MHT CET 2026 PCB Apr 23 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. The initial velocity of an object is $\vec{u} = 3\hat{i} + 2\hat{j}$ m/s. Its constant acceleration is $\vec{a} = 5\hat{i} + 3\hat{j}$ m/s^2. The magnitude of the final velocity after 5 s is

(A) $\sqrt{573}$ (B) $\sqrt{873}$
(C) $\sqrt{1073}$ (D) $\sqrt{373}$

2. A rod has mass (4 ± 0.01) kg, radius (2 ± 0.02) cm and length (50 ± 0.05) cm. The maximum percentage error in the measurement of density is

(A) 1.35 % (B) 2.35 %
(C) 3.35 % (D) 4.35 %

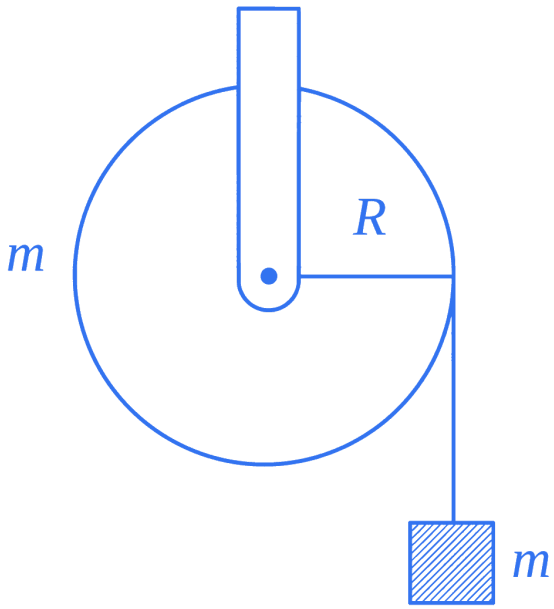
3. A string of length 'L' fixed at one end carries a mass 'm' at the other end. The string makes $\frac{3}{2\pi}$ revolutions per second around the vertical axis through fixed end. The tension in the string is

(A) $36mL$ (B) $18mL$
(C) $9mL$ (D) $4.5mL$

4. Which of the following statements is NOT TRUE about pseudo forces?
Pseudo forces
a. not accountable as per Newton's laws of motion in the inertial frame.
b. not among any of the four fundamental forces.
c. are imaginary.
d. are measurable.

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

5. A mass m supported by massless string wound around a uniform hollow cylinder of mass m and radius R. If the string does not slip on the cylinder, with what acceleration will the mass fall on release?
{g = acceleration due to gravity}



(A) $\frac{5g}{6}$ (B) $\frac{2g}{3}$
(C) $\frac{g}{2}$ (D) g

6. A child is standing with folded hands at the centre of a platform rotating about its central axis. The kinetic energy of a system is K. The child now stretches his arms so that the moment of inertia of the system doubles. The kinetic energy of the system now is

(A) $\frac{K}{4}$ (B) $\frac{K}{2}$
(C) $2K$ (D) $4K$

7. If $\vec{r}$ is a position vector of the body and $\vec{p}$ is linear momentum, $\vec{r} = 2\hat{i} + 3\hat{j} - 3\hat{k}$ and $\vec{p} = 2\hat{i} + 4\hat{j} - 5\hat{k}$.
The angular momentum of the body is

(A) $-3\hat{i} + 4\hat{j} + 2\hat{k}$ (B) $-3\hat{i} - 4\hat{j} + 2\hat{k}$
(C) $-2\hat{i} + 3\hat{j} + 2\hat{k}$ (D) $-\hat{i} - 2\hat{j} + \hat{k}$

8. The escape velocity of a body on the earth's surface is v_e. A body is thrown with a speed of $\sqrt{6}v_e$. Assume that the sun and the planets do not influence the motion of the body, the velocity of a body at infinite distance is v_∞. The value of $\frac{v_\infty}{v_e}$ is

(A) $\sqrt{6}$ (B) 2

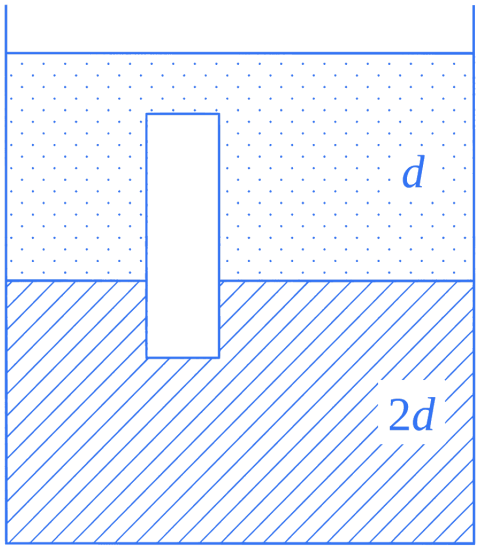
(C) $\sqrt{5}$ (D) 3

9. Two capillary tubes of radii $r_1 = 0.3$ cm and $r_2 = 0.6$ cm are dipped in the same liquid. The ratio of heights through which the liquid will rise in the tubes $\left(\frac{h_1}{h_2}\right)$ is

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

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

10. A homogeneous solid cylinder of length L and cross-sectional area $A/5$ is immersed such that it floats with its axis vertical at the liquid-liquid interface with length $L/4$ in the denser liquid as shown in the figure. The lower density liquid is open to atmosphere having pressure p_0. Then, density of the solid cylinder is



