Tissue matching, blood group matching, etc, are required before undertaking anygraft.

In the light of the above statements, choose the most appropriate answer from the options given below

(1) Both statements A and B are incorrect
(2) Only statement A is correct
(3) Only statement A is incorrect
(4) Both statements A and B are correct

195. All of the following STIs are curable if detected early and treated properly, except

(1) Hepatitis-B
(2) Syphilis
(3) Genital warts
(4) Gonorrhea

196. Which of the following statement is false?

(1) Virus infected cells secrete interferons
(2) Interferons protect non-infected cells from further viral infection
(3) Skin on our body is the main barrier which prevents entry of the micro-organisms
(4) The over all ability of the host to fight the disease causing organisms, conferred by the immune system is called auto immunity

197. Given below are two statements. One is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion: The foetus also recieves some antibodies from their mother through the placenta during pregnancy

Reason : IgG is mainly found in sweat, tears, saliva, mucus, colostrum and gastro-intestinal secretions.

In the light of the above statements, choose the correct answer from the option given below.

(1) Both (A) and (R) are correct but (R) is not the correct explanation of (A).

(2) (A) is correct but (R) is not correct.

(3) (A) is not correct but (R) is correct.

(4) Both (A) and (R) are correct and (R) is the correct explanation of (A)

198. Choose the correct statement about emergency contraceptive.

(1) Emergency contraceptive administration within 72 hours of coitus have been found to be very effective.

(2) It could be used to avoid possible pregnancy due to rape or casual unprotected intercourse.

(3) It contains progestogens or progestogen-estrogen combination.

(4) All of the above.

199. What is the function of copper ions in copper releasing IUDs?

(1) They increase phagocytosis of sperm within the uterus

(2) They suppress sperm motility and the fertilising capacity of sperms

(3) They make the uterus unsuitable for implantation

(4) They inhibit ovulation

200. Immunity acquired after an infection is:

(1) Active immunity

(2) Innate immunity

(3) Passive immunity

(4) Both (2) and (3)

NEET (2024)

PRACTICE TEST-02 SOLUTION

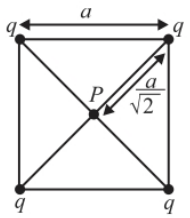
DURATION : 200 Minutes | **M. MARKS : 720**

ANSWER KEY

PHYSICS		CHEMISTRY		BOTANY		ZOOLOGY	
1.	(2)	51.	(3)	101.	(2)	151.	(1)
2.	(1)	52.	(2)	102.	(1)	152.	(3)
3.	(2)	53.	(3)	103.	(1)	153.	(1)
4.	(2)	54.	(1)	104.	(3)	154.	(4)
5.	(1)	55.	(3)	105.	(2)	155.	(2)
6.	(4)	56.	(1)	106.	(3)	156.	(3)
7.	(2)	57.	(4)	107.	(2)	157.	(1)
8.	(3)	58.	(2)	108.	(2)	158	(2)
9.	(2)	59.	(4)	109.	(2)	159.	(3)
10.	(3)	60.	(2)	110.	(3)	160.	(1)
11.	(3)	61.	(3)	111.	(3)	161.	(1)
12.	(3)	62.	(1)	112.	(1)	162.	(3)
13.	(4)	63.	(4)	113.	(4)	163.	(4)
14.	(3)	64.	(1)	114.	(4)	164.	(3)
15.	(4)	65.	(4)	115.	(3)	165.	(1)
16.	(1)	66.	(2)	116.	(3)	166.	(2)
17.	(2)	67.	(3)	117.	(2)	167.	(1)
18.	(1)	68.	(4)	118.	(1)	168.	(4)
19.	(3)	69.	(1)	119.	(3)	169.	(1)
20.	(2)	70.	(3)	120.	(2)	170.	(4)
21.	(2)	71.	(4)	121.	(2)	171.	(4)
22.	(1)	72.	(4)	122.	(1)	172.	(1)
23.	(3)	73.	(3)	123.	(2)	173.	(2)
24.	(1)	74.	(1)	124.	(3)	174.	(1)
25.	(4)	75.	(3)	125.	(3)	175.	(3)
26.	(2)	76.	(2)	126.	(3)	176.	(2)
27.	(1)	77.	(2)	127.	(4)	177.	(4)
28.	(4)	78.	(4)	128.	(4)	178.	(4)
29.	(4)	79.	(1)	129.	(4)	179.	(3)
30.	(3)	80.	(1)	130.	(4)	180.	(4)
31.	(4)	81.	(2)	131.	(4)	181.	(1)
32.	(3)	82.	(1)	132.	(3)	182.	(3)
33.	(1)	83.	(3)	133.	(2)	183.	(4)
34.	(2)	84.	(1)	134.	(4)	184.	(1)
35.	(4)	85.	(2)	135.	(1)	185.	(2)
36.	(3)	86.	(3)	136.	(1)	186.	(4)
37.	(4)	87.	(2)	137.	(1)	187.	(4)
38.	(1)	88.	(3)	138.	(1)	188.	(4)
39.	(1)	89.	(4)	139.	(3)	189.	(3)
40.	(1)	90.	(4)	140.	(4)	190.	(1)
41.	(3)	91.	(3)	141.	(1)	191.	(4)
42.	(1)	92.	(3)	142.	(4)	192.	(4)
43.	(2)	93.	(3)	143.	(3)	193.	(3)
44.	(2)	94.	(3)	144.	(4)	194.	(4)
45.	(2)	95.	(4)	145.	(4)	195.	(1)
46.	(3)	96.	(2)	146.	(1)	196.	(4)
47.	(4)	97.	(3)	147.	(4)	197.	(2)
48.	(1)	98.	(4)	148.	(3)	198.	(4)
49.	(4)	99.	(4)	149.	(3)	199.	(2)
50.	(1)	100.	(2)	150.	(1)	200.	(1)

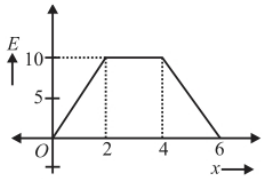
SECTION – I (PHYSICS)

1. **(2)**



$$V_p = 4\left(\frac{kq\sqrt{2}}{a}\right) = 4\sqrt{2}\frac{kq}{a}$$

2. **(1)**



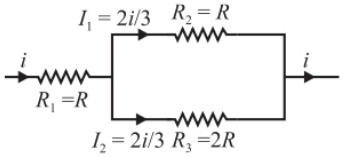
$$V_2 - V_6 = -\int Edr$$

$$V_2 - V_6 = (10)(2) + \frac{1}{2}(10)(2) = 30 \text{ (Magnitude wise)}$$

3. **(2)**

$$V = \frac{9\times10^9 \times 2\times10^{-8} \times \frac{1}{2}}{9} = 10 \text{ V}$$

4. **(2)**



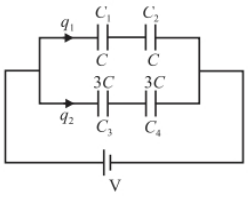
Power dissipated across R_2.

$P' = I_1^2 R \qquad \{\because\ P = i^2R\}$

$P' = \left(\frac{2i}{3}\right)^2 R = \frac{4}{9}i^2R$

$$\boxed{P' = \frac{4}{9}P}$$

5. **(1)**



$C_{net} = 2C$

$q = 2CV$

$\frac{q_1}{q_2} = \frac{1}{3}$

$3q_1 = q_2$

$q_1 + q_2 = 2CV$

$q_1 = \frac{CV}{2}$

$q_2 = \frac{3CV}{2}$

6. **(4)**

$i = \frac{10}{1000} = 0.01$ A

$n = \frac{0.01}{1.6\times10^{-19}}$ X 300

7. **(2)**

$1 = R_0 (1 + (0.00125)(25))$

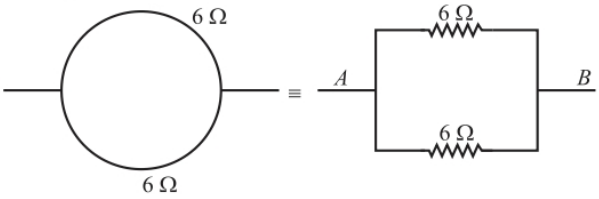
$1.2 = R_0 (1 + (0.00125)\theta)$

$\frac{12}{10} = \frac{1+0.00125\theta}{1.03125}$

Solving, we get

$\theta = 190°C$

8. **(3)**



Hence req. across AB = 3 Ω

9. **(2)**

$W = U_f - U_i = \frac{1}{2}CV_f^2 - \frac{1}{2}CV_i^2$

$= \frac{1}{2}C(40^2 - 20^2)$

$W = 600$ C

$W_1 = \frac{1}{2}C(50^2 - 40^2) = \frac{900}{2}C$

$W_1 = \frac{900}{2}\cdot\frac{W}{600} = \frac{3}{4}$ W

10. **(3)**

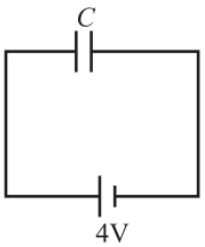
$Q = \int Idt$

$Q = It$ [If current is constant]

