MHT CET 2026 PCB Apr 24 Shift 2 Question Paper

Conducted by the State Common Entrance Test Cell, Maharashtra

Time Allowed: 180 Minutes **Total Questions: 200** **Maximum Marks: 200**

General Instructions

(i) This **PCB** paper is from **MHT CET 2026**, conducted by the **State Common Entrance Test Cell, Maharashtra**.

(ii) Answer all **200 multiple choice questions**: **50 Physics**, **50 Chemistry** and **100 Biology**.

(iii) Each question offers **four choices**, with **one correct answer**.

(iv) Allow **90 minutes for Physics and Chemistry together**, followed by **90 minutes for Biology**. The first group closes before the second opens.

(v) Every correct answer earns **1 mark**.

(vi) There is **no negative marking**. Unanswered questions score zero.

1. What is the relation between the two vectors $\vec{A} = 2\hat{i} + 5\hat{j} - 6\hat{k}$ and $\vec{B} = \hat{i} + \frac{5}{2}\hat{j} - 3\hat{k}$?

(A) $\vec{A}$ is perpendicular to $\vec{B}$
(B) $\vec{A}$ is parallel to $\vec{B}$
(C) $\vec{A} + \vec{B} = 0$
(D) $\vec{A} - \vec{B} = 0$

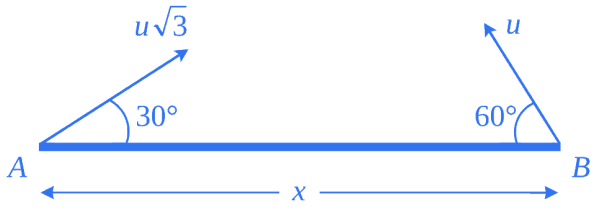
2. The error in measurement of radius of sphere is 0.2 %, then the percentage error in its volume is

(A) 0.6 %
(B) 0.8 %
(C) 1.2 %
(D) 1.0 %

3. A block is kept on the floor of an elevator at rest. The elevator starts descending with acceleration of 5 m/s^2. The displacement of the block during the first 0.2 s after the start is {Take $g = 10\ m/s^2$}

(A) 0.1 cm
(B) 1 cm
(C) 10 cm
(D) 1 m

4. Two particles are separated by a horizontal distance $'x'$ as shown. They are projected at the same time as shown with different initial speeds. The time after which the horizontal distance between them becomes zero is
$\left\{\cos 30^\circ = \frac{\sqrt{3}}{2},\ \cos 60^\circ = \frac{1}{2}\right\}$



(A) $\frac{x}{u}$
(B) $\frac{x}{2u}$
(C) $\frac{2u}{x}$
(D) $\frac{u}{x}$

5. A small disc is on the top of the hemisphere of radius R. The minimum horizontal velocity v that should be given to the disc for it to leave the hemisphere and not slide down is {consider zero friction}
{g = acceleration due to gravity}

(A) $\sqrt{2gR}$
(B) $\sqrt{gR}$
(C) $\sqrt{g^2R}$
(D) $\frac{g}{R}$

6. Two solid cylinders P and Q of same mass and same radius, start rolling down a fixed inclined plane from the same height at the same time. Cylinder P has most of its mass concentrated near its surface, while Q has most of its mass concentrated near the axis. Which of the following statements is correct?
a. Both the cylinders P and Q reach the ground at the same time.
b. Cylinder P has larger linear acceleration than cylinder Q
c. Both cylinders reach the ground with same translational kinetic energy.
d. Cylinder Q reaches the ground with larger angular speed.

(A) c
(B) a
(C) d
(D) b

7. Consider a uniform square plate of side $'a'$ and mass $'m'$. The moment of inertia of this plate about an axis perpendicular to its plane and passing through one of its corners is

(A) $\frac{5ma^2}{6}$
(B) $\frac{2ma^2}{3}$
(C) $\frac{7ma^2}{12}$
(D) $\frac{ma^2}{12}$

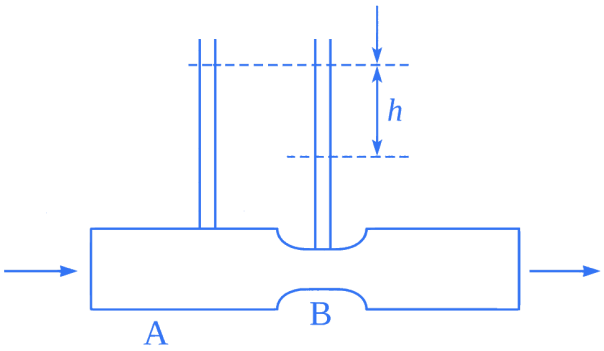
8. Four particles of equal masses (M) move along the circle of radius R under the action of their mutual gravitational attraction. The magnitude of net gravitational force on each particle is
$\{\cos(90)^\circ = 0\}$

(A) $\frac{GM^2}{R^2}\left(\frac{1}{\sqrt{2}} + \frac{1}{2}\right)$
(B) $\frac{GM^2}{R^2}\left(\frac{1}{\sqrt{2}} + \frac{1}{4}\right)$
(C) $\frac{GM^2}{R^2}\left(\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}}\right)$
(D) $\frac{GM^2}{R^2}\left(\frac{1}{\sqrt{2}} + 2\right)$

9. The excess pressure inside a spherical soap bubble X, is six times that of another spherical soap bubble Y. The ratio of mass of bubble X to that of bubble Y is

(A) $\frac{1}{6}$
(B) $\frac{1}{36}$
(C) $\frac{1}{216}$
(D) $\frac{1}{1296}$

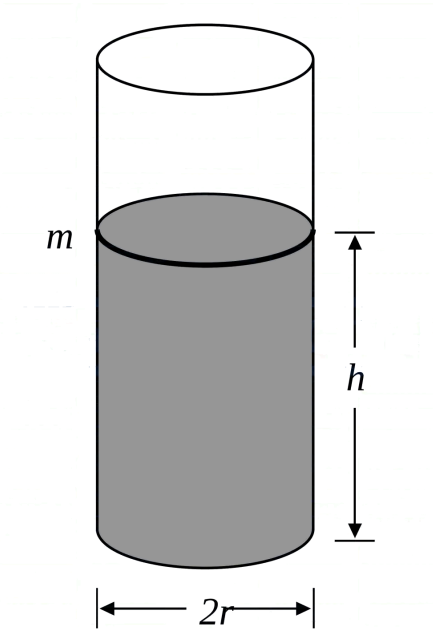
10. Water flows through a horizontal tube as shown. If the difference of heights of water column in the vertical tubes is $h = 2$ cm, and the areas of cross section at A and B are $4\ \text{cm}^2$ and $2\ \text{cm}^2$ respectively, the difference in pressure that is $(P_A - P_B)$ is $\{v_A =$ velocity of water at point A, $v_B =$ velocity of water at point B, density of water $\rho = 1\ \text{g/cm}^3\}$



(A) $\frac{3}{2}v_A^2$ (B) $\frac{1}{2}v_A^2$

(C) v_A^2 (D) $2v_A^2$

11. A cylindrical vessel containing a liquid of density ρ is closed by a smooth piston of mass m as shown. If atmospheric pressure is P_0, radius of cylinder is 'r' and height of liquid is 'h', then the force at the bottom of the cylinder is



(A) $\left(P_0 + \frac{mg}{\pi r^2} + \rho gh\right)\pi r^2$

(B) $\left(P_0 + \frac{mg}{\pi r^2}\right)\pi r^2$

(C) $\left(\frac{mg}{\pi r^2} + \rho gh\right)\pi r$

(D) $\left(\frac{mg}{\pi r^2}\right)\pi r^2$

12. The ratio of emissive power of perfectly black body at 1327 °C to that at 527 °C is

(A) 4 : 1 (B) 16 : 1

(C) 64 : 1 (D) 8 : 1

13. If two temperatures differ by 25 °C on Celsius scale, the difference in temperature on Fahrenheit scale is

(A) 65 F (B) 45 F

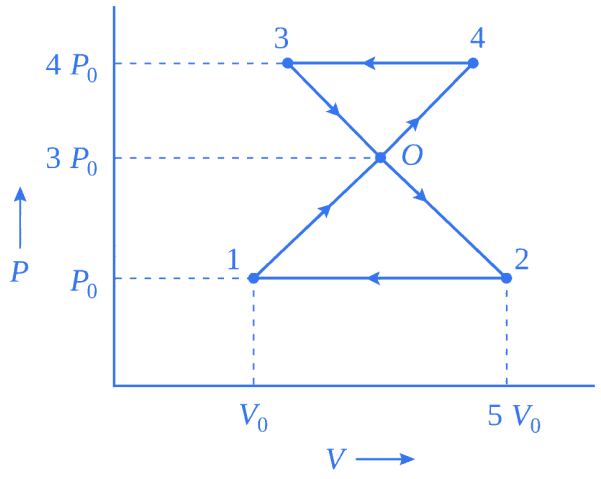
(C) 38 F (D) 25 F

14. Which of the following statements is NOT CORRECT?
In an isothermal process,
a. there is perfect thermal equilibrium with environment.
b. there is no change in internal energy during the process.
c. the work done is equal to zero.
d. the time taken is very large.