(A) $\frac{5d}{4}$ (B) $\frac{4d}{5}$

(C) $4d$ (D) $\frac{d}{5}$

11. Assume that a drop of liquid evaporates by decrease in its surface energy, so that its temperature remains unchanged. What should be the maximum radius of the drop for this to be possible? The surface tension is T, density of liquid is ρ and L is its latent heat of vaporization. {heat required in evaporation $= L(dm)$, dm = mass of the liquid evaporated}

(A) $\frac{\rho L}{T}$ (B) $\sqrt{\frac{T}{\rho L}}$

(C) $\frac{T}{\rho L}$ (D) $\frac{2T}{\rho L}$

12. Three very large plates of same area are kept parallel (in vertical plane) and close to each other. They are considered as ideal black surfaces and have very high thermal conductivity. The first and third plates are maintained at temperatures $2T$ and $3T$ respectively. The temperature of the middle (i. e. second) plate under steady state condition is

(A) $(97)^{1/4}T$ (B) $\left(\frac{97}{2}\right)^{1/4}T$

(C) $\left(\frac{97}{4}\right)^{1/4}T$ (D) $\left(\frac{65}{2}\right)^{1/4}T$

13. If the temperature of 5 kg mass of a material of a specific heat capacity 200 J/kg °C rises from the 30°C to 40°C. The heat received is

(A) 15000 J (B) 12000 J

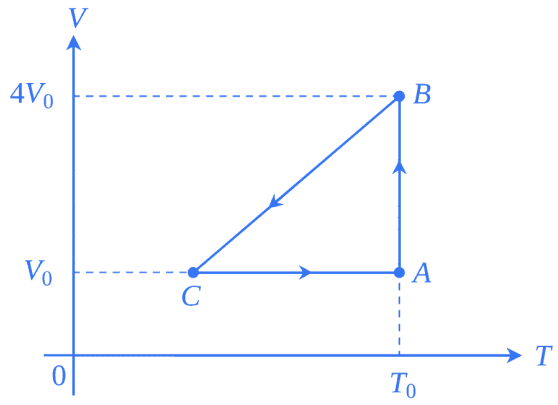
(C) 10000 J (D) 8000 J

14. A rigid diatomic ideal gas is compressed adiabatically to $(1/32)$ of its initial volume. If the initial temperature of the gas is T_1 (in kelvin) and the final temperature is "nT_1", the value of n is $\{\gamma = 1.4\}$

(A) 1 (B) 2

(C) 3 (D) 4

15. One mole of an ideal gas in initial state A undergoes a cyclic process ABCA, as shown in the figure. Its pressure at A is P_0. Choose the correct option from the following.



(A) Internal energies at A and B are not the same.

(B) Work done by the gas in process AB is $P_0V_0\ln(4)$

(C) Pressure at C is $\frac{P_0}{4}$

(D) Temperature at C is $\frac{T_0}{4}$

16. According to law of equi-partition of energy the molar specific heat of a rigid diatomic gas at constant pressure is

(A) $\frac{9R}{2}$

(B) $\frac{7R}{2}$

(C) $\frac{5R}{2}$

(D) $\frac{3R}{2}$

17. Statement I- The kinetic energy per molecule of the gas is equal to $\frac{3}{2}k_BT$.
{k_B = Boltzmann constant, T = absolute temperature of the gas}
Statement II- For the ideal gas with total energy E, the product $PV = \left(\frac{3}{2}\right)E$
{P = pressure of the gas and V = volume of the gas}

(A) Both statements are correct.

(B) Both statements are incorrect.

(C) Statement I is incorrect and statement II is correct.

(D) Statement I is correct and statement II is incorrect.

18. A body of mass 1 kg is performing linear SHM. Its displacement x(cm) at t(s) is given by $x = 6\sin\left(100t + \frac{\pi}{4}\right)$. Maximum kinetic energy of the body is

(A) 9 J

(B) 18 J

(C) 27 J

(D) 36 J

19. A bob of a simple pendulum has a speed of 3 m/s at its lowest position. The pendulum is 0.5 m long. The speed of the bob, when the length makes an angle of $(60)^\circ$ with the vertical, is
(Take $g = 10$ m/s^2, $\cos 60^\circ = 1/2$)

(A) 2 m/s

(B) $\frac{1}{2}$ m/s

(C) 3 m/s

(D) $\frac{1}{3}$ m/s

20. Particle performs simple harmonic motion with amplitude A. Its speed is tripled at the instant that is at a distance $\frac{2A}{3}$ from the equilibrium position. The new amplitude of the motion is

(A) $\frac{A}{3}\sqrt{41}$

(B) $3A$

(C) $\sqrt{3}A$

(D) $\frac{7A}{3}$

21. Four harmonics of equal frequencies and equal intensities I_0 have phase angles $0, \frac{\pi}{3}, \frac{2\pi}{3}, \pi$. When they are superimposed, the intensity of the resultant wave is "nI_0". The value of n is
(all phase angles are in radian and $\cos(60)^\circ = \frac{1}{2}$)

(A) 1

(B) 2

(C) 3

(D) 4

22. The ends of the stretched wire of length L are fixed at $x = 0$ and $x = L$. In one experiment, the displacement of the wire is $y_1 = A\sin\left(\frac{\pi x}{L}\right)$ and energy is E_1. In another experiment, its displacement is $y_2 = A\sin\left(\frac{2\pi x}{L}\right)$ and energy is E_2. Then.

(A) $E_2 = E_1$

(B) $E_2 = 2E_1$

(C) $E_2 = 4E_1$

(D) $E_2 = 16E_1$

23. The tension in a piano wire is increased by 25 %. Its frequency becomes "nf", where f is the original frequency, then, the value of n is nearly

(A) $\sqrt{0.8}$

(B) $\sqrt{1.25}$

(C) $\sqrt{1.12}$

(D) $\sqrt{1.56}$

24. The walls of the hall built for music concerts should

(A) amplify sound.