$= 20 \times 10^{-6} \times 30 = 600 \times 10^{-6}$ C

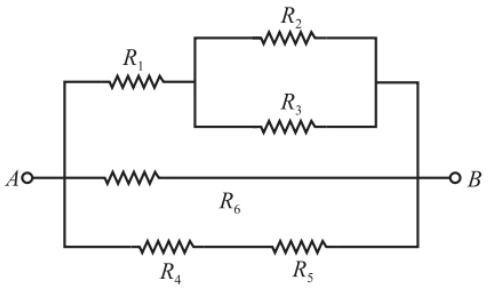
$= 6 \times 10^{-4}$ C

11. **(3)**



Here, potential difference on the capacitor will depend on emf of battery i.e., 4 V.

12. (3)



R_2 and $R_3 \Rightarrow$ Parallel

13. (4)

Since $\vec{J} = \sigma\vec{E}$

σ is the material property called conductivity it does not depend upon dimension of conductor.

$\vec{J} \rightarrow$ Current density depends upon area of cross-section of conductor. So $\vec{J}$ will change and hence $\vec{E}$ will change and $\vec{v}_d = \dfrac{e\vec{E}\tau}{m}$

So $\vec{v}_d \rightarrow$ drift velocity will also change.

14. (3)

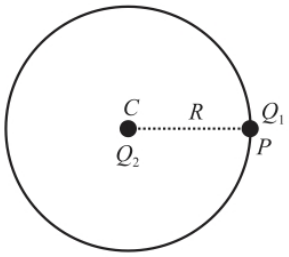
Since $\rho \propto \dfrac{1}{n}$

$\rho \propto \dfrac{1}{\tau}$

In conductor when we increase temperature

n does not increases significantly but τ decreases significantly due to this ρ increases. In semiconductor n increases significantly but τ does not decreases significantly, so ρ decreases.

15. (4)



$W = Q_1\Delta V$

$\because \quad \Delta V = 0$

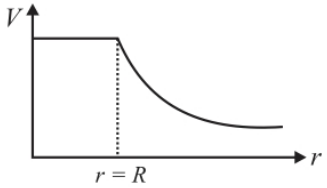
Then $W = 0$

or $W = U_f - U_i$

$\because \quad U_f = U_i$

Then $W = 0$

16. (1)



$V = k\dfrac{Q}{r}$, for $r > R$

$V = k\dfrac{Q}{R}$, for $r = R$

$V = k\dfrac{Q}{R}$ = Constant, for $r < R$

17. (2)

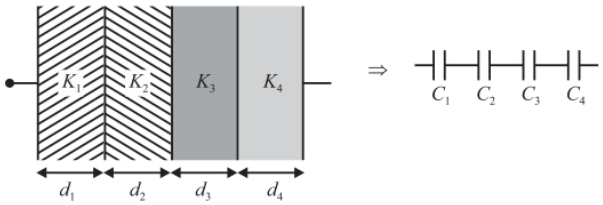
$W_{en} = U_f - U_i$

$= q\left(V_f - V_i\right)$

Since $V_f = 0$ [Potential at the perpendicular bisector of a dipole is zero]

and $V_i = 0$ at ∞ So W = 0

18. (1)



$C_1 = \dfrac{K_1\varepsilon_0 A}{d_1}, C_2 = \dfrac{K_2\varepsilon_0 A}{d_2}, C_3 = \dfrac{K_3\varepsilon_0}{d_3}, C_4 = \dfrac{K_4\varepsilon_0 A}{d_4}$

$\dfrac{1}{C_{eq}} = \dfrac{d_1}{K_1\varepsilon_0 A} + \dfrac{d_2}{K_2\varepsilon_0 A} + \dfrac{d_3}{K_3\varepsilon_0 A} + \dfrac{d_4}{K_4\varepsilon_0 A}$

$C_{eq} = \dfrac{\varepsilon_0 A}{\left[\dfrac{d_1}{K_1} + \dfrac{d_2}{K_2} + \dfrac{d_3}{K_3} + \dfrac{d_4}{K_4}\right]}$

19. (3)

Due to a dipole potential at a large distance r

$v \propto \dfrac{P}{r^2}$

P = Dipole moment

r = Large distance

20. (2)

Electric field due to a infinite length charge conducting sheet = $\dfrac{\sigma}{\varepsilon_0}$

So potential difference between two plates

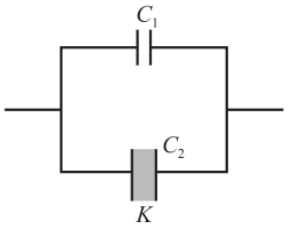
$= \left(\dfrac{\sigma r}{\varepsilon_0}\right)$

21. **(2)**

$r(\uparrow) \Rightarrow \frac{ke^2}{r}(\downarrow)$

and hence $U = -k\frac{e^2}{r}(\uparrow)$

22. **(1)**



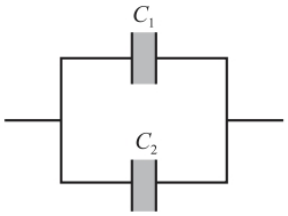
$C' = C_1 + C_2$

$= \frac{A\varepsilon_0}{2d} + \frac{A\varepsilon_0 K}{2d}$

$C' = \frac{A\varepsilon_0}{2d}(1+K)$

$\boxed{C' = \frac{C}{2}(1+K)}$

23. **(3)**



$C = C_1 + C_2$

$= \frac{A\varepsilon_0 K_1}{2d} + \frac{A\varepsilon_0 K_2}{2d}$

$= \frac{A\varepsilon_0}{2d}(K_1 + K_2)$

$= \frac{A\varepsilon_0}{2d}(6+4)$

$= \frac{5A\varepsilon_0}{d}$

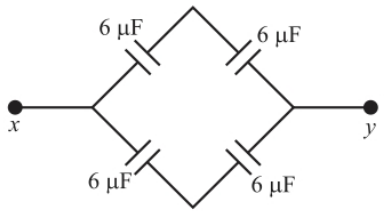
24. **(1)**

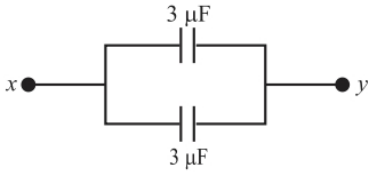
$\boxed{V = k\frac{Q}{r} = \text{constant } (r \le R)}$

Inside hollow sphere electric potential remains same.

25. **(4)**

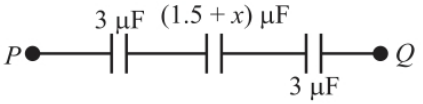
It is like a balanced wheat stone bridge.