(A) c (B) a

(C) d (D) b

15. The work done by an ideal gas during closed cycle $1 \to 2 \to 3 \to 4 \to 1$ as shown in figure is



(A) P_0V_0 (B) $2P_0V_0$

(C) $3P_0V_0$ (D) $4P_0V_0$

16. The pressure P, volume V and temperature T of a gas in the jar A and the other gas in the jar B is at pressure $2P$, volume $V/4$ and temperature $2T$, then the ratio of the number of molecules in the jar A and B will be

(A) 1 : 1 (B) 1 : 2

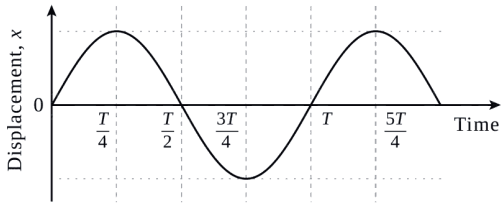
(C) 2 : 1 (D) 4 : 1

17. Pressure exerted by an ideal gas on the walls of the container is equal to
a) mean kinetic energy per unit volume.
b) half of mean kinetic energy per unit volume.
c) one-third of mean kinetic energy per unit volume.
d) two-third of mean kinetic energy per unit volume.

(A) d (B) c

(C) b (D) a

18. The graph shows variation of displacement of a particle performing SHM with time t. which of the following statements is correct from the graph?



(A) The acceleration is maximum at time T .

(B) The force is maximum at time $\frac{3T}{4}$.

(C) The velocity is zero at time $\frac{T}{2}$.

(D) The kinetic energy is equal to total energy at time $\frac{T}{4}$.

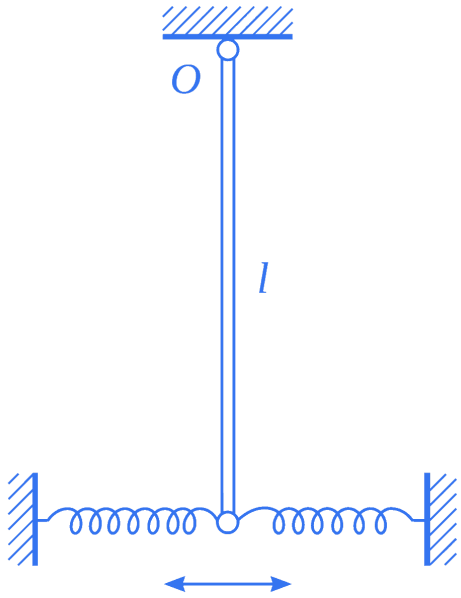
19. The periodic time of a simple pendulum, (the simple pendulum with its bob is in air) is T. But if the bob of the simple pendulum is completely immersed in a non viscous liquid, whose density is $\frac{1}{20}$ times the density of material of the bob, then its new period will be

(A) T (B) $\frac{19T}{20}$

(C) $\frac{20T}{19}$ (D) $\sqrt{\frac{20}{19}}T$

collegedunia

20. The frequency of small oscillations of thin uniform vertical rod of mass $'m'$ and length $'l'$ hinged at point O with the help of two springs with spring constants k_1 and k_2, is



(A) $\frac{1}{2\pi}\sqrt{\frac{(k_1+k_2)}{m}+\frac{3g}{2l}}$ (B) $\frac{1}{2\pi}\sqrt{\frac{3(k_1+k_2)}{m}+\frac{3g}{2l}}$

(C) $2\pi\sqrt{\frac{(k_1+k_2)}{m}+\frac{g}{2l}}$ (D) $2\pi\sqrt{\frac{(k_1+k_2)}{3m}+\frac{2g}{3l}}$

21. A uniform rope of length L and mass m_1 hangs vertically from a rigid support. A block of mass m_2 is attached to the free end of the rope. A transverse pulse of wavelength λ_1 is produced at the lower end of the rope. The wavelength of the pulse when it reaches the top of the rope is λ_2. The ratio $\frac{\lambda_2}{\lambda_1}$ is

(A) $\sqrt{\frac{m_1+m_2}{m_2}}$ (B) $\sqrt{\frac{m_2}{m_1}}$

(C) $\sqrt{\frac{m_1+m_2}{m_1}}$ (D) $\sqrt{\frac{m_1}{m_2}}$

22. Two sources of sound placed close to each other are emitting progressive waves given by $y_1 = 4\sin(600\pi t)$ and $y_2 = 5\sin(608\pi t)$.
An observer located near these two sources of sound will hear

(A) 4 beats/s with intensity ratio 25 : 16 between waxing and waning.

(B) 8 beats/s with intensity ratio 25 : 16 between waxing and waning.

(C) 8 beats/s with intensity ratio 81 : 1 between waxing and waning.

(D) 4 beats/s with intensity ratio 81 : 1 between waxing and waning.

23. A vibrating string of certain length $'l'$ under a tension $'T'$ resonates with a mode corresponding to the first overtone of an air column of length 75 cm inside a tube closed at one end. The string also generates 4 beats/s, when vibrated along with a tuning fork of frequency $'n'$. Increasing the tension of the string reduces the beat frequency. The frequency $'n'$ of the tuning fork in Hz is { Velocity of sound in air is 340 m/s}

(A) 344 (B) 336

(C) 117.3 (D) 109.3

24. A source of sound vibrating at frequency 500 Hz is rotated in a circle of radius $\frac{100}{\pi}$ cm at a constant angular speed of 5 revolutions per second. A listener is in the plane of the circle. The maximum and minimum frequency of sound heard are {Speed of sound on air = 332 m/s}

(A) 500 Hz and 480 Hz (B) 516 Hz and 485 Hz

(C) 416 Hz and 490 Hz (D) 520 Hz and 500 Hz

25. Three electric charges $2q$, $2q$, $-4q$ are placed at the corners of equilateral triangle of side $'x'$. The magnitude of electric dipole moment of the system is

(A) $2qx$ (B) $\sqrt{2}qx$

(C) $\sqrt{3}qx$ (D) $2\sqrt{3}qx$

26. Three point charges $q_1 = 1\ \mu$C, $q_2 = -2\ \mu$C, and $q_3 = 3\ \mu$C are placed at $(1,0,0)$, $(0,2,0)$ and $(0,0,3)$ respectively. The electric potential at origin is $\left\{\frac{1}{4\pi\epsilon_0} = 9\times10^9 \text{ SI unit}\right\}$

(A) 10^6 V (B) 3×10^3 V

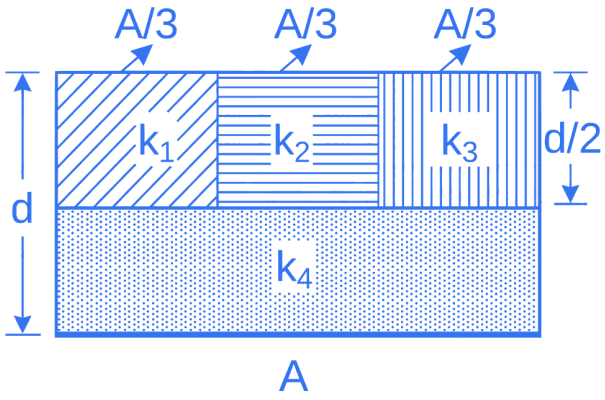
(C) 6×10^6 V (D) 9×10^3 V

27. Two point charges $+8q$ and $-2q$ are located at $x = 0$ and $x = L$ respectively. What is the location of a point on the x-axis from the origin, at which the net electric field due to these two point charges is zero?

(A) $8L$ (B) $4L$

(C) $2L$ (D) $\frac{L}{4}$

28. A parallel plate capacitor of area A, plate separation d and capacitance C is filled with four dielectric materials having dielectric constants k_1, k_2, k_3 and k_4 as shown in figure below. If a single dielectric material is to be used to have the same capacitance C in this capacitor, then its dielectric constants K is given by



(A) $k = k_1 + k_2 + k_3 + 3k_4$

(B) $k = \frac{2}{3}(k_1 + k_2 + k_3) + 2k_4$

(C) $\frac{2}{k} = \frac{3}{k_1+k_2+k_3} + \frac{1}{k_4}$

(D) $\frac{1}{k} = \frac{1}{k_1} + \frac{1}{k_2} + \frac{1}{k_3} + \frac{3}{2k_4}$

29. The range of voltmeter is 10 V and its resistance is 50 Ω. To convert it to a voltmeter of range 15 V, how much resistance is to be added?

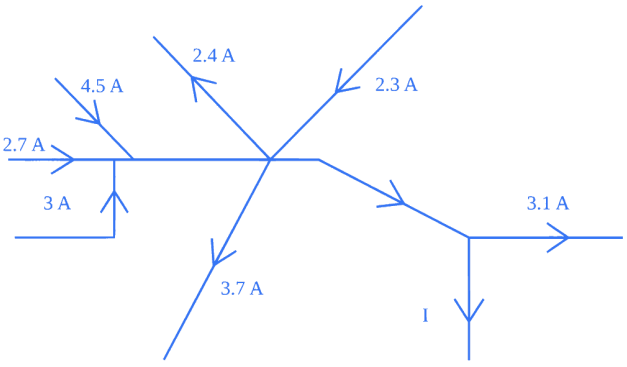
(A) 25 Ω resistor in parallel.

(B) 25 Ω resistor in series.

(C) 125 Ω resistor in parallel.

(D) 125 Ω resistor in series.