(B) reflect sound.

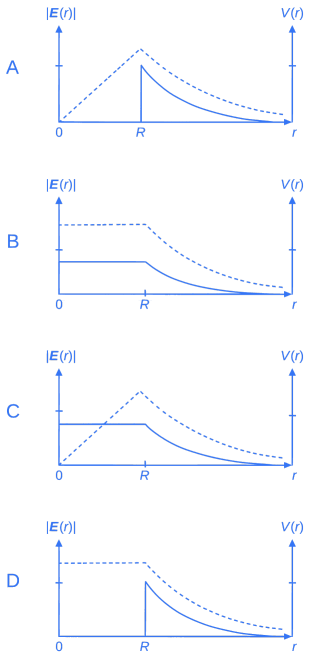
(C) transmit sound.

(D) absorb sound.

25. Which of the following statements is NOT TRUE for polar molecule?
a. In polar molecule the centre of mass of positive charges coincide with the centre of mass of negative charges.
b. They have permanent dipole moment.
c. They have asymmetric shape.
d. HCl, H_2O are the examples of polar molecules

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

26. Consider a thin spherical shell of radius R with its centre at the origin, carrying uniform positive surface charge density. The variation of the magnitude of the electric field $E(r)$ and electric potential $V(r)$ with the distance r from the centre, is best represented by which graph?



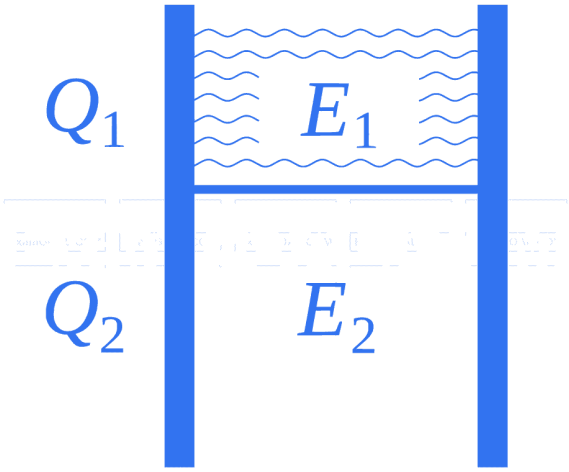
Continuous curve stands for intensity. Dotted curve stands for potential.

(A) C (B) A
(C) D (D) B

27. Three charges each of $+4\mu$C are placed at the corners A, B, C of a square ABCD of side 1 m. The electric field at the centre of the square is

(A) 7.2×10^4 N/C towards point B (B) 7.2×10^4 N/C towards point D
(C) 3.6×10^4 N/C towards point A (D) 3.6×10^4 N/C towards point C

28. A parallel plate capacitor has a dielectric slab of dielectric constant K between its plates that covers 1/3 of the area of its plates as shown in the figure. The total capacitance of the capacitor is C while that of the portion with dielectric in between is C_1. When the capacitor is charged, the plate area covered by the dielectric gets charge Q_1 and the rest of the area gets charge Q_2. The electric field in the dielectric is E_1 and that in the other portion is E_2. Choose the correct option.



(A) $\frac{E_1}{E_2} = 4$ (B) $\frac{E_1}{E_2} = \frac{1}{K}$
(C) $\frac{C}{C_1} = \frac{2+K}{K}$ (D) $\frac{Q_1}{Q_2} = \frac{3}{K}$

29. A galvanometer having a coil resistance of 100 Ω gives a full scale deflection when a current of 1 mA is passed through it. The value of the resistance which can convert this galvanometer into ammeter giving a full scale deflection of 10 A, is nearly

(A) 3 Ω (B) 2 Ω
(C) 0.1 Ω (D) 0.01 Ω

30. Which of the following statements is FALSE?
A. In a balanced Wheatstone bridge, if the cell and the galvanometer are exchanged, the null point is disturbed.
B. A rheostat can be used as a potential divider.
C. Kirchhoff's second law represents energy conservation.
D. Wheatstone's bridge is the most sensitive when all the four resistances are of the same order of magnitude.

(A) C (B) A
(C) D (D) B

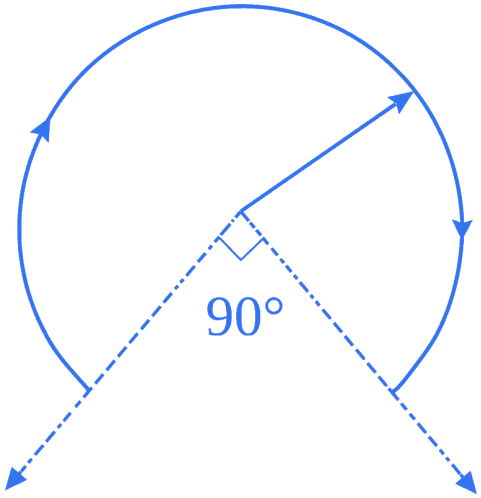
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31. Two wires of same material A and B, having lengths l and $\frac{2l}{3}$ carry the currents I and $\frac{3I}{4}$ respectively. Both the wires (A and B) are bent into a circles (of single turn). If B_A and B_B are the values of magnetic field at the centres of the respective circles, then the ratio $\frac{B_B}{B_A}$ is

(A) $\frac{3}{4}$ (B) $\frac{2}{3}$

(C) $\frac{9}{8}$ (D) $\frac{3}{8}$

32. The magnitude of the magnetic field at point O (centre of the arc) with radius R, in the following case is
(μ_0 = permeability of free space, I = current and R is the radius of circular arc)