$C_{xy} = 3 + 3 = 6\ \mu F$

26. **(2)**



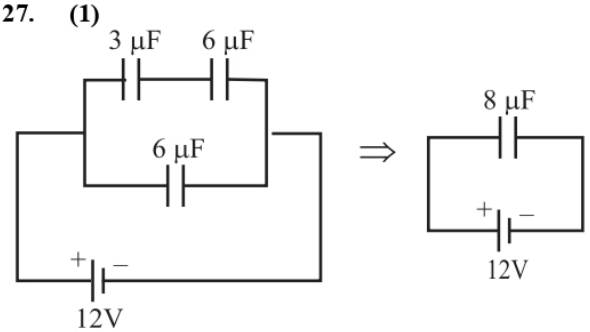
$\frac{1}{C_{eq}} = \frac{1}{3} + \frac{1}{1.5+x} + \frac{1}{3}$

$\frac{1}{1} = \frac{2}{3} + \frac{1}{1.5+x}$

$1.5 + x = 3$

$x = 1.5$

27. **(1)**



$Q = CV$

$= 8 \times 12 = 96\ \mu C$

28. **(4)**

$R = 8^{1/3} r$

$R = 2r$

And $C_S = 4\pi\varepsilon_0 r$

$C_B = 4\pi\varepsilon_0 R$

$\frac{C_B}{C_S} = \frac{R}{r}$

$= \frac{2r}{r}$

$\boxed{C_B = 2C_S}$

29. **(4)**

$$V = \frac{C_1V_1 + C_2V_2}{C_1 + C_2}$$

$$= \frac{30\times100 + 20\times50}{50}$$

$= 80$ V

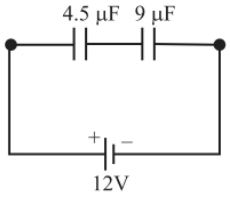
30. **(3)**

Change Q_1 will get divided on C_2 and C_3.

$V_1 + V_2 = V$

or $V_1 + V_3 = V$ $\quad (\because V_2 = V_2)$

31. **(4)**



Potential difference across 4.5 μF

$V = \left(\frac{9}{4.5+9}\right) \times 12 = 8$ V

32. **(3)**

Specific resistance or resistivity is material dependent, independent of geometry.

33. **(1)**

$i = \vec{j}\cdot\vec{A}$

$= \left(3\hat{j} + 4\hat{k}\right)\cdot\left(2\hat{i} + 3\hat{j}\right) = 9\ \mu A$

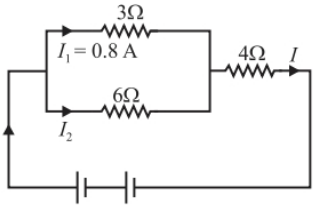
34. **(2)**

$$C' = \frac{\epsilon_0 A}{\frac{d}{2}} = \frac{2\epsilon_0 A}{d} = 2C$$

35. **(4)**

$$I = \frac{10}{5} = 2A$$

36. **(3)**



In given figure 3 Ω and 6 Ω are in parallel so potential difference remains same.

$V = I_2 6$

$3 \times 0.8 = I_2 \times 6$

$\boxed{I_2 = 0.4\ A}$

Now, $I = I_1 + I_2$

$I = 0.4 + 0.8$

$= 1.2$ A

Now potential drop across 4 Ω

$V = 1.2 \times 4 = 4.8$ Volt.

37. **(4)**

$$I = \frac{8-4}{12} = \frac{4}{12} = \frac{1}{3}\ \text{Amp}$$

By KVL

$$V_P + 1\times\frac{1}{3} + 4 - 8 + 2\times\frac{1}{3} = V_Q$$

$$V_P - V_Q = 4 - \frac{3}{3}$$

$$V_P - V_Q = 4 - \frac{3}{3}$$

$\boxed{V_P - V_Q = 3\ \text{volt}}$

38. **(1)**

$\boxed{i = neAV_d}$

$I \propto AV_d$

$$\frac{I_1}{I_2} = \frac{A_1}{A_2}\frac{V_{d_1}}{V_{d_2}}$$

$$\frac{I_1}{I_2} = \frac{\pi r_1^2}{\pi r_2^2}\times\frac{V_{d_1}}{V_{d_2}}$$

$$\frac{4}{1} = \left(\frac{1}{2}\right)^2\times\frac{V_{d_1}}{V_{d_2}}$$

$\boxed{\frac{V_{d_1}}{V_{d_2}} = \frac{16}{1}}$

39. **(1)**

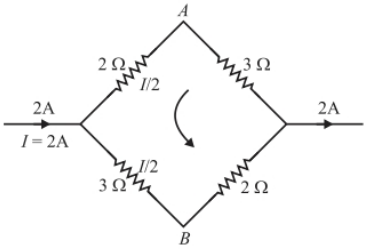
$$P = \frac{V^2}{R}$$

$$P \propto \frac{1}{R}$$

$$\frac{P_1}{P_2} = \frac{R_2}{R_1}$$

$\boxed{\frac{P_1}{P_2} = \frac{2}{1}}$

40. **(1)**



By KVL:

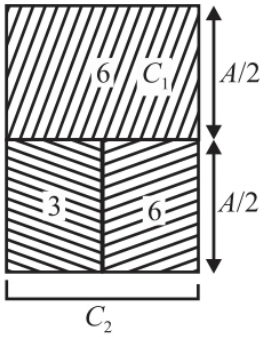
$$V_A + 2\times\frac{I}{2} - 3\times\frac{I}{2} = V_B$$

$$V_A + I - \frac{3I}{2} = V_B$$

$$V_A + 2 - \frac{3\times2}{2} = V_B$$

$\boxed{V_A - V_B = 1\ \text{volt}}$

41. **(3)**



$$C_1 = \frac{6A\varepsilon_0}{2d} = \frac{3A\varepsilon_0}{d}$$

$$C_2 = \frac{A\varepsilon_0}{2\left(d - \frac{d}{2}\left(1-\frac{1}{3}\right) - \frac{d}{2}\left(1-\frac{1}{6}\right)\right)}$$

After solving we get

$$C_2 = \frac{2\varepsilon_0 A}{d}$$

So, $C_{eq} = C_1 + C_2 = \frac{5\varepsilon_0 A}{d}$

$\Rightarrow \quad C_{eq} = \frac{K\varepsilon_0 A}{d} = \frac{5\varepsilon_0 A}{d}$

$\Rightarrow \quad K = 5$

42. **(1)**

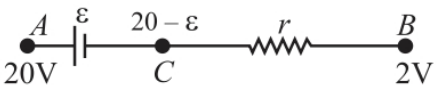
$$I = \frac{12-6}{4+2} = \frac{6}{6} = 1 \text{ A}$$

By KVL

$V_A - 6 - 1\times 4 = V_B$

$\boxed{V_A - V_B = 10 \text{ volt}}$

43. **(2)**



Potential at C point may be greater or less than potential at point B. Therefore current flow in resistance may be from B to A or A to B.

44. **(2)**

Battery is removed so Q = constant

Distance $d(\uparrow) \Rightarrow C(\downarrow)$

$Q = CV \Rightarrow V \propto 1/C$

$\Rightarrow \quad V(\downarrow)$

45. **(2)**

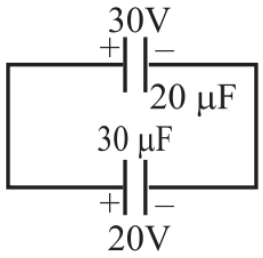
The charge on the capacitor remains constants

Capacitance $\quad C = \frac{\varepsilon_0 A}{d} \quad d\uparrow \quad C\downarrow$

Energy $\quad U = \frac{1}{2}\frac{Q^2}{C} \quad C\downarrow \quad U\uparrow$

Potential $\quad V = \frac{Q}{C} \quad C\downarrow \quad V\uparrow$

46. **(3)**



Common potential $V = \frac{C_1V_1 + C_2V_2}{C_1 + C_2}$

$= \frac{600+600}{20+30} = 24 \text{ V}$

47. **(4)**

Property of equipotential surface

48. **(1)**

P.E. of system $= \frac{2kq^2}{a} + \frac{2xkq^2}{a} + \frac{xkq^2}{a} = 0$

(where a is distance between charges)

or $2 + 3x = 0 \qquad \therefore x = -\frac{2}{3}$

49. **(4)**

E = Field near sphere $= \frac{V}{R} = \frac{8000}{1\times 10^{-2}} = 8\times 10^5$ V/m

$\therefore$ Energy density $= \frac{1}{2}\varepsilon_0 E^2 = \frac{4\pi\varepsilon_0}{8\pi} E^2$

$= \frac{8\times 8\times 10^{10}}{8\pi\times 9\times 10^9} = \frac{80}{9\pi} = 2.83 \text{ J/m}^3$

50. **(1)**

$E = -\frac{dV}{dx} = -10x - 10$

$\therefore \quad E_{(x=1\text{ m})} = -10\,(1) - 10 = -20$ V/m

SECTION – II (CHEMISTRY)

51. (3)

Crystalline solids are solids that have their atoms, molecules, and ions highly repetitive in nature and arranged in a specific pattern.

KCl, CsCl, and rhombic sulphur are crystalline solids whereas glass is an amorphous solid.