30. In the following figure current I equal to



(A) 1.1 A

(B) 2.2 A

(C) 3.3 A

(D) 4.4 A

31. In a cyclotron, a charged particle

(A) undergoes acceleration all the time.

(B) speeds up between the dees because of the magnetic field.

(C) speeds up in the dee.

(D) slows down within a dee and speeds up between the dees.

32. The magnetic flux near the axis and inside the air core solenoid of length 60 cm carrying current $'I'$ is 1.57×10^{-6} Wb. Its magnetic moment will be {cross-sectional area of a solenoid is very small as compared to its length, $\mu_0 = 4\pi \times 10^{-7}$ SI unit}

(A) 0.25 Am^2

(B) 0.50 Am^2

(C) 0.75 Am^2

(D) 1.00 Am^2

33. A magnetizing field of 360 A/m produces a magnetic flux density $B = 0.6$ T in a ferromagnetic material. The permeability of the material in T-m/A is

(A) $\frac{1}{300}$

(B) $\frac{1}{600}$

(C) 300

(D) 600

34. A wire of length 1 m is moving at a speed of 2 m/s perpendicular to its length in a homogeneous magnetic field of 0.5 T. If the ends of the wire are joined to a circuit of resistance 6 Ω, then the rate at which work is being done to keep the wire moving at constant speed is

(A) 1 W

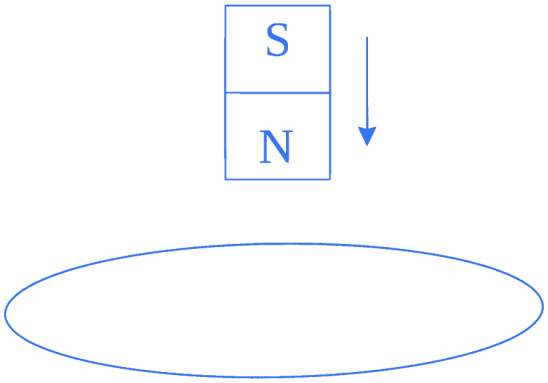
(B) $\frac{1}{3}$ W

(C) $\frac{1}{6}$ W

(D) $\frac{1}{12}$ W

collegedunia

35. The north pole of the magnet is brought near a metallic ring as shown in figure. The direction of induced current in the ring (if looked from upside) will be



(A) anti-clockwise.
(B) clockwise.
(C) first anti-clockwise and then clockwise.
(D) first clockwise and then anti-clockwise.

36. The self inductance L of a solenoid of length l and area of cross-section A, with a fixed number of turns N increases as

(A) both l and A increase.
(B) l decreases and A increases.
(C) l increases and A decreases.
(D) both l and A decrease.

37. In an AC circuit, E and I are given by $E = 150\ \sin(150t)$ V and $I = 150\ \sin\left(150t + \frac{\pi}{3}\right)$ A. The power dissipated in the circuit is
$\{\cos 60^\circ = 1/2\}$

(A) 106 W
(B) 150 W
(C) 5625 W
(D) zero

38. An alternating voltage given as, $E = 100\sqrt{2}\sin(100t)$ volt is applied to a capacitor of 1 μF. The current reading of the ammeter will be equal to

(A) 20 mA
(B) 10 mA
(C) 40 mA
(D) 80 mA

39. In an LCR series circuit, at resonance,

(A) the voltage across R is zero.
(B) the voltage across R equals to applied voltage.
(C) the voltage across C is zero.
(D) the voltage across C equals applied voltage.

40. The refracting angle of a prism is 'A' and its refractive index is $\cot\left(\frac{A}{2}\right)$. The minimum deviation produced by the prism is

(A) $(90)^\circ - \frac{3A}{2}$
(B) $(180)^\circ - 2A$
(C) $(180)^\circ - A$
(D) $(90)^\circ - 2A$

41. When the un-polarised light beam is incident from air to glass ($n = 1.5$) at the Brewster's angle,

(A) reflected beam is polarized 50 %.
(B) reflected and refracted beams are partially polarized.
(C) reflected beam is polarized 100 %.
(D) refracted beam is polarized 100 %

42. In Young's double slit experiment, the slits are 2 mm apart and are illuminated by photons of two wavelengths $\lambda_1 = 6000$ Å and $\lambda_2 = 5000$ Å one after the other. At what minimum distance from the common central bright fringe on the screen 2 m from the slit will, a bright fringe from one interference pattern coincide with a bright fringe from the other?

(A) 8 mm
(B) 6 mm
(C) 4 mm
(D) 3 mm

43. A parallel beam of light of intensity I is incident on a glass plate. 25 % of light is reflected by upper surface and 50 % of light is reflected from lower surface. Rest of the light is refracted. Above two reflected rays interfere, the ratio of maximum to minimum intensity in interference region is

(A) $\left(\frac{\frac{1}{2}+\sqrt{\frac{3}{8}}}{\frac{1}{2}-\sqrt{\frac{3}{8}}}\right)^2$
(B) $\left(\frac{\frac{1}{4}+\sqrt{\frac{3}{8}}}{\frac{1}{4}-\sqrt{\frac{3}{8}}}\right)^2$
(C) $\frac{5}{8}$
(D) $\frac{8}{5}$

44. **Statement I**- When the wavelength of incident radiation in a photoelectric experiment is decreased, then the stopping potential will decrease.
Statement II- In photoelectric effect, if the intensity of light is doubled, then the maximum kinetic energy of photoelectrons will become double.

(A) Statement I is true and statement II is false.
(B) Statement I is false and statement II is true.
(C) Both the statements are correct.
(D) Both the statements are incorrect.

45. When a light beam of frequency v is incident on a metal surface, photoelectrons are emitted. If these electrons describe a circle of radius r in a magnetic field of strength B, then the work function of the metal is
($h =$ Planck's constant, $m_e =$ mass of electron, $e =$ charge on electron)

(A) $hv + \frac{Ber}{2m_e}$ (B) $hv - \frac{(Ber)^2}{2m_e}$

(C) $hv + \frac{(Ber)^2}{2m_e}$ (D) $hv - \frac{Ber}{2m_e}$

46. The radius of the orbit of an electron in a hydrogen like atom is $4.5a_0$, where a_0 is the Bohr radius. Its orbital angular momentum is $\frac{3h}{2\pi}$. It is given that h is Planck's constant and R is Rydberg's constant. The possible wavelength (λ), when the transition of atom from higher energy level to lower energy level, is

(A) $\frac{9}{32R}$ (B) $\frac{9}{16R}$

(C) $\frac{9}{10R}$ (D) $\frac{4}{3R}$

47. When a nucleus in an atom undergoes a radioactive decay, the atomic number and/or mass number of the atom

(A) do not change for any type of radioactivity.

(B) change for α and β radiations but not for γ radiation.

(C) change for α radiation but not for others.

(D) change for β radiation but not for others.

48. To emit red or green light, LED is manufactured using

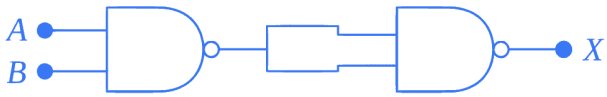
(A) aluminum gallium arsenide.

(B) zinc selenide.

(C) gallium arsenide phosphide.

(D) aluminum gallium phosphide

49. The output of the logic circuit shown in figure will be



(A) $X = \overline{A.B}$ (B) $X = A.B$

(C) $X = \overline{A + B}$ (D) $X = A + B$

50. In case of semiconductors, the band gap between the valence band and conduction band is

(A) between 5 eV and 6 eV.

(B) between 10 eV and 11 eV

(C) 1 eV or less but greater than zero.

(D) zero.

51. Calculate the number of moles and molecules of chlorine in 4.48 dm^3 of chlorine at STP.

(A) The number of mol of chlorine = 0.2 and number of molecules = 1.2044×10^{23}.

(B) The number of mol of chlorine = 0.4 and number of molecules = 2.4088×10^{23}.

(C) The number of mol of chlorine = 0.5 and number of molecules = 3.011×10^{23}.

(D) The number of mol of chlorine = 0.6 and number of molecules = 3.6132×10^{23}.

52. Identify the pair of atoms of elements as isotones from the following.

(A) ${}_6C^{12}$, ${}_6C^{14}$

(B) ${}_6C^{14}$, ${}_7N^{14}$

(C) ${}_5B^{11}$, ${}_6C^{12}$

(D) ${}_7N^{14}$, ${}_8O^{16}$

53. Which one of the following is NOT an example of an expanded octet?

(A) PCl_5

(B) H_2SO_4

(C) SF_6

(D) CH_4

54. A steel cylinder of 8 litres capacity contains hydrogen gas at 12 atm pressure. At the same temperature, how many cycle tubes of 4 litre capacity at 2 atmosphere can be filled up with this gas ?