(A) $\frac{\mu_0 I}{R}$ (B) $\frac{3\mu_0 I}{2R}$

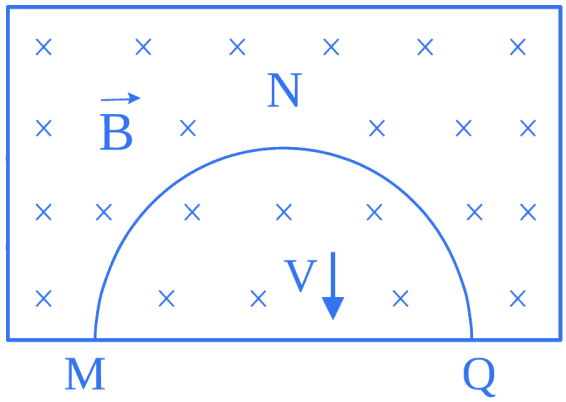
(C) $\frac{3\mu_0 I}{4R}$ (D) $\frac{3\mu_0 I}{8R}$

33. Which of the following statements is INCORRECT for diamagnetic materials?
a. Relative permeability is less than one.
b. Magnetic susceptibility is negative and low.
c. Magnetic susceptibility does not depend on the temperature.
d. Magnetic susceptibility is positive and low.

(A) d (B) a

(C) c (D) b

34. A thin semicircular conducting ring of radius R is falling with its plane vertical in a horizontal magnetic induction B. At the position MNQ the speed of ring is V and emf developed across the ring is



(A) zero (B) $2RBV$ and Q is at higher potential

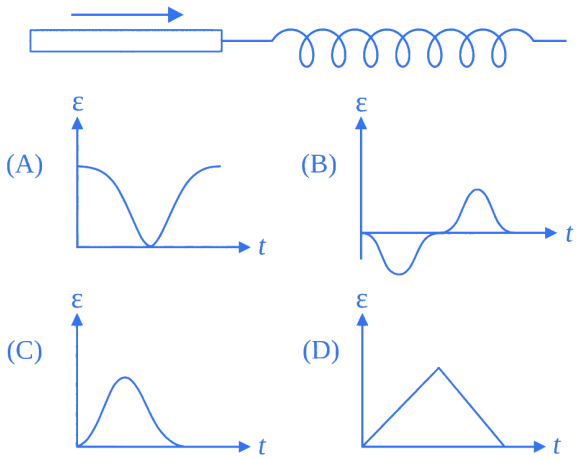
(C) RBV and Q is at higher potential (D) $\frac{BV\pi R^2}{2}$ and M is at higher potential

35. A very small circular loop of radius 'a' is initially (at $t = 0$) coplanar and concentric with a much larger fixed circular loop of radius 'b'. A constant current I flows in the larger loop. The smaller loop is rotated with a constant angular speed ω about the common diameter. The emf induced in the smaller loop as a function of time t is (μ_0 = permeability of free space)

(A) $\left(\frac{\pi a^2 \mu_0 I}{2b}\right)\omega\cos\omega t$ (B) $\left(\frac{\pi a^2 \mu_0 I}{2b}\right)\omega\sin\omega^2 t^2$

(C) $\left(\frac{\pi a^2 \mu_0 I}{2b}\right)\omega\sin\omega t$ (D) $\left(\frac{\pi a^2 \mu_0 I}{2b}\right)\omega(\sin)^2\omega t$

36. The variation of induced emf (E) with time (t) in a coil if a short bar magnet is moved along its axis with a constant velocity is best represented as {North pole is situated at left end of the bar magnet and South pole is situated at right end of the bar magnet}



(A) C
(B) D
(C) A
(D) B

37. The potential differences across the resistor, capacitor and inductor are 80 V, 40 V and 100 V respectively in series LCR circuit. The power factor of this circuit is

(A) 0.4
(B) 0.5
(C) 0.8
(D) 1.0

38. If a coil of inductance L and resistance R is connected to AC source with voltage V and angular frequency ω and current I, then the inductance L is

(A) $\frac{1}{\omega^2}\left(\sqrt{\left(\frac{V_{rms}}{I_{rms}}\right)^2 - R^2}\right)$
(B) $\frac{1}{\omega}\left(\sqrt{\left(\frac{V_{rms}}{I_{rms}}\right)^2 - R^2}\right)$
(C) $\frac{1}{\omega}\left(\left(\frac{V_{rms}}{I_{rms}}\right)^2 - R^2\right)$
(D) $\frac{1}{\omega^2}\left(\sqrt{\left(\frac{V_{rms}}{I_{rms}}\right)^3 - R^3}\right)$

39. In an L-C-R series, AC circuit at resonance,

(A) the capacitive reactance is more than the inductive reactance.
(B) the capacitive reactance is less than the inductive reactance.
(C) the capacitive reactance is equal to the inductive reactance.
(D) the power dissipated is minimum.