52. (2)

For a bcc unit cell, number of atoms per unit cell

$$=\left(8\times\frac{1}{8}\right)+1=2$$

53. (3)

'A' atoms occupy the lattice points at the corners of the cube.

There are 8 corners in a unit cell, each contributing one eighth to the unit cell. Number of 'A' atoms in one unit cell = $8\times\frac{1}{8}=1$

The 'B' atoms occupy the centre of each face of the cube.

There are 6 face centres in a unit cell, each contributing one half to the unit cell.

Number of 'B' atoms in one unit cell = $6\times\frac{1}{2}=3$

The formula of the compound is AB_3

54. (1)

CsCl has body-centred cubic (bcc) arrangement. Each $[Cs^+]$ ion is surrounded by 8 $[Cl^-]$ ion and each $[Cl^-]$ is surrounded by 8 $[Cs^+]$ ions. Therefore, the structure has 8 : 8 co-ordination number.

55. (3)

Edge length = $2(r_c + r_a)$

= 2(181 + 95) = 552 pm

56. (1)

For fcc

Z = 4

N = 24×10^{23} atoms

a = 200 pm

= 2×10^{-8} cm

$$d=\frac{Z\times M}{a^3\times N}=\frac{4\times 200}{8\times10^{-24}\times24\times10^{23}}$$

= 41.67 g/cm^3

The density of 200 g of this element is = 41.67 g/cm^3

57. (4)

When electrons are trapped in anion vacancies these are called F-centers.

58. (2)

Packing efficiency

- Packing efficiency is the percentage of total space filled by the particles.
- The packing efficiency of a face-centered cubic lattice is 74%.
- The packing efficiency of a body-centered cubic lattice is 68%.
- The packing efficiency of the simple cubic lattice is 52.4%.
- So, the order of packing efficiency order is as follows:-
- fcc > bcc > simple cubic

59. (4)

For bcc,

$\sqrt{3}\,a = 4r$

a = edge length

r = radius of atom

$$r=\frac{\sqrt{3}\,a}{4}$$

Given, a = 288 pm

$$r=\frac{\sqrt{3}}{4}\times288\text{pm}$$

60. (2)

Total no. of atoms present in a diamond cubic unit cell is 1 + 3 + 4 = 8. Since each carbon atom is surrounded by four more carbon atoms, the co-ordination number is 4.

61. (3)

$$\text{Molarity}=\frac{\text{No. of moles}}{\text{Volume (in litre)}}$$

$$M_1=\frac{n}{V_1}$$

If $V_2 = 2V_1$,

$$M_2=\frac{n}{V_2}$$

$$=\frac{n}{2V_1}$$

$$=\frac{M_1}{2}$$

62. (1)

No. of acidic Hydrogen in oxalic acid, $H_2C_2O_4 = 2$

We know that:

Normality = molarity × acidic (H)

$0.1 = \text{Molarity} \times 2$

$$\text{Molarity} = \frac{0.1}{2}$$

$= 0.05$ M

63. (4)

$$\text{Moles of } CuSO_4 = 0.05 \times \frac{100}{1000}$$

$= 0.005$

64. (1)

$$\frac{P^\circ - Ps}{P^\circ} = \frac{w \times M}{m \times W}$$

$$\frac{P^\circ - \frac{4}{5}P^\circ}{P^\circ} = \frac{w \times 18}{60 \times 180}$$

W = 120 gm

65. (4)

No. of moles of $H_2S = 0.195$ mol

$$\text{No. of moles of } H_2O = \frac{1000}{18} = 55.55 \text{mol}$$

Hence mole fraction of H_2S

$$= \frac{0.195}{0.195 + 55.55} = 0.0035$$

Pressure at STP = 0.987 bar

As per Henry's law,

$P = k_H \times x$

$$K_H = \frac{P}{x}$$

$$= \frac{0.987}{0.0035} = 282 \text{bar}$$

66. (2)

Colligative property depends just on number of solute particles present in the solution.

67. (3)

$Na_2SO_4 \rightleftharpoons 2Na^+ + SO_4^{2-}$

1	0	0
$1-\alpha$	2α	α

$$\text{Van't Hoff factor (i)} = \frac{1 - \alpha + 2\alpha + \alpha}{1} = 1 + 2\alpha.$$

68. (4)

- Osmotic pressure (π) = iCRT where C is molar concentration of the solution.
- With increase in molar concentration of solution osmotic pressure increases.
- Since, weight of all solutes and its solution volume are equal, so higher will be the molar mass of solute, smaller will be molar concentration and smaller will be the osmotic pressure.
- Order of molar mass of solute decreases as Sucrose > Glucose > Urea
- So, correct order of osmotic pressure of solution is $P_3 < P_1 < P_2$.

69. (1)

Solution showing negative deviation from Roult law form maximum boiling azeotrope. Water and Nitric acid → forms maximum boiling azeotrope.

70. (3)

For ideal solution,

$\Delta_{mix} H = O$

$\Delta_{mix} S > O$

$\Delta_{mix} G < O$

$\Delta_{mix} V = O$

71. (4)

A half-reaction is either just oxidation or just reduction.

At the cathode the reduction takes place therefore, electrons are not given out in the external circuit from the cathode.

72. (4)

$$E_{cell} = 0.092\text{V}, \frac{[M^{2+}(aq)]}{[M^{4+}(aq)]} = 10^x$$

$pH_2 = 1$ bar

$$E_{cell} = E^\circ_{cell} - \frac{0.059}{2}\log_{10}\frac{[M^{2+}][H^+]^2}{[M^{4+}]pH_2}$$

$$0.092 = 0.151 - \frac{0.059}{2}\log_{10} 10^x$$

$\therefore x = 2$

73. (3)

$2Cr(s) + 3Cd^{2+}(aq) \rightarrow 2Cr^{3+}(aq) + 3Cd(s)$

Observing the reaction we can conclude that Cr is undergoing oxidation and acts as Anode. And Cd^{2+} is undergoing reduction and acts as cathode.

Also given,

$E^\circ_{Cr^{3+}/Cr} = -0.74$V is the reduction potential of Cr^{3+}.

$E^\circ_{Cd^{2+}/Cd} = -0.40$V is the reduction potential of Cd^{2+}.

We know that,

$E^\circ_{cell} = E^\circ_{cathode} - E^\circ_{anode}$

Here, $E^\circ_{cell} = E^\circ_{Cd^{2+}/Cd} - E^\circ_{Cr^{3+}/Cr}$

$= -0.40 - (-0.74) = 0.34$ V

74. (1)

$2H_2O \rightarrow H_3O^+ + OH^-$

We know that,

$$\log K = \frac{E^\circ_{cell} \times n}{0.0591}$$

$$\log K = \frac{-0.8277 \times 1}{0.0591} = -14$$

$\Rightarrow K = 10^{-14}$

75. (3)

Since the value of the EMF of the cell is positive, the redox reaction is spontaneous. For spontaneous reactions, the free energy change is negative and the equilibrium constant has a value greater than (1).

76. (2)

$\Lambda^\circ_m = 20 S cm^2 mol^{-1}$

$\Lambda^\circ_{mCH_3COOH} = \Lambda^\circ_{CH_3COO^-} + \Lambda^\circ_{mH^+}$

$= 50 + 350 = 400 \text{ S cm}^2 \text{ mol}^{-1}$

$$\alpha = \frac{\Lambda_{mCH_3COOH}}{\Lambda^o_{mCH_3COOH}} = \frac{20}{400} = \frac{1}{20}$$

$$K_a = \frac{C\alpha^2}{1-\alpha} = C\alpha^2 = 7 \times 10^{-3} \times \left(\frac{1}{20}\right)^2$$

$$= 7 \times 10^{-3} \times \frac{1}{4} \times 10^{-2}$$

$= 1.75 \times 10^{-5} \text{ mol L}^{-1}$

77. (2)

$E^o_{Zn^{2+}|Zn} = -0.76V$

$E^o_{Fe^{2+}|Fe} = -0.44V$

Zn has higher negative SRP (Standard Reduction Potential) so it works as anode and protects iron to make as the cathode.

78. (4)

Higher the standard reduction potential, better is oxidising agent.

Among the given $E^\circ_{MnO_4^-/Mn^{2+}}$ is highest, hence MnO_4^- is the strongest oxidising agent.