(A) 12

(B) 48

(C) 5

(D) 8

55. Determine the temperature at which 2 moles of oxygen gas expands isothermally and reversibly from 2 dm^3 to 20 dm^3 performs -11490 J of work $[2.303 \times R = 19.15\ JK^{-1}mol^{-1}]$

(A) 295 K

(B) 310 K

(C) 305 K

(D) 300 K

56. Calculate the work done in the following reaction at 300 K,
$A(g) + B(g) = 2C(g)$ $[R = 8.314\ JK^{-1}mol^{-1}]$

(A) 2.494 kJ

(B) 4.988 kJ

(C) 0 kJ

(D) -2.494 kJ

57. Identify from following reactions that it takes place with $\Delta H = \Delta U$.

(A) $CO_2(g) + H_2(g) \rightarrow CO(g) + H_2O(g)$

(B) $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$

(C) $CO(g) + \frac{1}{2}O_2(g) \rightarrow CO_2(g)$

(D) $H_2(g) + \frac{1}{2}O_2(g) \rightarrow H_2O(l)$

58. Solubility of MA_2 type of electrolyte is 0.5×10^{-4} mol/litre. Then find out k_{sp} of electrolyte?

(A) 5×10^{-13}

(B) 5×10^{-12}

(C) 25×10^{-13}

(D) 5×10^{-14}

59. Calculate the solubility of AgCl in mol/dm^3 at 25 °C. Given: K_{sp} (AgCl) $= 1.8 \times 10^{-10}$

(A) 1.8×10^{-5} M

(B) 1.34×10^{-5} M

(C) 1.8×10^{-10} M

(D) 3.6×10^{-5} M

60. A weak monobasic acid is 0.05 % dissociated in its solution, find the degree of dissociation.

(A) 2×10^{-4}

(B) 4×10^{-2}

(C) 5×10^{-4}

(D) 2×10^{-2}

61. Calculate the oxidation number of sulfur in H_2SO_4.

(A) +2

(B) +6

(C) +4

(D) −2

62. Identify oxidant and reductant, respectively, in the following reaction:
$Zn(s) + Cu^{2+}(aq) \longrightarrow Zn^{2+}(aq) + Cu(s)$

(A) Zn, Cu^{2+}

(B) Cu, Zn^{2+}

(C) Cu^{2+}, Zn

(D) Zn^{2+}, Cu^{2+}

63. Which of the following statements is NOT true regarding dihydrogen?

(A) It reduces oxides and ions of metal, having more reactivity than iron.

(B) It inflames with fluorine at −250 °C in dark

(C) It is used for preparation of methanol.

(D) It reacts with alkali metals to form metal hydrides.

64. CH_3-CH=CH-CH_2-COOH
What is the IUPAC name of the above compound ?

(A) Pent-2-enoic acid (B) Pent-3-enoic acid
(C) Pent-2-en-1-oic acid (D) 3-Pentenol

65. Identify the alkane having two secondary carbon atoms.:

(A) Cyclohexane
(B) 1,2,3,4-Tetramethylcyclohexane
(C) 1-Ethyl-2,3,4-trimethylcyclohexane
(D) 2,4-Dimethylheptane

66. Which of the following types exhibits 100% atom economy?

(A) Addition (B) Substitution
(C) Elimination (D) Dehydrogenation

67. Which of the following reagent is NOT required for the conversion of propyne to acetone?

(A) Water (B) Zinc dust
(C) H_2SO_4 (D) $HgSO_4$

68. Identify the major product of the reaction between propene and HBr in the presence of peroxide.

(A) 1-Bromopropane (B) 2-Bromopropane
(C) 1,2-Dibromopropane (D) 3-Bromopropene

69. What is the packing efficiency and number of atoms per unit cell present in a face centered cubic system?

(A) Packing efficiency = 52.4 % and number of atoms per unit cell = 1
(B) Packing efficiency = 68 % and number of atoms per unit cell = 2
(C) Packing efficiency = 26 % and number of atoms per unit cell = 6
(D) Packing efficiency = 74 % and number of atoms per unit cell = 4

70. What is the packing efficiency in BCC unit cell ?

(A) 24 % (B) 32 %
(C) 68 % (D) 74 %

71. Which of the following crystal system has four types of unit cells?

(A) Cubic (B) Orthorhombic
(C) Tetragonal (D) Monoclinic

72. What should be the molarity of aqueous solution of K_2SO_4 so that it is isotonic with aqueous 1 M glucose at same temperature, assuming complete dissociation?

(A) 1 M (B) 3 M
(C) 0.333 M (D) 0.5 M

73. A solution of glucose containing 18 g in 1 dm^3 is isotonic with a urea solution. Calculate the mass of urea in 500 mL solution.
[Molar mass of urea = 60 g mol^{-1}. Molar mass of glucose = 180 g mol^{-1}]

(A) 1.5 g. (B) 3 g.
(C) 6 g. (D) 9 g.

74. Identify the state of solute and solvent respectively in amalgams of mercury with metals.

(A) Solid in Solid (B) Solid in liquid
(C) liquid in solid (D) solid in gas

75. Calculate the standard Gibbs energy change for the following cell
$Cd(s) \mid Cd^{++}(1M) \parallel Sn^{++}(1M) \mid Sn(s)$ if E^0_{cell} is 0.27 V.

(A) −52.11 kJ (B) 52.11 kJ
(C) −26.6 kJ (D) 26.6 kJ

76. How long (in minutes) must a 2 A current be passed through $AgNO_3$ solution to deposit 5.4 g Ag? [Molar mass of Ag = 108 g mol^{-1}]

(A) 40.2 min. (B) 54.5 min.
(C) 30.1 min. (D) 60.6 min.

77. What is the Standard cell potential of a cell constituted by two electrodes, A ($E^0_{A^+/A} = 0.30$ V) and B ($E^0_{B^+/B} = +0.42$ V) ?

(A) 0.12 V (B) 0.30 V
(C) 0.42 V (D) 0.72 V

78. What is the order of reaction for the following?
$2H_2O_2(l) \rightarrow 2H_2O(l) + O_2(g)$

(A) Zero (B) First
(C) Second (D) Third

collegedunia

79. Which of the statement is correct regarding the half-life of a first-order reaction?

(A) It depends on the initial concentration of reactants

(B) It is independent of the initial concentration of reactants

(C) It increases with increasing concentration of product

(D) It decreases with increasing initial concentration of reactants.

80. Which of the following statements represents rate of reaction?

(A) Change in temperature per unit time

(B) Change in concentration of reactants or products per unit time

(C) Change in volume of the reaction mixture

(D) Change in color of the solution

81. Which of the following ions has the highest flocculating power for As_2S_3 sol?

(A) Al^{+3}

(B) Ba^{+2}

(C) S^{-2}

(D) PO_4^{-3}

82. Match **List I** with **List II**

List I **Compounds**	**List II** **Uses**
(A). Chlorine	(I). as a preservative
(B). SO_2	(II). in a petroleum refining
(C). Sulfuric acid	(III). manufacturing of steel
(D). Oxygen	(IV). extraction of gold and platinum metal

Choose the **correct** answer from the options given below:

(A) (A) - (I), (B) - (II), (C) - (III), (D) - (IV)

(B) (A) - (II), (B) - (IV), (C) - (I), (D) - (III)

(C) (A) - (IV), (B) - (I), (C) - (II), (D) - (III)

(D) (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

83. Identify the pair of diamagnetic lanthanoid ions by the following?

(A) Ce^{4+} and Yb^{2+}

(B) Ce^{4+} and Eu^{2+}

(C) Gd^{3+} and Eu^{3+}

(D) Pm^{3+} and Sm^{3+}

84. Identify the correct match from the following for coordinate complex (column A) and respective geometry (column B)

Column A **Coordination complex**	**Column B** **Geometry**
(A). $[Ni(CN)_4]^{-2}$	(I). Trigonal bipyramidal
(B). $[Ag(NH_3)_2]^{+}$	(II). Linear
(C). $[Ni(Cl)_4]^{2-}$	(III). Tetrahedral
(D). $[Fe(CO)_5]$	(IV). Square planar

(A) (A) - (I), (B) - (II), (C) - (III), (D) - (IV)

(B) (A) - (IV), (B) - (II), (C) - (III), (D) - (I)

(C) (A) - (I), (B) - (II), (C) - (IV), (D) - (III)

(D) (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

85. Which of the following isomers is used in the treatment of cancer?

(A) trans-$[Pt(NH_3)_2Cl_2]$

(B) $[Pt(NH_3)Cl_3]^{+}$

(C) cis-$[Pt(NH_3)_2Cl_2]$

(D) $K_2[PtCl_6]$

86. Why aqueous cobalt chloride solution when treated with conc. HCl develops a deep blue colored solution?

(A) Due to formation of $[CoCl_4]^{2+}$ having tetrahedral geometry.

(B) Due to formation of $[CoCl_4]^{2-}$ having tetrahedral geometry.

(C) Due to formation of $[CoCl_4]^{2-}$ having octahedral geometry.

(D) Due to formation of $[CoCl_4]^{2+}$ having octahedral geometry.