40. The angle of minimum deviation produced by a thin prism in air is δ_1. What will be the minimum deviation (δ_2) if the prism is immersed in another liquid medium? $\{{}_an_g = 3/2,\ {}_an_l = 4/3\}$

(A) $\delta_2 = \frac{\delta_1}{2}$
(B) $\delta_2 = 2\delta_1$
(C) $\delta_2 = \frac{\delta_1}{3}$
(D) $\delta_2 = \frac{\delta_1}{4}$

41. Two coherent sources of intensity ratio α interfere. In interference pattern, $\frac{I_{max}-I_{min}}{I_{max}+I_{min}}$ is

(A) $\frac{2\alpha}{1+\alpha}$
(B) $\frac{2\sqrt{\alpha}}{1+\alpha}$
(C) $\frac{2\alpha}{1+\sqrt{\alpha}}$
(D) $\frac{1+\alpha}{2\alpha}$

42. In a diffraction pattern due to a single slit of width a, the first minimum is observed at an angle 30° when light of wavelength 5000 Å is incident on the slit. The first secondary maximum is observed at an angle of
$\{\sin(30)^\circ = \cos(60)^\circ = \frac{1}{2}\}$

(A) $\sin^{-1}\left(\frac{2}{3}\right)$
(B) $\sin^{-1}\left(\frac{1}{2}\right)$
(C) $\sin^{-1}\left(\frac{3}{4}\right)$
(D) $\sin^{-1}\left(\frac{1}{4}\right)$

43. In Young's double-slit experiment, the intensity at a point is $\left(\frac{1}{4}\right)$ of the maximum intensity. The angular position of this point is
{λ = wavelength of light used, d = separation between the two slits, $\cos(60)^\circ = \frac{1}{2}$}

(A) $\sin^{-1}\left(\frac{\lambda}{d}\right)$
(B) $\sin^{-1}\left(\frac{\lambda}{2d}\right)$
(C) $\sin^{-1}\left(\frac{\lambda}{3d}\right)$
(D) $\sin^{-1}\left(\frac{\lambda}{4d}\right)$

44. Light of frequency $4\nu_0$ is incident on the metal of threshold frequency ν_0. The maximum kinetic energy of the emitted photoelectron is (h = Planck's constant)

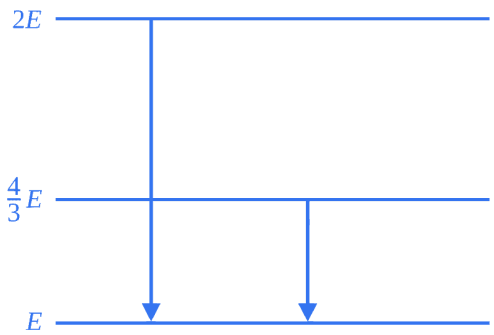
(A) $3h\nu_0$
(B) $2h\nu_0$
(C) $\frac{3}{2}h\nu_0$
(D) $\frac{1}{2}h\nu_0$

45. A particle is dropped from a height 'y'. The de-Broglie wavelength of the particle as a function of height is

(A) y (B) $y^{1/2}$

(C) y^0 (D) $y^{-1/2}$

46. The energy levels of certain atom are represented in the following figure. During the transition from 2E to E level, a photon of wavelength λ is emitted. The wavelength of photon produced during transition from $\frac{4E}{3}$ level to E will be



(A) 3λ (B) $\frac{\lambda}{3}$

(C) $\frac{3\lambda}{2}$ (D) $\frac{4\lambda}{3}$

47. At time $t = 0$, the activity of a radioactive substance is 1600 Bq. At $t = 8$ s, the activity remains 100 Bq. The activity at $t = 2$ s is

(A) 400 Bq (B) 800 Bq

(C) 1600 Bq (D) 3200 Bq

48. The below truth table corresponds to

A	B	Y
0	0	1
1	0	1
0	1	1
1	1	0

(A) NAND gate (B) XOR gate

(C) OR gate (D) NOR gate

49. In a common emitter amplifier circuit using n-p-n transistor, the phase difference between the input and output voltages will be

(A) 180° (B) 135°

(C) 90° (D) 45°

50. The potential barrier in p-n junction diode is due to

(A) depletion of positive charges near the junction.

(B) accumulation of positive charges near the junction.

(C) depletion of negative charges near the junction.

(D) accumulation of positive and negative charges near the junction.

51. Find the mass of 1 molecule of H_2SO_4 in grams.

(A) 1.605×10^{-22} g
(B) 1.665×10^{-22} g
(C) 1.647×10^{-22} g
(D) 1.627×10^{-22} g

52. What is the total number of electrons present in completely filled 3s, 3p, and 3d subshell having same value of magnetic quantum number?

(A) 18
(B) 9
(C) 6
(D) 3

53. Which of the following compounds has the highest boiling point?

(A) CH_3-CH_2-CH_3
(B) CH_3-CN
(C) CH_3-Cl
(D) CH_3-O-CH_3

54. What is the bond angle Cl-B-Cl and molecular geometry of BCl_3 molecule?

(A) 120° and trigonal bipyramidal
(B) 109°28′ and tetrahedral
(C) 107°18′ and tetrahedral
(D) 120° and trigonal planar

55. 1 mole of certain gas expands isothermally and reversibly from 1 dm^3 to 10 dm^3 and performs −4308 J work. Calculate the temperature at which expansion of gas takes place [R = 8.314 JK $^{-1}$mol^{-1}]

(A) 200 K.
(B) 215 K.
(C) 225 K.
(D) 205 K.

56. What is the work done when an ideal gas (0.300 mol) expands in vacuum?

(A) zero
(B) one
(C) two
(D) three

57. Which of the following physical transformations is an exothermic?

(A) Enthalpy of ionisation of one mole of gaseous sodium atom.
(B) Electron gain enthalpy of one mole of gas phase atoms of chlorine.
(C) Enthalpy of atomization of one mole of methane gas.
(D) Enthalpy of solution of one mole of sodium chloride in specified amount of water.