79. (1)

SOP = – SRP

but if SOP = SRP

then SOP = SRP = 0

It is for SHE (standard Hydrogen Electrode).

80. (1)

Dissociation of sulfuric acid,

$H_2SO_4 \rightarrow 2H^+(aq) + SO_4^{-2}(aq)$

Dissociation of water,

$H_2O \rightarrow H^+(aq) + OH^-(aq)$

At Anode: $4OH^-(aq) \rightarrow 2H_2O(l) + O_2(g) + 4e^-$

At Cathode: $2H^+(aq) + 2e^- \rightarrow H_2(g)$

81. (2)

In the reaction,

$C_{12}H_{22}O_{11} + H_2O \rightarrow C_6H_{12}O_6 + C_6H_{12}O_6$

Here, H_2O is present in excess.

Hence, it will not appear in the rate law expression. Thus, it is an example of a pseudo-first-order reaction.

The rate law expression for the reaction is,

$r = k [C_{12}H_{22}O_{11}]$.

82. (1)

$$K = \frac{2.303}{t} \log_{10}\left(\frac{a}{a-x}\right)$$

$$K = \frac{2.303}{60} \log\left(\frac{1}{0.4}\right) = \frac{2.303}{60} \times 0.39$$

$$t_{\frac{1}{2}} = \frac{0.693}{k} = \frac{0.693 \times 60}{2.303 \times 0.39} = 46.15 \simeq 45 \text{ minute}$$

83. (3)

Given that:

$xA = yB \rightarrow mP + nQ$

Rate = $k [A]^C [B]^d$

The total order of the reaction is the sum of the powers to which the concentration terms are raised in the rate reaction.

Hence, order = (c + d)

84. (1)

Arrhenius equation gives the idea about relation between temperature and activation energy with rate constant,

$k = Ae^{-E_a/RT}$, this is the Arrhenius equation,

85. (2)

$CH_3COOC_2H_5 + H_2O \rightarrow CH_3COOH + C_2H_5OH$

In the above reaction medium of reaction is water which will be in excess, hence it can be avoided in rate expression, thus rate will be given as

Rate = $K [CH_3COOC_2H_5]$

86. (3)

According to the collision theory, only a small fraction of collisions is effective in bringing about the chemical reaction and the rest of the collisions are ineffective.

For effective collision (to yield product), the colliding molecules must have more than or equal to a certain minimum amount of energy called threshold energy.

Threshold energy = Activation energy + Average kinetic energy of the molecules.

87. **(2)**

$$t = \frac{2.303}{k}\log\frac{A}{A_0} = \frac{2.303}{4.606\times10^{-3}}\log\frac{2}{0.2} = 500\,s$$

88. **(3)**

$$\log\frac{k_2}{k_1} = \frac{E_a}{2.303\times R}\left(\frac{1}{T_1}-\frac{1}{T_2}\right)$$

Substituting the values

$$\log 2 = \frac{E_a}{2.303\times 8.314}\left(\frac{1}{293}-\frac{1}{308}\right)$$

$E_a = 34.7\ kJ\ mol^{-1}$

89. **(4)**

For zero order reaction

$$t_{1/2} = \frac{a}{2k} \Rightarrow k = \frac{a}{2t_{1/2}}$$

$$k = \frac{0.02}{2\times100} = 1.0\times10^{-4}\,molL^{-1}\,s^{-1}$$

90. **(4)**

The activation energy of the reverse reaction is higher than that of the forward reaction.

Hence, the reaction is exothermic.

For the exothermic reaction, the enthalpy change of the reaction is equal to the difference between the activation energy of the forward reaction and the reverse reaction.

$\Delta H = 25kJ - 32kJ = -7kJ.$

91. **(3)**

Due to weak Van der Waals forces, physical adsorption causes the adsorbate to accumulate on the adsorbent. Between the adsorbent and the adsorbate, there is no substantial attraction or bond formation.

92. **(3)**

We know that,

$$\Delta T_b = \frac{1000\times K_b\times w}{W\times M}$$

Substituting the values,

$$\Delta T_b = \frac{1000\times K_b\times w}{W\times M}$$

$$\Delta T_b = \frac{1000\times K_b\times 10}{100\times100}$$

$$\Delta T_b = K_b$$

93. **(3)**

Fog is a colloidal solution in which water (liquid, dispersed phase) is dispersed in the air (gas, dispersion medium).

94. **(3)**

Blue colour of water in sea is due to scattering of light by water molecules. As blue has smaller wavelength, therefore scattering of blue is very large.

95. **(4)**

Higher the critical temperature, greater will be the van der Waal forces of attraction and also the extent of adsorption.

The nature of gas defines the amount of gas adsorbed by the solid. Hence easily liquefiable gases (gases having higher critical temperatures) are easily adsorbed as the Vander walls forces tends to be strong near the critical temperature values.

Hence from above option

H_2 (33) is having lower critical temperature, hence it will be least adsorbed on charcoal.

96. **(2)**

Freundlich adsorption isotherm

$$\frac{x}{m} = kp^{\frac{1}{n}}$$

where $0 \le \frac{1}{n} \le 1$

97. **(3)**

The size of colloid particles generally ranges between 1 to 1000 nanometres i.e.

10^{-5} to 10^{-7} cm.

98. **(4)**

Ostwald process is used for making nitric acid.

In this process, platinum with 10% rhodium is used as catalyst.

99. **(4)**

Amount of starch in mg that prevent coagulation by 1mL of 10% NaCl solution = 0.025 × 1000 = 25.

Hence, gold number = 25.

100. **(2)**

Change in free energy, $\Delta G = \Delta H - T\Delta S$

At the equilibrium state, in the adsorption, process, the change in free energy $\Delta G = 0$

$\Delta H - T\,\Delta\,S = 0$

$\Delta H = T\,\Delta\,S$

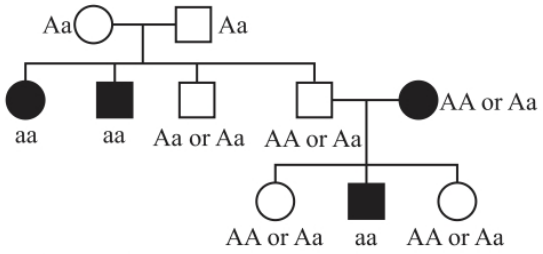
Hence

At equilibrium, the enthalpy change is equal to the product of temperature and entropy change.

SECTION – III (BOTANY)

101. (2)
Sickle cell-anaemia disorder arises due to substitution in a single base of DNA.
(Class 12th NCERT Page No. 74-75)

102. (1)
Cystic fibrosis is an autosomal (recessive) disorder. Let 'a' be the disease causing recessive allele and 'A' be the normal dominant allele.

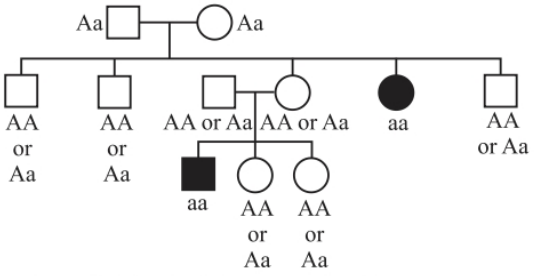


(Class 12th NCERT Page No. 73)

103. (1)
◇ → Sex unspecified
(Class 12th NCERT Page No. 72)

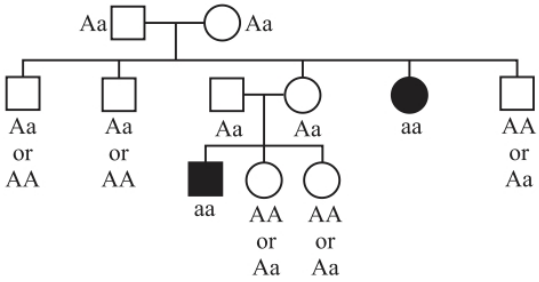
104. (3)
Cystic fibrosis, Myotonic dystrophy and thalassemia are Mendelian disorders.
(Class 12th NCERT Page No. 73)

105. (2)
Sickle cell anaemia is caused due to an autosomal recessive gene.



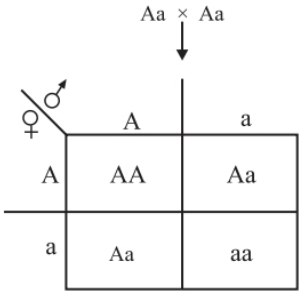
(Class 12th NCERT Page No. 74-75)

106. (3)
Phenyl ketonuria is an autosomal recessive trait.