87. Identify the chemical name of the commonly used refrigerant Freon 12

(A) Chlorofluoro methane

(B) Dichlorodifluoro methane

(C) Chlorodifluoro methane

(D) Dichlorofluoro methane

88. Which of the following reactions can convert chlorobenzene into toluene?

(A) Wurtz reaction

(B) Fittig reaction

(C) Wurtz-Fittig reaction

(D) Grignard reaction

89. Identify the compounds formed when anisole is heated with concentrated HI.

(A) Iodobenzene
(B) Iodobenzene + methanol
(C) Phenol + methanol
(D) Phenol + Iodomethane

90. Identify the reagent used in Reimer-Tiemann reaction,

(A) $CHCl_3$, aq.NaOH
(B) [O], I_2/NaOH
(C) NaOH, CO_2, H^+
(D) $NaHCO_3$, Cu

91. Which is the Lucas reagent among following?

(A) Anhydrous $ZnCl_2$ dissolved in conc. HNO_3
(B) $ZnCl_{2(aq)}$ dissolved in conc. HCl
(C) Anhydrous $ZnCl_2$ dissolved in conc. HCl
(D) Anhydrous $ZnCl_2$ dissolved in dil. HCl

92. Which of the following reagents gives the same reduction product with propionaldehyde and acetone ?

(A) $LiAlH_4$
(B) Ni / H_2
(C) Na-Hg / HCl
(D) Zn-Hg / Conc HCl

93. What is the product obtained when Pent-3-enenitrile is treated with DIBAL-H followed by acid hydrolysis?

(A) CH_3-CH=CH-CH_2-CHO
(B) CH_3-$(CH_2)_2$-CH_2-CHO
(C) CH_3-CH=CH-CH_2-COOH
(D) CH_3-$(CH_2)_2$-CH_2OH

94. Which is the correct decreasing order of boiling point for following amines?
Tertiary amine (I), Secondary amine (II), Primary amine (III)

(A) (I) > (II) > (III)
(B) (III) > (I) > (II)
(C) (II) > (I) > (III)
(D) (III) > (II) > (I)

95. Name the polymer in which chains are formed by α-1,4-glycosidic linkages between α-glucose units and branches are formed by α-1,6-glycosidic linkages.

(A) Amylose
(B) Amylopectin
(C) Starch
(D) Cellulose

96. Which of the following is a disaccharide ?

(A) Glucose
(B) Fructose
(C) Sucrose
(D) Starch

97. Which of the following exists as a zwitter ion ?

(A) Salicylic acid
(B) Sulfanilic acid
(C) p-Aminophenol
(D) p-Aminoacetophenone

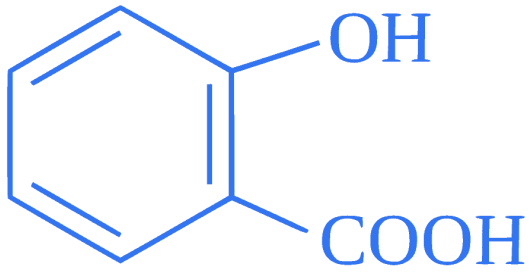
98. Which of the following polymers is not a thermoplastic polymer?

(A) Bakelite
(B) Polyethylene
(C) Polystyrene
(D) Polyvinyls

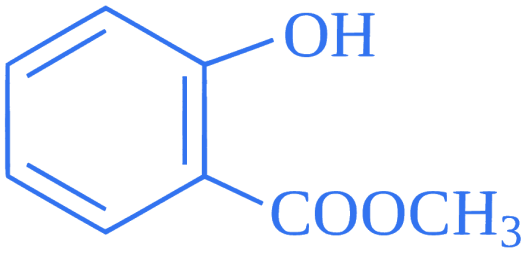
99. Amongst the following, identify a copolymer.

(A) Orlon
(B) PVC
(C) PHBV
(D) Teflon

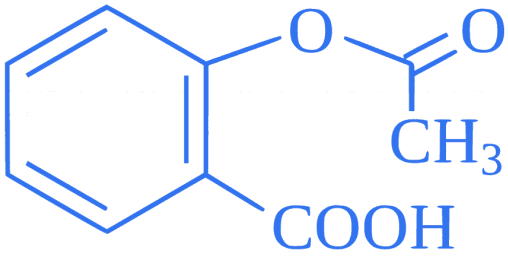
100. Identify the structural formula of aspirin.



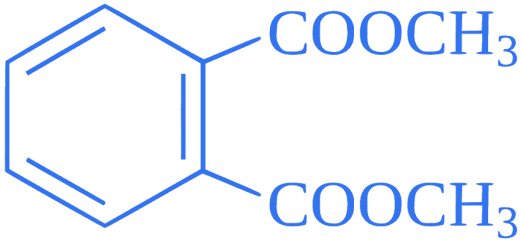
(A)



(B)



(C)

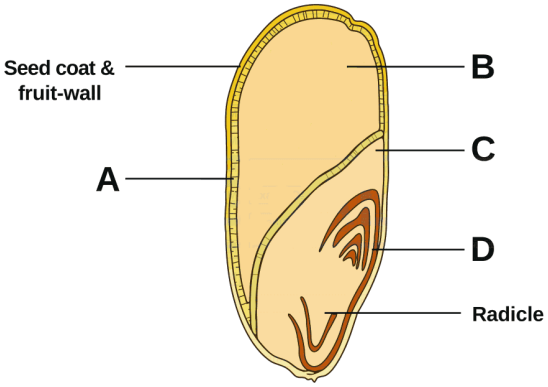


(D)

101. Find a brachiating ape from the options given below.

(A) Chimpanzee
(B) Gorilla
(C) Gibbon
(D) Orangutan

102. Given below is the diagram of a typical monocot seed. Identify the parts labelled as A, B, C and D and choose the correct option.



(A) A- Plumule ; B- Endosperm ; C- Scutellum; D- Aleurone layer.
(B) A- Aleurone layer; B- Endosperm; C- Scutellum; D- Plumule.
(C) A- Plumule; B- Scutellum; C- Endosperm; D- Aleurone layer.
(D) A- Scutellum; B- Plumule; C- Aleurone layer; D- Endosperm.

103. Assertion - (A) The hepatic portal vein exhibits a wide lumen and comparatively thinner tunica media.
Reason - (R) Its endothelial lining is arranged in a tessellated pattern to facilitate exchange between blood and hepatocytes.
Choose the correct option from the following.

(A) Both (A) and (R) are true, and (R) is the correct explanation for (A).
(B) Both (A) and (R) are true, but (R) is NOT the correct explanation for (A).
(C) (A) is true; however, statement (R) is false.
(D) (A) is false; however, (R) is true.

104. In some individuals, the palms of the hands feel excessively wet. What could be the reason behind this?

(A) Abundant Sebaceous glands in the palm.
(B) Abundant ceruminous glands in the palm.
(C) Abundant mucus glands in the skin.
(D) Abundant sweat glands in the skin.

105. Glucose is phosphorylated to Glucose-6-Phosphate by the enzyme Glucokinase using a molecule of ATP. To which category of enzymes does the Glucokinase belong?

(A) Oxidoreductase.
(B) Hydrolase.
(C) Transferase.
(D) Ligase.

106. In large proteins such as myoglobin and enzymes, peptide chains are much looped, twisted and folded back on themselves to form a tertiary structure. Which bonds are involved in the formation of tertiary structure of proteins?

(A) Hydrogen bonds.
(B) Peptide bonds.
(C) Disulphide bonds.
(D) Glycosidic bonds.

107. Which type of mineral absorption shows a sudden drop when the roots are deprived of oxygen?

(A) Passive absorption by direct ion-exchange.
(B) Passive absorption by mass flow.
(C) Donnan equilibrium.
(D) Active Absorption.

108. Which of the following sets of conditions favour the opening of stomata?

(A) Conversion of sugar to starch in guard cells, Formation of Potassium malate in the guard cells, Exosmosis in the guard cells, Uptake of K^+ and Cl^- ions by guard cells.

(B) Conversion of starch to sugar in guard cells, Formation of Potassium malate in the guard cells, Endosmosis in the guard cells, Uptake of K^+ and Cl^- ions by guard cells.

(C) Conversion of starch to sugar in guard cells, Formation of Potassium malate in the guard cells, Exosmosis in the guard cells, Prevention of uptake of K^+ and Cl^- ions by guard cells.

(D) Conversion of sugar to starch in guard cells, Formation of Potassium malate in the guard cells, Exosmosis in the guard cells, Prevention of uptake of K^+ and Cl^- ions by guard cells.

109. Active absorption of water by roots is _____.

(A) Along the DPD gradient and with the expenditure of ATP (energy).

(B) Against the DPD gradient and with the expenditure of ATP (energy).

(C) Against the DPD gradient and without the expenditure of ATP (energy).

(D) Along the DPD gradient and without the expenditure of ATP (energy).

110. The cortical cell absorbs water from the root hair cell because ___.

(A) The cortical cell has more O.P. and more DPD than that of the root hair cell.

(B) The cortical cell has less O.P. and more DPD than that of the root hair cell.

(C) The cortical cell has more O.P. and less DPD than that of the root hair cell.

(D) The cortical cell has same values of O.P. and DPD than that of the root hair cell.

111. Water can easily rise through the conducting elements of xylem due to _____.

(A) Water has high specific heat.

(B) Water has high surface tension and high adhesive and cohesive force.

(C) Water has high heat of vaporization.

(D) Water has high heat of fusion.

112. Read the following statements and choose the **correct** answer from the options given below:
(A). Diffusion is the movement of ions/ atoms/ molecules of a substance from the region of their lower concentration to the region of their higher concentration.
(B). Diffusion results in the diffusion pressure (D. P.) which is directly proportional to the number of diffusing particles.
(C). Diffusion pressure of pure solvent (pure water) is always less than the diffusion pressure of solvent in a solution.
(D). The difference in the diffusion pressures of pure solvent and the solvent in a solution is called Diffusion Pressure Deficit.

(A) (A), (B) and (D) only.

(B) (A), (B) and (C) only.

(C) (B), (C) and (D) only.

(D) (B) and (D) only.