58. What is pH of HCl solution containing 0.365 g of HCl in 100 mL of solution, assuming complete dissociation at 298 K? (Molar mass of HCl = 36.5 g/mol)

(A) 2
(B) 1
(C) 3.65
(D) 3

59. Calculate the pH of the buffer solution consists of 0.005 M weak acid and 0.02 M of its salt with strong base BA. [pK_a = 3.4437]

(A) 4.046
(B) 2.842
(C) 3.7447
(D) 3.1437

60. Which of the following salts of weak acids and weak bases on hydrolysis turns red litmus blue?
[K_a for acetic acid = 1.8×10^{-5}, K_a for hydrofluoric acid = 6.8×10^{-4}, K_a for hydrogen cyanide = 4.0×10^{-10}, K_a for formic acid = 1.8×10^{-4} and K_b for ammonium hydroxide = 1.8×10^{-5}]

(A) Ammonium acetate
(B) Ammonium fluoride
(C) Ammonium cyanide
(D) Ammonium formate

61. What is the change in oxidation number of S in the following reaction?
$SO_2 + 2H_2S \rightarrow 3S + 2H_2O$

(A) −2 to 1
(B) −2 to 0
(C) −2 to 3
(D) −2 to −3

62. Identify the pair of basic oxides from the following.

(A) CaO and Na_2O
(B) SO_2 and Cl_2O
(C) BaO and N_2O_5
(D) CO and N_2O

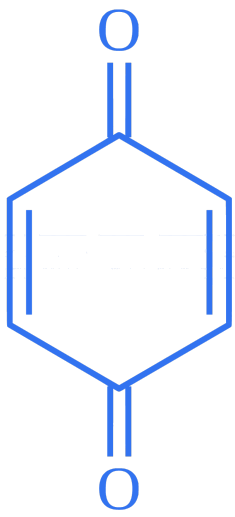
63. Which of the following compound used in petrol refining?

(A) Calcium carbonate
(B) Sodium carbonate
(C) Hydrogen peroxide
(D) Sodium hydroxide

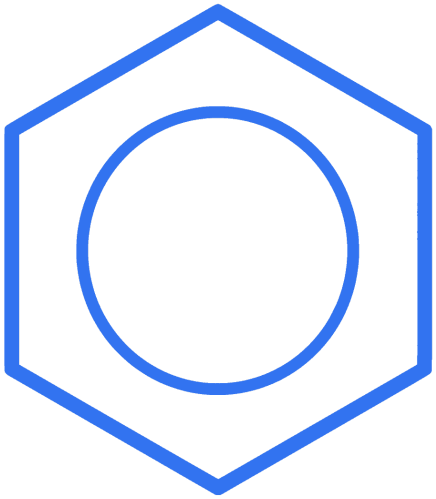
64. Which of the following elements is in allotropic form in fullerene?

(A) Fluorine
(B) Iron
(C) Phosphorus
(D) Carbon

65. Identify free radical inhibitor from following.
(A)



(B) O_2
(C)



(D) CrO_3
Choose the *correct* answer from the options given below.

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

66. How many primary amine isomeric forms are possible for the formula $C_4H_{11}N$?

(A) 1
(B) 2
(C) 3
(D) 4

67. What are cresol?

(A) Hydroxy toluenes.
(B) Dihydric alcohols.
(C) Trihydric Alcohols.
(D) Trihydric phenol.

68. Which of the following is Not a Freon?

(A) CCl_3F
(B) CCl_2F_2
(C) CBr_2F_2
(D) $CClF_3$

69. What type of isomerism is found in but-2-ene?

(A) Chain Isomerism
(B) Position isomerism
(C) Geometrical isomerism
(D) Tautomerism

70. What is the major product obtained by oxidation of phenylethene with $KMnO_4$ in dilute H_2SO_4?

(A) Benzoic acid
(B) Ethylene glycol
(C) Acetophenone
(D) Benzophenone

71. Chlorobenzene on reaction with acetyl chloride in presence of anhydrous aluminum chloride forms,

(A) 2-Chloroacetophenone
(B) 3-Chloroacetophenone
(C) 4-Chloroacetophenone
(D) 2-Chloroacetophenone and 4-Chloroacetophenone

72. In the combustion reaction of alkanes, if 1 mole of ethane is burnt, find number of moles of oxygen required?

(A) 3
(B) 4
(C) 7
(D) 3.5

73. The density of iridium is 22.4 g cm^{-3}. The unit cell of iridium is fcc Calculate the volume of unit cell. if the molar mass of iridium is 192.2 g/mol.

(A) 5.7×10^{-23} cm^3
(B) 2.8×10^{-23} cm^3
(C) 3.1×10^{-23} cm^3
(D) 4.6×10^{-23} cm^3

74. In a compound, atoms of element Y form hexagonal close-packed structure. Atoms of element X occupy 2/3 of the octahedral voids. What is the formula of the compound?

(A) X_2Y_3
(B) X_4Y_3
(C) X_3Y_2
(D) X_4Y_5

75. If a solution is prepared by dissolving solute in 0.3 L of water having osmotic pressure 164.1 atm at 300 K, what will be the number of moles of solute in solution? (R = 0.08205 L atm K^{-1}mol $^{-1}$)

(A) 0.5
(B) 1
(C) 1.5
(D) 2.0

76. 200 mL of an aqueous solution of a protein contains 1.26 g of protein, the osmotic pressure of this solution at 300 K is found to be 2.57×10^{-3} bar. Calculate the molar mass of protein. (R = 0.083 L bar $mol^{-1}K^{-1}$)

(A) 5102.2 g mol^{-1}
(B) 12204.4 g mol^{-1}
(C) 31011 g mol^{-1}
(D) 61039 g mol^{-1}

77. Which of the following statements is NOT true about 0.05 M urea solution & 0.1 M glucose solution?

(A) The osmotic pressure exhibited by the glucose solution is higher than that exhibited by the urea solution.
(B) The glucose solution is hypertonic to urea solution.
(C) These two solutions are isotonic solutions.
(D) The urea solution is hypotonic to glucose solution.