(Class 12th NCERT Page No. 75)

107. (2)
Cystic fibrosis is due to an autosomal recessive gene (aa)



∴ aa = 1/4
(Class 12th NCERT Page No. 73)

108. (2)
X-linked recessive trait shows transmission from carrier female to male progeny.
(Class 12th NCERT Page No. 73-75)

109. (2)
Statement (i), (ii) and (iii) are correct.
(Class 12th NCERT Page No. 73-76)

110. (3)
Myotonic dystrophy is due to autosomal dominant mutation.
(Class 12th NCERT Page No. 73)

111. (3)
Klinefelter's syndrome- 44 + XXY
(Class 12th NCERT Page No. 76)

112. (1)
Physical, phychomotor and mental development is retarted in an individual affected with Down's syndrome.
(Class 12th NCERT Page No. 76)

113. (4)
Both Klinefelter's syndrome and Down's syndrome affected individual possess 47 chromosomes.
(Class 12th NCERT Page No. 76)

114. (4)
This is because all mutations weather dominant or recessive are expressed in haploids. Haploid plants can be produced in large number by anther and ovary cultures. Haploids may be useful for isolation of mutants, since even recessive mutant alleles will be expressed in the mutagen treated generation itself.
(Class 12th NCERT Page No. 72)

115. (3)
Gynaecomastia is seen in Klinefelter's syndrome.
(Class 12th NCERT Page No. 76)

116. (3)
Monosomy is seen in Turner's syndrome. The complete absence of an X chromosome generally occurs because of an error in the father's sperm or in the mother's egg.
(Class 12th NCERT Page No. 76)

117. (2)
Allosomic trisomy is seen in Klinefelter syndrome i.e. 47, XXY.
(Class 12th NCERT Page No. 76)

118. (1)
Turner's syndrome is seen in human female only.
(Class 12th NCERT Page No. 76)

119. (3)
In haemophilia, single protein that is part of cascade of proteins involved in blood clotting is affected.
(Class 12th NCERT Page No. 74)

120. (2)
Heterozygous individuals exhibit sickle cell trait.
(Class 12th NCERT Page No. 74-75)

121. (2)
Klinefelter's syndrome is a genetic condition in which each cell in the affected person contains three sex chromosomes XXY. It is caused due to the presence of an additional copy of X-chromosome resulting into a karyotype of 47, XXY. Such individuals are sterile.
(Class 12th NCERT Page No. 76)

122. (1)
In Klinefelter's syndrome, individual has overall masculine development, gynaecomastia and is sterile. This condition is represented as 44 + XXY (47) due to the presence of an extra X-chromosome in males.
Edward syndrome is 18 trisomy and its causes severe developmental delay.
Down's syndrome is 21 trisomy and it is identified as Mongolism due to the short stature of affected individual.
Turner's syndrome is characterised by a missing X-chromosome in female. It causes sterility in females.
(Class 12th NCERT Page No. 76)

123. (2)
Phenylketonuria is due to deficiency of liver enzyme phenylalanine hydroxylase, which converts phenylalanine into tyrosine. It occurs in people, who are homozygous recessive. It results with a high level of phenylalanine in blood, tissue fluids and urine. Hence, both A and R are correct, but R is not the correct explanation of A.
(Class 12th NCERT Page No. 75)

124. (3)
The statement in option (3) is correct.
Thalassemia is due to less synthesis of the globin chains of haemoglobin. Anaemia is the main feature of this disease. Rest of the statements are incorrect. The correct information about statements is as follows
Thalassemia differs from sickle-cell anaemia in that the former is quantitative problem synthesising few globin molecules, while the later is a qualitative problem of synthesising an incorrectly functioning globin.
(Class 12th NCERT Page No. 74-75)

125. (3)
Colour blindness is an autosomal recessive genetic disorder, where affected gene is present on the X-chromosome.
The man whose father was colourblind is normal (XY). But the woman whom he married will be a carrier to this disease, as her mother was colourblind X^CX^C with a normal father (XY). Thus, in this case, the percentage of a male child to be colourblind is 50%.
(Class 12th NCERT Page No. 73-74)

126. (3)
Statement I, II and III are correct.
Statement IV is incorrect and the correct information is as follows
Sickle-cell anaemia is an autosomal recessive gene disorder in which sickle-cell RBC's are formed instead of the normal ones. The person suffering from this disease shows symptoms of anaemia.
(Class 12th NCERT Page No. 74-76)

127. (4)
The only correctly matched pair is of Klinefelter's syndrome.
Other appropriate matches can be corrected as
(i) Thalassemia - Blood disorder - Anaemia, jaundice
(ii) Down's syndrome - $\left.\begin{matrix}47\,XX+21\\47\,XY+21\end{matrix}\right\}$ Female, Male
(iii) Turner's syndrome - 45 + XO - Webbing of neck
(Class 12th NCERT Page No. 75-76)

128. (4)

In sickle-cell anaemia, the correct sequence of amino acid from 1-7th position of the β-chain haemoglobin (HbS) is

Val	His -	Leu	Thr	Pro -	Val	Glu
-		-	-		-	
1	2	3	4	5	6	7

(Class 12th NCERT Page No. 74-75)

129. (4)

The genotype of a person suffering from Klinefelter's syndrome is XXY. It occurs due to the presence of an additional copy of X-chromosome resulting in the karyotype of 47, XXY.

(Class 12th NCERT Page No. 76)

130. (4)

In alpha thalassemia, the gene HBAl is located on chromosome 16. In this, the synthesis of alpha globin chain is reduced or absent.

(Class 12th NCERT Page No. 75)

131. (4)

In Down's syndrome (Mongolism), each cell has 47 chromosomes. (45 + XY in males and 45 + XY in females). It is due to trisomy of chromosome 21 (2n + 1) = 47.

(Class 12th NCERT Page No. 76)

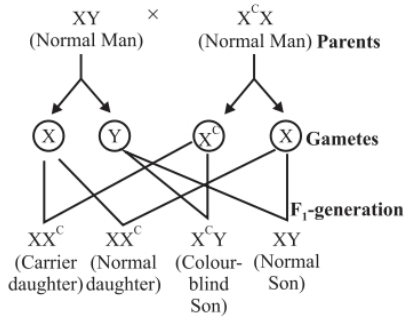
132. (3)

Haemophilia is related to colour blindness as both are X-linked recessive disease. The genes for both are found on X-chromosome. Albinism, sickle-cell anaemia and thalassemia are autosomal disease.

(Class 12th NCERT Page No. 74)

133. (2)

The chances of daughter to be colourblind is 0%. Colour blindness is an X-linked disease. So, a woman whose father was colourblind will be carrier for the disease.



(Class 12th NCERT Page No. 73-74)

134. (4)

In this condition, male offspring has a 50% chance of acquiring the active disease. Haemophilia is an X-linked recessive disease and is always transmitted from mother to son. Thus, if father shows normal genotype and mother shows a carrier trait for haemophilia, then the male offspring has 50% chances of active disease.

(Class 12th NCERT Page No. 74)

135. (1)

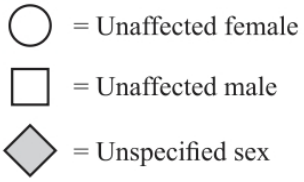
Man has only one X-chromosome that is inherited by his daughter. Therefore, a hereditary disease, which is X-chromosome linked, is never passed on from father to son.

(Class 12th NCERT Page No. 73-75)

136. (1)

The symbol in option (1) is correctly depicting its meaning thus, option (1) is correct. Other pairs are incorrect.

The correctly matched pairs are as follows



(Class 12th NCERT Page No. 72)

137. (1)

Option (1) contains the correct match. The correct information about the remaining incorrect matches are as follows

Colour blindness	:	X-linked
Erythroblastosis foetus	:	It arises when an Rh^+ foetusis carried by an Rh^- mother, leading to the formation of antibodies against the Rh of the foetus due to which the foetus dies.
Down's syndrome	:	Autosomal and aneuploidy (trisomy + 21)

(Class 12th NCERT Page No. 73-76)

138. (1)

XO chromosomal abnormality in human causes Turner's syndrome.