113. Which of the following are amides formed from amino acids?

(A) Glutamic acid and Aspartic acid.

(B) Glutamine and Aspartic acid.

(C) Asparagine and Glutamine.

(D) Asparagine and Glutamic acid.

114. Given below are two statements:
Statement (I): $NADH_2$ $(NADH + H^+)$ and $FADH_2$ that are produced during glycolysis, connecting link reaction and Krebs cycle, are oxidised with the help of various electron carriers and enzymes.
Statement (II): These carriers and enzymes are arranged in the cytoplasm in the form of various complexes as complex I, II, III, IV and V.
In light of the above statements, choose the *most appropriate* answer from the options given below.

(A) Both Statement (I) and Statement (II) are true.

(B) Both Statement (I) and Statement (II) are false.

(C) Statement (I) is true but Statement (II) is false.

(D) Statement (I) is false but Statement (II) is true.

115. In Krebs' cycle, GTP is produced during the conversion of ___.

(A) α-ketoglutarate to succinyl CoA.
(B) fumarate to malate.
(C) succinate to fumarate.
(D) succinyl CoA to succinic acid.

116. Where does the end product of Glycolysis undergoes aerobic oxidation in eukaryotes?

(A) Outer chamber of mitochondria.
(B) Inner mitochondrial membrane.
(C) Cytoplasm.
(D) Mitochondrial matrix.

117. During lactic acid fermentation, pyruvic acid is reduced to lactic acid using one proton and two electrons from _____.

(A) $NADH + H^+$ produced during glycolysis.
(B) $FADH_2$ produced in Krebs cycle.
(C) Acetyl CoA.
(D) Water.

118. Find the **CORRECT** statements from the following and choose the correct option.
(A). Glycolysis (EMP pathway) is a common path for aerobic and anaerobic respiration.
(B). Glycolysis occurs in mitochondria.
(C). Glycolysis involves the breakdown of glucose molecule into two pyruvic acid molecules.
(D). During Glycolysis, ATP is produced by oxidative phosphorylation.

(A) (A), (B) and (D) only.
(B) (A) and (C) only.
(C) (A), (B), (C) and (D).
(D) (B), (C) and (D) only.

119. Which of the following plants require longer duration of light than the critical photoperiod, for flowering?

(A) *Chrysanthemum*.
(B) Wheat.
(C) *Xanthium*.
(D) Cucumber.

120. The process of seed germination is stimulated due to the synthesis of hydrolytic enzymes. Which hormone is responsible for this process?

(A) Abscissic Acid.
(B) Cytokinin.
(C) Ethylene.
(D) Gibberellin.

121. What is true about Arithmetic and Geometric growth curves?

(A) Both are exponential.
(B) Both are linear.
(C) Arithmetic growth curve is linear while Geometric growth curve is exponential.
(D) Arithmetic growth curve is exponential while Geometric growth curve is linear.

122. The process in which digested food components are transported by the blood to each cell and are used for the synthesis of protoplasm is called _____.

(A) Anabolism
(B) Assimilation
(C) Catabolism
(D) Nutrition

123. Which of the following is NOT bacterial activity in the human alimentary canal?

(A) Fermentation of carbohydrates and production of methane gas.
(B) Digestion of protein and production of substances like indole, skatole etc.
(C) Synthesis of Vitamin B
(D) Synthesis of Vitamin D

124. Some small children aged about 2 to 3 years were showing slender legs and oedema. They also showed symptoms like a protruding belly, bulging eyes, and changes in skin and hair colour. According to you, which of the following could be the possible cause of these symptoms?

(A) Deficiency of vitamin D.
(B) Inadequate intake of protein.
(C) Deposition of excess of fats.
(D) Unavailability of a carbohydrate-rich diet.

125. In a child, a genetic disorder leads to the mucous cells of salivary glands being completely nonfunctional, while serous cells remain normal. Over time, the child begins to experience irritation of the buccal mucosa and minor scratches in the lining of food pipe. Which of the following best explains the reason for these symptoms?

(A) Absence of salivary amylase in the salivary secretion.
(B) Deficiency of mucus leading to inadequate lubrication of food bolus.
(C) Excess secretion of lysozyme causing irritation of oral epithelium.
(D) Reduced secretion of the water component of saliva leads to dryness.

126. How many molars are present in the lower jaw of an adult human female?

(A) 2
(B) 3
(C) 4
(D) 6

127. Pepsin and Trypsin are protein digesting enzymes. Their optimum pH values are 2 and 9.5 respectively. What is the location of these enzymes in the digestive tract?

(A) Pepsin: Duodenum: Trypsin: Stomach.
(B) Pepsin: Stomach : Trypsin : Duodenum.
(C) Pepsin: Stomach : Trypsin: Stomach.
(D) Pepsin: Duodenum : Trypsin : Duodenum.

128. Consider the following situations for an adult human being --
I) The maximum amount of air that can be breathed out after a maximum inspiration is around 4500 ml.
II) Tidal volume is 500 ml.
III) Inspiratory reserve volume is 2500 ml.
What would be the Expiratory reserve volume in that individual ?

(A) 1500 ml
(B) 2000 ml
(C) 2500 ml
(D) 3000 ml

129. If in a person, the trachea and bronchi of the respiratory system do not have tracheal rings, then which of the following would be the result?

(A) Trachea and bronchi airways collapse
(B) Trachea become more elastic
(C) Air flows smoothly from and to lungs
(D) Breathing rate increases.

130. Which special feature among the following is seen in frogs for gaseous exchange through the skin?

(A) Skin is thick and dry.
(B) Skin is thin and moist.
(C) Skin is non-vascular
(D) Exoskeleton in the form of scales.

131. Which of the following is the normal ratio between Systolic, Diastolic and Pulse pressure in an adult man ?

(A) 1:2:3
(B) 2:3:1
(C) 3:2:1
(D) 2:2:1

132. Which of the following statements is INCORRECT about the mechanism of blood clotting ?

(A) Thromboplastin inactivates heparin.
(B) Thromboplastin converts prothrombin into thrombin.
(C) Factor VII is not in active use.
(D) Thrombin converts soluble blood protein fibrinogen into insoluble fibrin.

133. Which of the following options shows the leucocytes in decreasing order (from highest % to lowest %)?

(A) Neutrophils - Basophils - Eosinophils - Lymphocytes - Monocytes
(B) Neutrophils - Eosinophils - Basophils - Lymphocytes - Monocytes
(C) Neutrophils - Lymphocytes - Monocytes - Eosinophils - Basophils
(D) Neutrophils - Monocytes - Basophils - Eosinophils - Lymphocytes

134. Acute Renal failure can be detected biochemically by elevated level of which of the following components of serum?

(A) Ammonia
(B) Albumin
(C) Bile Salts
(D) Creatinine

135. Which of the following statements is TRUE ?

(A) As tubular fluid passes down through descending limb of loop of Henle, it's osmolarity decreases.

(B) As tubular fluid flows up through the ascending limb of the loop of Henle, it's osmolarity increases.

(C) As blood passes through descending limb of the vasa recta, it's osmolarity increases.

(D) As blood flows through the ascending part of the vasa recta, it becomes hyper osmotic.

136. If a person performing heavy physical work in summer becomes dehydrated due to excessive sweating and low water intake, which of the following changes will occur to maintain the proper water level in the blood?

(A) Increase in ADH secretion → Increased water reabsorption in distal tubule & collecting duct → Formation of concentrated urine.

(B) Increase in ADH secretion → Decreased water reabsorption in distal tubule & collecting duct → Formation of concentrated urine.

(C) Decrease in ADH secretion → Increased water reabsorption in distal tubule & collecting duct → Formation of dilute urine.

(D) Decrease in ADH secretion → Decreased water reabsorption in distal tubule & collecting duct → Formation of concentrated urine.

137. Given below are two statements:
Statement (I): Between the urinary bladder and the urethra, there are two sphincters, namely internal and external sphincters.
Statement (II): Of these, the external sphincter is made up of smooth muscles and dysfunction of the same can lead to kidney infection.
In light of the above statements, choose the *most appropriate* answer from the options given below.

(A) Both Statement (I) and Statement (II) are correct.

(B) Both Statement (I) and Statement (II) are incorrect.

(C) Statement (I) is correct but Statement (II) is incorrect.

(D) Statement (I) is incorrect but Statement (II) is correct.

138. In which of the following, Ammonia is excreted as an excretory waste product?

(A) Larval amphibians

(B) Cartilaginous fishes

(C) Camel

(D) Whale

139. During mechanism of hearing, generation of nerve impulses in afferent neurons occurs due to which of following events?

(A) Vibrations of Reissner's membrane cause displacement of otolithic membrane.

(B) Upward movement of basilar membrane causes the hair cells to press against tectorial membrane.

(C) Downward movement of basilar membrane causes compression of hair cells against Reissner's membrane.

(D) Vibration of tectorial membrane alone.

140. A person suffered a head injury in a road accident, which resulted in damage to the hypoglossal nerve. What adverse effect will this have on his bodily functions?

(A) Impaired hearing and equilibrium.

(B) Loss of control over movement of eye ball.

(C) Loss of voluntary movements of the tongue.

(D) Excess secretion of Saliva.