78. Which of the following paste is used in dry cell as an electrolyte?

(A) Paste of ammonium chloride (NH_4Cl) and zinc chloride ($ZnCl_2$)
(B) Paste of manganese dioxide (MnO_2) and carbon black
(C) Paste of potassium hydroxide (KOH) and zinc oxide (ZnO)
(D) Paste of sodium hydroxide (NaOH) and zinc chloride ($ZnCl_2$)

79. How many Faraday electricity is required to reduce 0.25 g of Nb(V) to the metal? (Atomic mass of Nb = 93)

(A) 2.7×10^{-3}
(B) 1.3×10^{-2}
(C) 3.7×10^{-2}
(D) 7.8×10^{-3}

80. The resistivity of a solution is 25.0 Ω·cm. Find its conductivity κ in (S cm^{-1}).

(A) 0.04 S cm^{-1}
(B) 0.07 S cm^{-1}
(C) 0.14 S cm^{-1}
(D) 0.317 S cm^{-1}

81. Identify the molecularity and order of the following elementary reaction, $C_2H_5I_{(g)} \rightarrow C_2H_{4(g)} + HI_{(g)}$, if rate = $k[C_2H_5I]$

(A) Bimolecular and First-Order
(B) Unimolecular and First-Order
(C) Unimolecular and Second-order
(D) Bimolecular and second-order kinetics

82. Find the order of reaction if unit of rate constant is mol dm^{-3} s^{-1}.

(A) 1
(B) 3
(C) 0
(D) 2

83. For a reaction, A+B→Products, that is a second order reaction. Identify the correct rate expression for reaction from the following.

(A) $r = K[A]^2[B]$
(B) $r = K[A]^{3/2}[B]$
(C) $r = K[A][B]^2$
(D) $r = K[A][B]$

84. The phenomenon in which the adsorbate molecules are held on the surface of the adsorbent by a weak van der Waals force of attraction is known as

(A) physisorption
(B) chemisorption
(C) absorption
(D) desorption

85. Which of the following inert gases is used for magnetic resonance imaging?

(A) He
(B) Ne
(C) Ar
(D) Xe

86. Identify the highest oxidation state exhibited by plutonium ($Z = 94$).

(A) +6
(B) +4
(C) +5
(D) +7

87. Which of the following pairs of elements does NOT form an alloy?

(A) Na, Hg
(B) Hg, Fe
(C) Cu, Zn
(D) C, Fe

88. Which atoms from EDTA are used to bind to metal ions during formation of complex?

(A) Four nitrogen and two oxygen atoms
(B) Three nitrogen and three oxygen atoms
(C) Four oxygen and two nitrogen atoms
(D) Three oxygen, two nitrogen and one magnesium atoms

89. Which type of complex is Diamminedichloroplatinum(II)?

(A) Cationic
(B) Anionic
(C) Neutral
(D) Chelate

90. Which of the following product obtained when alkyl chloride react with aq KOH at room temperature?

(A) Alkyl amine
(B) Acid anhydride
(C) Carboxylic acid
(D) Alcohol

91. Identify the product of Kolbe's reaction from following.

(A) Salicylic acid (o-hydroxybenzoic acid)
(B) p-Cresol
(C) Anisole
(D) Benzaldehyde

92. Which of the following reagents converts acid chloride to aldehyde selectively?

(A) $LiAlH_4$
(B) H_2/Pt
(C) $H_2/Pd\text{-}BaSO_4$
(D) $NaBH_4$

93. Aldehydes containing at least one α-hydrogen atom undergo a reaction in presence of dilute aq. NaOH to form β-hydroxy aldehyde. Identify the reaction.

(A) Cannizzaro reaction
(B) Aldol reaction
(C) Reformatsky reaction
(D) Wolff–Kishner reaction

94. Which is the best reagent for the following conversion?

$CH_3\text{-}CH{=}CH\text{-}CH_2\text{-}CHO \longrightarrow CH_3\text{-}CH{=}CH\text{-}CH_2\text{-}CH_2\text{-}OH$

(A) H_2 / Ni
(B) $LiAlH_4$, H_3O^+
(C) H_2 / Pd
(D) Anhydrous $ZnCl_2$, conc. HCl

95. Which of the following statements is NOT correct for benzene sulfonyl chloride?

(A) It is known as Hinsberg's reagent.
(B) It is used to distinguish primary and secondary amines.
(C) On treatment with secondary amines, it leads to product that is soluble in alkali.
(D) It does not react with tertiary amines.

96. Identify the product formed when glucose is oxidized with concentrated nitric acid

(A) Gluconic acid
(B) Saccharic acid
(C) Sorbitol
(D) Mannitol

97. What is monomer used in cellulose, a straight chain polysaccharide?

(A) α-D-glucose
(B) α-D-fructose
(C) β-D-glucose
(D) β-D-fructose

98. Which of the following combinations used to obtain terywool?

(A) cotton and wool
(B) nylon and wool
(C) dacron and wool
(D) rayon and wool

99. Identify the metal nanoparticle that acts as a highly effective bacterial disinfectant in the water purification process.

(A) carbon black
(B) silver
(C) aluminium
(D) copper

100. Identify the term used for the process of alkaline hydrolysis of natural oils and fats to produce soap.

(A) Esterification
(B) Hydrogenation
(C) Saponification
(D) Neutralization

101. The H-antigen in *Salmonella typhi* is associated with

(A) Capsule
(B) Flagella
(C) Cell wall
(D) Cytoplasm

102. Which of the following is INCORRECT regarding the nervous system of *Planaria*?

(A) It is the most primitive animal having CNS
(B) It consists of U-shaped brain
(C) It belongs to the phylum Aschelminthes.
(D) The eyes are located on dorsal side of the brain

103. Which of the following organisms has salt secreting glands?

(A) Marine iguanas only.
(B) Sea turtles only.
(C) Both Marine iguanas and Sea Turtles
(D) Both Whales and sea turtles.