(Class 12th NCERT Page No. 76)

139. (3)

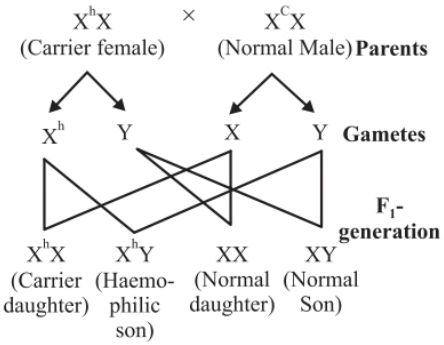
Down's syndrome or Mongolian idiocy is not related to sex chromosome X or Y. It is due to the trisomy of 21st chromosome, leading to a total of 47 chromosomes.

(Class 12th NCERT Page No. 76)

140. (4)

Since, there are three normal children, so its clear that the husband is not haemophilic (XY).

Haemophilic son indicates that mother is carrier for the gene (X^hY). So, the genotype should be X^hY and XY as given is the cross below



(Class 12th NCERT Page No. 76)

141. (1)

The defect sickle-cell anaemia is caused by the substitution of glutamic acid by valine at the 6th position of the β globin chain of the haemoglobin molecule.

(Class 12th NCERT Page No. 74-75)

142. (4)

Turner's syndrome is not a Mendelian disorder. It is characterised by 44 autosomes and only one X-chromosome.

The disorder cystic fibrosis, sickle-cell anaemia, colour blindness and haemophilia are caused due to the abnormality in gene and thus are Mendelian disorders.

(Class 12th NCERT Page No. 74-75)

143. (3)

Gene for colour blindness is located on X-chromosome.

(Class 12th NCERT Page No. 73-74)

144. (4)

Blood has defective Hb in sickle-cell anaemia. It is a biochemical disorder inherited as a recessive trait. In this disease, the haemoglobin differs in electrophoretic mobility and physiochemical mobility and physiochemical properties from normal haemoglobin.

(Class 12th NCERT Page No. 74-75)

145. (4)

More men suffer from colour blindness than women because men are hemizygous and one defective gene is enough to make them colourblind. The gene for colour blindness is present on X-chromosome. If one X-chromosome of female has gene for colour blindness, this will be carrier (normal), but if a male has gene on X-chromosome he will be colourblind (since only one X-chromosome is present in male).

(Class 12th NCERT Page No. 73-74)

146. (1)

Colour blindness is caused due to recessive female chromosome.

(Class 12th NCERT Page No. 73-74)

147. (4)

2n-1 is called monosomic condition.

(Class 12th NCERT Page No. 75-76)

148. (3)

Haemophilia shows criss-cross inheritance.

(Class 12th NCERT Page No. 74)

149. (3)

Genetic variation in a population arises due to mutations as well as recombination.

(Class 12th NCERT Page No. 72)

150. (1)

Mutations are generally recessive in nature. These are large discontinuous sudden heritable change in the genotype.

(Class 12th NCERT Page No. 72)

SECTION – IV (ZOOLOGY)

151. (1)
(NCERT 12th Page 154)
The lymph nodes are small solid structures located at different points along the lymphatic system. Lymph nodes serve to trap the micro-organisms or other antigens, which happen to get into the lymph and tissue fluid. Antigens trapped in the lymph nodes are responsible for the activation of lymphocytes present there and cause the immune response.

152. (3)
(NCERT 12th Page 152)
Recombinant DNA technology has allowed the production of antigenic polypeptides of pathogen in bacteria or yeast. Vaccines produced using this approach allow large scale production and hence greater availability for immunisation, e.g., hepatitis B vaccine produced from yeast.

153. (1)
(NCERT 12th Page 153)
- Allergy is due to the release of chemicals like histamine and serotonin from the mast cells.
- The use of drugs like anti-histamine, adrenalin and steroids quickly reduce the symptoms of allergy.

154. (4)
(NCERT 12th Page 152)
If a person is infected with some deadly microbes to which quick immune response is required as in tetanus, we need to directly inject the preformed antibodies, or antitoxin (a preparation containing antibodies to the toxin). Even in cases of snakebites, the injection which is given to the patients, contain preformed antibodies against the snake venom. This type of immunisation is called passive immunisation.

155. (2)
(NCERT 12th Page 151)
- Each antibody molecule has four poly peptide chains, two small called light chains and two longer called heavy chains. Hence, an antibody is represented as H_2L_2.
- The light and heavy chains are joined together by disulphide linkages.

156. (3)
(NCERT 12th Page 60, 61)
- Pills - Prevent ovulation
- Condom - Barrier method
- Vasectomy - Blocks sperm transport
- Copper T - Release Cu^{+2} which supress sperm motility.

157. (1)
(NCERT 12th Page 154)
The spleen is a large bean shaped organ. It mainly contains lymphocytes and phagocytes. It acts as a filter of the blood by trapping blood-borne micro-organisms. Spleen also has a large reservoir of erythrocytes. Spleen is a secondary lymphoid organ.

158. (2)
(NCERT 12th Page 154)
Peyer's patches are aggregates of lymphoid tissue present in small intestine and appendix.

159. (3)
(NCERT 12th Page 60)
Lactational amenorrhea (absence of menstruation) method is based on the fact that ovulation and therefore the cycle do not occur during the period of intense lactation following parturition. Therefore, as long as the mother breast-feeds the child fully, chances of conception are almost nil. However, this method has been reported to be effective only upto a maximum period of six months following parturition.

160. (1)
(NCERT 12th Page 150)
- Monocytes - Cellular barrier
- Skin and epithelium of urogenital tract – Physical barrier.

161. (1)
(NCERT 12th Page 152)
Tissue matching, blood group matching are essential before undertaking any graft/transplant and even after this the patient has to take immuno-suppresants all his/her life. The body is able to differentiate 'self' and 'nonself' and the cell-mediated immune response is responsible for the graft rejection.

162. (3)
(NCERT 12th Page 152)
Tissue matching, blood group matching are essential before undertaking any graft/transplant and even after this the patient has to take immuno-suppresants all his/her life. The body is able to differentiate 'self' and 'nonself' and the cell-mediated immune response is responsible for the graft rejection.

163. (4)

(NCERT 12th Page 153, 154)

- The primary lymphoid organs are bone marrow and thymus where immature lymphocytes differentiate into antigen sensitive lymphocytes.
- Rheumatoid arthritis is an auto-immune disease.

164. (3)

(NCERT 12th Page 151 Fig. 8.4)

Antigen binding site is formed by the variable regions of heavy and light chains.

165. (1)

(NCERT 12th Page 153)

- The exaggerated response of the immune system to certain antigens present in the environment is called allergy. The substances to which such an immune response is produced are called allergens.
- Symptoms of allergic reactions include sneezing, watery eyes, running nose and difficulty in breathing. Allergy is due to the release of chemicals like histamine and serotonin from the mast cells.

166. (2)

(NCERT 12th Page 154)

- After maturation, the lymphocytes migrate to secondary lymphoid organs like spleen, lymph nodes, tonsils, Peyer's patches of small intestine and appendix.
- Both bone-marrow and thymus provide micro-environments for the development and maturation of T-lymphocytes.
- The spleen is a large bean shaped organ. It mainly contains lymphocytes and phagocytes. It acts as a filter of the blood by trapping blood-borne micro-organisms.
- The lymph nodes are small solid structures located at different points along the lymphatic system. Lymph nodes serve to trap the micro-organisms or other antigens, which happen to get into the lymph and tissue fluid.

167. (1)

(NCERT 12th Page 152)

The principle of immunisation or vaccination is based on the property of 'memory' of the immune system. In vaccination, a preparation of antigenic proteins of pathogen or inactivated/weakened pathogen (vaccine) are introduced into the body. The antibodies produced in the body against these antigens would neutralise the pathogenic agents during actual infection. The vaccines also generate memory-B and T-cells that recognise the pathogen quickly on subsequent exposure.

168. (4)

(NCERT 12th Page 57)

India was amongst the first countries in the world to initiate action plans and programmes at a national level to attain total reproductive health as a social goal. These programmes called 'family planning' were initiated in 1951 and were periodically assessed over the past decades.

169. (1)

(NCERT 12th Page 62)

Surgical methods, also called sterilisation, are generally advised for the male/female partner as a terminal method to prevent any more pregnancies. Surgical intervention blocks gamete transport and thereby prevent conception.