141. Which of the following is the largest basal nucleus, at the floor of Cerebrum?

(A) Corpus albicans
(B) Corpus striatum
(C) Corpus luteum
(D) Corpus Callosum

142. Choose the option that shows the correct sequence of the following steps involved in the generation and conduction of a nerve impulse.
I. The number of cations inside the axon increases.
II. Na+ ions diffuse into the neuron from the ECF.
III. Membrane potential changes from -70 mV to about +30 mV.
IV. Application of stimulus make membrane of nerve fibre more permeable to Na+.

(A) II → I → IV → III
(B) IV → II → I → III
(C) I → II → IV → III
(D) III → II → I → IV

143. The rate of transmission of nerve impulses is comparatively higher in which of the following animals?

(A) Labeo
(B) Salamander
(C) Tortoise
(D) Whale

144. Which of the following cells is responsible for the synthesis of Myelin sheath in the Central Nervous System?

(A) Astrocytes
(B) Microglia
(C) Oligodendrocytes
(D) Schwann Cells

145. A student of the 5^{th} class, while playing cricket, was hit hard on the head by the ball, causing damage to his anterior pituitary gland, but he survived. In such a situation, which of the following could happen to him?

(A) The growth of adrenal glands will be stimulated.
(B) Process of spermatogenesis will enhance.
(C) The physical growth of the body is hampered.
(D) Secretion of TSH will increase.

146. Which of the following statements about the mode of action of lipid soluble hormones is INCORRECT?

(A) The hormone acts as the first messenger.
(B) The hormone bind to the intracellular receptors.
(C) The hormone-receptor complex enters into the nucleus.
(D) The hormone-receptor complex binds to specific site of DNA.

147. Which of the following hormones is detected in the blood of a human female, only during pregnancy?

(A) Follicle Stimulating Hormone
(B) Human Placental Lactogen
(C) Luteinising Hormone
(D) Progesterone

148. Which of the following term is best suited for the process, which involves production of offsprings by the formation and fusion of gametes?

(A) Amphimixis
(B) Apomixis
(C) Apogamy
(D) Parthenocarpy

149. Given below are the 4 layers of anther wall in angiosperms.
(A). Epidermis.
(B). Middle layers.
(C). Tapetum.
(D). Endothecium.
From the options given below, choose the **correct** sequence of these layers from inside out.

(A) (A), (B), (C), (D).
(B) (D), (C), (A), (B).
(C) (B), (A), (D), (C).
(D) (C), (B), (D), (A).

150. Match the structures in the Angiospermic embryosac in **List I** with their correct ploidy levels in **List II**.

List I (Structures in the Angiospermic embryosac)	**List II (Ploidy levels)**
(A). Definitive nucleus	(I). n
(B). Synergid	(II). 3n
(C). Primary Endosperm Nucleus	(III). 2n

Choose the **correct** answer from the options given below:

(A) (A) - (I), (B) - (II), (C) - (III).
(B) (A) - (III), (B) - (I), (C) - (II).
(C) (A) - (II), (B) - (III), (C) - (I).
(D) (A) - (III), (B) - (II), (C) - (I).

151. Which of the following sets of plants exhibit Ornithophily?

(A) *Bombax, Callistemon, Butea.*
(B) *Adansonia, Callistemon, Butea.*
(C) *Adansonia, Anthocephalus, Kigelia.*
(D) *Anthocephalus, Kigelia, Bombax.*

152. Which of the following phenomena is observed in Citrus?

(A) Cleavage polyembryony.
(B) Adventive polyembryony.
(C) Recurrent apomixis.
(D) Parthenocarpy.

153. In *Sansevieria*, vegetative propagation can be carried out by the process of _____.

(A) Tissue culture.
(B) Leaf cutting.
(C) Stem cutting.
(D) Grafting.

154. During early embryonic development in humans, which of the following options shows the correct sequence of the various events given below.
I. Formation of hypoblast and epiblast
II. Appearance of primitive streak
III. Differentiation of cytotrophoblast and syncytiotrophoblast.
IV. Formation of amnion

(A) III $\rightarrow$ I $\rightarrow$ IV $\rightarrow$ II
(B) II $\rightarrow$ III $\rightarrow$ IV $\rightarrow$ I
(C) I $\rightarrow$ III $\rightarrow$ II $\rightarrow$ IV
(D) IV $\rightarrow$ I $\rightarrow$ III $\rightarrow$ II

155. During pregnancy in a human female, in which of the following periods can the embryo's heartbeat be detected with the help of ultrasound?

(A) 3^{rd} Week
(B) 4^{th} Week
(C) 5^{th} Week
(D) 6^{th} Week

156. Choose the option that shows the correct sequence of various events occurring during the menstrual cycle.
I) Rapid secretion of Luteinizing hormone (LH)
II) Decrease in the level of progesterone and estrogen
III) Release of FSH under the influence of GnRH
IV) Corpus luteum begins to secrete progesterone and estrogen

(A) III $\rightarrow$ II $\rightarrow$ I $\rightarrow$ IV
(B) III $\rightarrow$ I $\rightarrow$ IV $\rightarrow$ II
(C) II $\rightarrow$ I $\rightarrow$ IV $\rightarrow$ III
(D) I $\rightarrow$ III $\rightarrow$ II $\rightarrow$ IV

157. Given below are two statements:
Statement (I): One of the physiological devices used as birth control measures is in the form of tablets.
Statement (II): Contraceptive pill 'Saheli' is hormonal and steroidal in nature
In light of the above statements, choose the *most appropriate* answer from the options given below.

(A) Both Statement (I) and Statement (II) are true.
(B) Both Statement (I) and Statement (II) are false.
(C) Statement (I) is true but Statement (II) is false.
(D) Statement (I) is false but Statement (II) is true.

158. With respect to Sex determination pattern in Birds which of the following statement is true?

(A) Females are homogametic.
(B) Males are heterogametic.
(C) The sex of an individual depends on the type of egg fertilized by the sperm.
(D) The sex of an individual depends on the type of sperm that fertilizes the egg.

159. Match the disorders in **List I** with their causes in **List II** and choose the correct option.

List I	**List II**
(A) Thalassemia.	(I) non-disjunction of sex chromosomes.
(B) Sickle-cell anaemia.	(II) non-disjunction of 21st pair of chromosomes.
(C) Turner's Syndrome.	(III) Synthesising few globin molecules.
(D) Down's Syndrome.	(IV) synthesising an incorrectly functional globin.

(A) (A) - (I), (B) - (II), (C) - (III), (D) - (IV).
(B) (A) - (II), (B) - (IV), (C) - (I), (D) - (III).
(C) (A) - (I), (B) - (II), (C) - (IV), (D) - (III).
(D) (A) - (III), (B) - (IV), (C) - (I), (D) - (II).

160. The genes located on homologous regions of X and Y chromosomes do not inherit together because crossing over occurs in this region. Thus, they exhibit incomplete sex linkage. They are called the X-Y linked traits. Which of the following is NOT an example of X-Y linked traits?

(A) Total colour blindness.
(B) Nephritis.
(C) Myopia.
(D) Retinitis pigmentosa.

161. In a typical monohybrid, a cross with respect to a certain trait, 120 plants are obtained in the F_2 generation. What will be the approximate number of homozygous and heterozygous plants respectively?

(A) 40 and 80.
(B) 60 and 60.
(C) 20 and 100.
(D) 10 and 110.

162. Female gametes in a plant have genotypes TR, Tr, tR and tr with respect to height (T/t) and flower colour. (R/r). What will be the phenotype of this plant?

(A) Heterozygous tall ; Homozygous White (Ttrr).
(B) Heterozygous tall; Heterozygous Red (TtRr).
(C) Homozygous tall red (TTRR).
(D) Homozygous Tall ; Heterozygous Red (TTRr).

163. What is the role of the DHU arm of a tRNA molecule?

(A) Amino acid recognition site.
(B) Amino acid binding site.
(C) Codon recognition site.
(D) Ribosome recognition site.

164. Given below are two statements:
Statement (I): The Human Genome Project aims at transferring the related technologies to the private sectors, such as industries.
Statement (II): The Human Genome Project does not consider the legal, ethical and social issues which may arise from the project.
In light of the above statements, choose the *most appropriate* answer from the options given below.

(A) Both Statement (I) and Statement (II) are correct.
(B) Both Statement (I) and Statement (II) are incorrect.
(C) Statement (I) is correct but Statement (II) is incorrect.
(D) Statement (I) is incorrect but Statement (II) is correct.

165. Which of the following step in DNA fingerprinting involves the movement of negatively charged DNA fragments to the positive pole?

(A) Southern blotting.
(B) Autoradiography.
(C) Gel electrophoresis.
(D) Restriction digestion.

166. Match the terms in **List I** with their correct descriptions in **List II** and choose the correct option.

List I	**List II**
(A) Splicing	(I) Polyadenylation.
(B) Capping	(II) Express sequences or coding sequences.
(C) Tailing	(III) Removal of introns.
(D) Exons	(IV) Addition of methylated guanosine tri phosphate to 5' end.

(A) (A) - (I), (B) - (II), (C) - (III), (D) - (IV).
(B) (A) - (II), (B) - (IV), (C) - (I), (D) - (III).
(C) (A) - (I), (B) - (II), (C) - (IV), (D) - (III).
(D) (A) - (III), (B) - (IV), (C) - (I), (D) - (II).

167. During DNA replication, Okazaki fragments are used to elongate _____.

(A) the lagging strand towards replication fork.
(B) the lagging strand away from the replication fork.
(C) the leading strand away from replication fork.
(D) the leading strand towards replication fork.

168. The transforming principle in Griffith's experiment was detected _____.

(A) When heat killed S-strain of S. pneumoniae were mixed up with the R-strain.
(B) When the live S-strain of S. pneumoniae were mixed up with the R-strain.
(C) When live R-strain of S. pneumoniae were mixed up with the S-strain.
(D) When heat killed R-strain of S. pneumoniae were mixed up with the S-strain.

169. Given below are two statements:
Statement (I): Analogous organs leads to convergent evolution.
Statement (II): Analogous organs help to trace common ancestry.
In light of the above statements, choose the *most appropriate* answer from the options given below.

(A) Both Statement (I) and Statement (II) are true.
(B) Both Statement (I) and Statement (II) are false.
(C) Statement (I) is true but Statement (II) is false.
(D) Statement (I) is false but Statement (II) is true.

170. If the individuals of a particular species live in the same geographical region, but interbreeding is not possible because they attain sexual maturity at different seasons of the year, then what type of isolation is this called?

(A) Ethological
(B) Ecological
(C) Mechanical
(D) Temporal

171. Before industrialization in Great Britain, which insects had a higher population?

(A) *Biston betularia*
(B) *Aphid crocci*
(C) *Cactoblastis cactorum*
(D) *Biston carbonaria*

172. Which one of the following is NOT the feature of a primitive atmosphere of earth?

(A) Presence of high concentration of Nitrogen.
(B) Reducing atmosphere
(C) No free oxygen
(D) No ozone layer

173. Find the drug from the options given below, which is extracted from the latex of *Papaver somniferum*?

(A) Hashish
(B) LSD
(C) Smack
(D) Charas

174. What is extreme over-indulgence in food among adolescents called?

(A) Anorexia nervosa
(B) Amnesia
(C) Bulimia
(D) Illusion

175. Human immunodeficiency virus parasitizes which of the following cells?

(A) T_4 lymphocytes
(B) B Lymphocytes
(C) Memory B Cells
(D) Killer T Cells

176. Which of the following is an example of Cytokine barrier?

(A) Antibody
(B) Histamine
(C) Interkinin
(D) Interferon

177. Which of the following diseases is considered as the most common form of dementia?

(A) Alzheimer's disease
(B) Parkinson's disease
(C) Gull's disease
(D) Grave's disease

178. Which of the following groups represents the good breeds of cow?

(A) Gir, Mehsana, Murrah.
(B) Brahma, Cochin, Langshan.
(C) Sahiwal, Sindhi, Holstein.
(D) Nagpuri, Nili, Surati.

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

(A) Inbreeding.
(B) Cross breeding.
(C) Mutational breeding.
(D) Out crossing.

180. Which plant breeding technique was used to produce NP 836 variety of wheat (rust resistant), Indore-2 variety of cotton (resistant to boll worm), Regina-II variety of cabbage (resistant to bacterial rot), etc.?

(A) Hybridization.
(B) Polyploidy breeding.
(C) Mutation breeding.
(D) rDNA technology.

181. A cross between *Saccharum barberi* (a native of North India) and *S. officinarum* (from South India) to produce CO -419, 421, 453 having high yield and high sugar content is a _____.

(A) Intravarietal Cross.
(B) Intervarietal Cross.
(C) Interspecific Cross.
(D) Intergeneric Cross.

182. Which of the following groups of bacteria are used in the commercial production of Yoghurt?

(A) *Lactobacillus acidophilus* and *Propionibacterium shermanii*.
(B) *Penicillium roquefortii* and *Propionibacterium shermanii*.
(C) *Lactobacillus acidophilus* and *Acetobacter aceti*.
(D) *Streptococcus thermophilus* and *Lactobacillus bulgaricus*.

183. Which of the following enzymes is used to insert the foreign DNA into the vector DNA?

(A) Exonuclease. (B) Endonuclease.

(C) DNA ligase. (D) *Taq* polymerase.

184. The device required for PCR is called thermal cycler. How many copies of the DNA segments are produced at the end of 9 cycles in an automatic thermal cycler?

(A) 18. (B) 9.

(C) 128. (D) 512.

185. Which of the following deals with the biological phenomena or events in relation to socially acceptable moral duty, conduct and judgement?

(A) Biopiracy. (B) Bioethics.

(C) Biotechnology. (D) Biopatent.

186. Match the transgenes in **List I** with their applications in **List II**.

LIST I (Transgene)	**LIST II (Application)**
(A) cys E and cys M	(I) Pest control
(B) Genes from marine mussels	(II) Keratin protein found in wool.
(C) Arabidopsis genes	(III) Superglue.
(D) αAI-Pv gene from adzuki bean	(IV) Oil content and oil quality of oil crops.

(A) (A) - (I), (B) - (II), (C) - (III), (D) - (IV). (B) (A) - (II), (B) - (III), (C) - (IV), (D) - (I).

(C) (A) - (I), (B) - (II), (C) - (IV), (D) - (III). (D) (A) - (III), (B) - (IV), (C) - (I), (D) - (II).

187. Which of the following crop plants is genetically modified using the genes for ferritin protein isolated from soybean and Phaseolus?

(A) Wheat. (B) Maize.

(C) Tobacco. (D) Rice.

188. If the population of a country has the mutual relation of different age groups as shown below, then what type of population growth will that country have?
Pre-reproductive age group $<$ Reproductive age group $<$ Post-reproductive group.

(A) Negative growth (B) Zero growth

(C) Slow growth (D) Rapid growth

189. Given below are two statements, one is labelled as Assertion (A) and other one labelled as Reason (R).
Assertion (A) : Most of the poikilothermic animals are thermo-conformers in nature.
Reason (R) : Poikilothermic animals can maintain constant body temperature with ambient temperature.
In light of the above statements, choose the *most appropriate* answer from the options given below.

(A) Both (A) and (R) are correct and (R) is the correct explanation of (A). (B) Both (A) and (R) are correct but (R) is NOT the correct explanation of (A).

(C) (A) is correct but (R) is incorrect. (D) (A) is incorrect but (R) is correct.

190. Various morphological, physiological and behavioural attributes of an organism to survive and reproduce in its habitat is said to be _____

(A) Aestivation (B) Adaptation

(C) Emigration (D) Hibernation

191. According to your opinion, 'decomposition of waste and detoxification' are examples of which type of ecosystem service from the following?

(A) Cultural services (B) Provisioning services

(C) Regulating services (D) Supporting services

192. Which of the following statements is FALSE about the Phosphorus Cycle?

(A) Atmospheric inputs of phosphorus through rainfall are meagre. (B) Gaseous exchange of phosphorus between organisms and the environment are negligible.

(C) Phosphorus does not act as a limiting factor for plant growth. (D) Agricultural runoff rich in phosphate content leads to eutrophication.

193. Who among the following feed on producers as well as consumers?

(A) Herbivores (B) Carnivores

(C) Omnivores (D) Detritivores

194. Which of the following correctly explains Net Primary Productivity?

(A) Rate of formation of new organic matter by consumers.
(B) Rate of production of organic matter during photosynthesis.
(C) Gross primary productivity minus respiratory losses.
(D) Rate of assimilation of food energy by consumers.

195. When certain exotic species is introduced accidentally into a new geographic area, then which of the following is more likely to happen?

(A) Exotic species spread slowly.
(B) Exotic species start spreading rapidly.
(C) Exotic species perish very soon.
(D) Exotic species population remains stable.

196. Which of the following are the narrowly utilitarian reasons for conservation of biodiversity?
(A). For providing equal right of survival to living beings.
(B). For industrial products like resins, tannins etc.
(C). For pollination and seed dispersal.
(D). For medicinal use of plants and animals.

(A) (A), (B) and (D) only.
(B) (A) and (C) only.
(C) (B) and (D) only.
(D) (B), (C) and (D) only.

197. The Rivet Popper Hypothesis by the ecologist, Paul Ehrlich, explains significance of _____.

(A) Species-Area relationships.
(B) Evil Quartet.
(C) Biodiversity.
(D) Patterns of Biodiversity.

198. A college student standing near a traffic signal in a metropolitan city like Delhi suddenly felt dizzy and fainted. What might be the possible reasons for this?

(A) Sudden increase in blood sugar levels
(B) Exposure to high levels of air pollution causes shortness of breath.
(C) Increase in Air Oxygen Concentration
(D) Sweating Due to Cold Weather

199. Match the Pollutants in **Column-I** with their effects in **Column-II** and choose the correct option:

Column I	**Column-II**
(A) UV B rays	(I) Biomagnification.
(B) Biodegradable organic matter	(II) Greenhouse effect
(C) DDT	(III) Mutations.
(D) Chlorofluorocarbons	(IV) BOD.

(A) (A) - (I), (B) - (II), (C) - (III), (D) - (IV).
(B) (A) - (II), (B) - (IV), (C) - (I), (D) - (III).
(C) (A) - (I), (B) - (II), (C) - (IV), (D) - (III).
(D) (A) - (III), (B) - (IV), (C) - (I), (D) - (II).

200. Which of the following is a reason for the break down of chemical bonds within molecules such as DNA of living organisms causing injuries?

(A) Chlorofluorocarbons.
(B) UV rays.
(C) Ozone.
(D) Methane.

- End of Question Paper -