170. (4)

(NCERT 12th Page 150)

Innate immunity is a non-specific type of defense, that is present at the time of birth. This is accomplished by providing different types of barriers to the entry of the foreign agents into our body.

171. (4)

(NCERT 12th Page 152)

When a host is exposed to antigens, which may be in the form of living or dead microbes or other proteins, antibodies are produced in the host body. This type of immunity is called active immunity. Active immunity is slow and takes time to give its full effective response. Injecting the microbes deliberately during immunisation or infectious organisms gaining access into body during natural infection induce active immunity. When ready-made antibodies are directly given to protect the body against foreign agents, it is called passive immunity.

172. (1)

(NCERT 12th Page 64)

Transfer of an ovum collected from a donor into the fallopian tube (GIFT - gamete intra fallopian transfer) of another female who cannot produce one, but can provide suitable environment for fertilisation and further development is another method attempted.

173. (2)

(NCERT 12th Page 151, 152)

- Colostrum during initial days of lactation contains IgA.
- B-lymphocytes produce antibodies

174. (1)

(NCERT 12th Page 150)

Neutrophils and monocytes are phagocytic cells of blood.

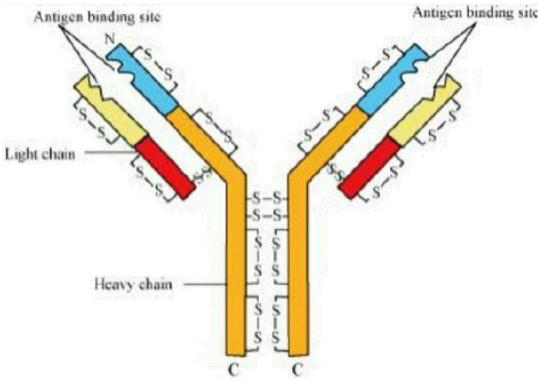
175. (3)

(NCERT 12th Page 63)

Infections like hepatitis-B and HIV can also be transmitted by sharing of injection needles, surgical instruments, etc., with infected persons, transfusion of blood, or from an infected mother to the foetus too.

176. (2)

(NCERT 12th Page 151 Fig. 8.4)



177. (4)

(NCERT 12th Page 153, 154)

The primary lymphoid organs are bone marrow and thymus where immature lymphocytes differentiate into antigen sensitive lymphocytes.

178. (4)

(NCERT 12th Page 154)

There is lymphoid tissue also located within the lining of the major tracts (respiratory, digestive and urogenital tracts) called mucosa associated lymphoid tissue (MALT). It constitutes about 50 per cent of the lymphoid tissue in human body.

179. (3)

(NCERT 12th Page 64)

In test tube baby programme, ova from the wife/donor (female) and sperms from the husband/donor (male) are collected and are induced to form zygote under simulated conditions in the laboratory. The zygote or early embryos (with upto 8 blastomeres) could then be transferred into the fallopian tube (ZIFT-zygote intra fallopian transfer) and embryos with more than 8 blastomeres, into the uterus (IUT-intra uterine transfer) to complete its further development.

180. (4)

(NCERT 12th Page 150, 151, 153)

- T-lymphocytes mediate CMI which is responsible for graft rejection.
- Macrophages are included in cellular barrier of immunity.
- Mast cell is involved in allergy.
- Anti-tetanus injection contains preformed antibodies.

181. (1)

(NCERT 12th Page 152)

- When a host is exposed to antigens, which may be in the form of living or dead microbes or other proteins, antibodies are produced in the host body. This type of immunity is called active immunity. Active immunity is slow and takes time to give its full effective response.
- B-lymphocytes mediate humoral immune response

182. (3)

(NCERT 12th Page 62)

Surgical intervention blocks gamete transport and thereby prevent conception. Sterilisation procedure in the male is called 'vasectomy'. In vasectomy, a small part of the vas deferens is removed or tied up through a small incision on the scrotum.

183. (4)

(NCERT 12th Page 152)

In vaccination, a preparation of antigenic proteins of pathogen or inactivated/weakened pathogen (vaccine) are introduced into the body. The antibodies produced in the body against these antigens would neutralise the pathogenic agents during actual infection. The vaccines also generate memory-B and T-cells that recognise the pathogen quickly on subsequent exposure.

184. (1)

(NCERT 12th Page 153)

The exaggerated response of the immune system to certain antigens present in the environment is called allergy. The substances to which such an immune response is produced are called allergens. The antibodies produced to these are of IgE type. Common examples of allergens are mites, dust, pollens, animal dander, etc.

185. (2)

(NCERT 12th Page 152)

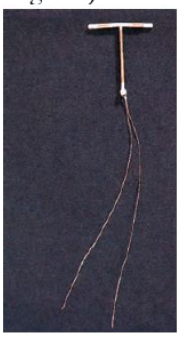
In vaccination, a preparation of antigenic proteins of pathogen or inactivated/weakened pathogen (vaccine) are introduced into the body. The antibodies produced in the body against these antigens would neutralise the pathogenic agents during actual infection. The vaccines also generate memory-B and T-cells that recognise the pathogen quickly on subsequent exposure.

186. (4)
(NCERT 12th Page 58)
Introduction of sex education in schools should be encouraged to provide right information to the young so as to discourage children from believing in myths and having misconceptions about sex-related aspects. Proper information about reproductive organs, adolescence and related changes, safe and hygienic sexual practices, sexually transmitted diseases (STD), AIDS, etc., would help people, especially those in the adolescent age group to lead a reproductively healthy life.

187. (4)
(NCERT 12th Page 150)
Physiological barriers: Acid in the stomach, saliva in the mouth, tears from eyes-all prevent microbial growth.

188. (4)
(NCERT 12th Page 60)
Lippes loop is a non-medicated IUDs.

189. (3)
(NCERT 12th Page 60)



Cu-T

190. (1)
(NCERT 12th Page 153)
The exaggerated response of the immune system to certain antigens present in the environment is called allergy. The substances to which such an immune response is produced are called allergens.

191. (4)
(NCERT 12th Page 150)
Acid in stomach is an example of innate immunity which is non-specific.

192. (4)
(NCERT 12th Page 150, 153)
- Innate immunity is non-specific type of defense, that is present at the time of birth. This is accomplished by providing different types of barriers to the entry of the foreign agents into our body.
- Acquired immunity, on the other hand is pathogen specific, characterised by memory.

193. (3)
(NCERT 12th Page 150, 152)
- Active natural immunity- It is achieved as a results of an infection.
- Passive natural immunity - IgG antibodies are transferred to the foetus through placenta.
- PMNL- Cellular barrier.
- Acid in stomach- Physiological barrier.

194. (4)
(NCERT 12th Page 151, 152)
- When some human organs like heart, eye, liver, kidney fail to function satisfactorily transplantation is the only remedy to enable to patient to live normal life.
- Tissue matching, blood group matching, etc, are required before undertaking anygraft.

195. (1)
(NCERT 12th Page 63)
Except for hepatitis-B, genital herpes and HIV infections, other diseases are completely curable if detected early and treated properly.

196. (4)
(NCERT 12th Page 150)
The overall ability of the host to fight the disease-causing organism, conferred by the immune system is called immunity.

197. (2)
(NCERT 12th Page 152)
Yellowish fluid colostrum secreted by mother during the initial days of lactation has abundant antibodies (IgA) to protect the infant. The foetus also receives some antibodies from their mother, through the placenta during pregnancy. These are some examples of passive immunity.

198. (4)
(NCERT 12th Page 61)
Administration of progestogens or progestogen-estrogen combinations or IUDs within 72 hours of coitus have been found to be very effective as emergency contraceptives as they could be used to avoid possible pregnancy due to rape or casual unprotected intercourse.

199. (2)

(NCERT 12th Page 60)

IUDs increase phagocytosis of sperms within the uterus and the Cu ions released suppress sperm motility and the fertilising capacity of sperms.

200. (1)

(NCERT 12th Page 152)

- Injecting the microbes deliberately during immunisation or infectious organisms gaining access into body during natural infection induce active immunity.
- When a host is exposed to antigens, which may be in the form of living or dead microbes or other proteins, antibodies are produced in the host body. This type of immunity is called active immunity.
- When ready-made antibodies are directly given to protect the body against foreign agents, it is called passive immunity.