104. After fertilization, the outer and inner integuments of an angiospermic ovule change into _____ respectively.

(A) seed and fruit
(B) testa and tegmen
(C) mesocarp and endocarp
(D) tegmen and testa

105. Identify the CORRECT pair with respect to distribution of stomata on leaves.
(A). Epistomatic - on lower epidermis
(B). Amphistomatic - on both surfaces
(C). Hypostomatic - on upper epidermis

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

106. Epiphytic plants like orchids absorb water vapors from the air with the help of epiphytic roots having special tissue called ____.

(A) epiblema
(B) velamen
(C) stoma
(D) lenticels

107. Alveolar wall is made up of ------- epithelium resting on a basement membrane of connective tissue.

(A) Ciliated
(B) Squamous
(C) Columnar
(D) Cuboidal

108. The _____ is/are present in the pulp of the tooth.

(A) calcium phosphate and calcium carbonate
(B) bony dentin
(C) blood vessels and nerve fibres
(D) cementum substance

109. Approximate size of a typical nucleus is

(A) 10^{-5} m
(B) 10^{6} m
(C) 10^{5} m
(D) 10^{-6} m

110. An enzyme catalyzes a reaction at a high rate at 37°C but becomes inactive at 60°C. This is because

(A) The enzyme is denatured at high temperature.
(B) The enzyme is activated only at low temperature
(C) The substrate becomes inactive at high temperature.
(D) The enzyme-substrate complex becomes more stable

111. Which of the following statements is INCORRECT about the enzyme-substrate complex?

(A) It allows the enzyme to bind more tightly to the substrate.
(B) It helps break the chemical bonds within the substrate.
(C) Formation of the Enzyme-Product complex.
(D) It transforms the product back into the substrate.

112. A protein consisting of more basic amino acids such as ----------exists as a cation at the physiological pH of 7.4. Such proteins are called basic proteins.

(A) Lysine and aspartic acid
(B) Methionine and arginine
(C) Lysine and arginine
(D) Proline and cysteine

113. Which fatty acids do not contain double bond between carbon atoms?

(A) Unsaturated fatty acids
(B) Saturated fatty acids
(C) Oleic acid
(D) Linoleic acid

114. Given below are two statements:
Statement (I): Due to endo-osmosis water from surrounding cells and xylem, is absorbed.
Statement (II): Due to decrease in turgor pressure, sugar from photosynthetic cell is forced ultimately into sieve tube of vein
In light of the above statements, choose the *most appropriate* answer from the options given below with reference to mechanism of sugar transport through phloem.

(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.

115. All the following are examples of vertical transport of food through phloem EXCEPT:

(A) It occurs from leaves to growing point of stem
(B) It occurs from leaves to developing flowers
(C) It occurs from leaves to fruits
(D) It occurs from phloem to pith.

116. Roots absorb water from soil by employing three physical processes, sequentially. Identify their correct sequence.

(A) Imbibition → Diffusion → Osmosis
(B) Diffusion → Osmosis → Imbibition
(C) Diffusion → Imbibition → Osmosis
(D) Osmosis → Imbibition → Diffusion

117. Which of the following is a symbiotic microorganism?

(A) *Bacillus* spp
(B) *Rhizobium*
(C) *Nitrosomonas*
(D) *Pseudomonas*

118. Which of the following is function of Molybdenum?

(A) Activates carboxylase enzyme
(B) Required for uptake and utilisation of Ca^{2+}
(C) Activates enzyme in the nitrogen metabolism
(D) Activates enzyme in phosphate metabolism

119. Given below are two statements, one is labelled as Assertion (A) and other one labelled as Reason (R).
Assertion (A): Photochemical receptors in the leaves are the proteinaceous pigments located in the stroma of the chloroplast.
Reason (R): These proteinaceous pigments are called Phytochromes.
In light of the above statements, choose the *correct* answer from the options given below.

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

120. Which of the following processes adds CO_2 to the atmosphere?

(A) Photosynthesis
(B) Respiration
(C) Carboxylation.
(D) Nitrification.

121. If glucose is incompletely oxidized to ethyl alcohol in the absence of oxygen, the RQ will be _____.

(A) 1
(B) infinite
(C) less than 1
(D) more than 1

122. α-Ketoglutarate and Oxaloacetate act as precursors in the synthesis of _____.

(A) Fatty acids, Malic acid
(B) Glutamic acid, Aspartic acid
(C) Succinic acid, Cholesterol
(D) Citric acid, Aconitic acid

123. Which of the following coenzyme is NOT directly required in any of the steps of the Kreb's cycle?

(A) NAD
(B) FAD
(C) Coenzyme Q
(D) Co A

124. Identify the step, in which phosphorylation occurs with the help of inorganic phosphate and not ATP.

(A) Glucose (6C) 1M → Glucose -6-phosphate (6C) 1M

(B) Glyceraldehyde-3-phosphate (3C) → 1,3 bisphosphoglycerate (3C)

(C) 2 Phosphoenol pyruvate (3C) → Pyruvic acid (3C)

(D) 1,3 bisphosphoglycerate (3C) → 3 Phosphoglycerate (3C)

125. In glycolysis, which enzyme requires Zn^{2+} as cofactor?

(A) Hexokinase

(B) Phosphofructokinase

(C) Aldolase

(D) Glyceraldehyde phosphate dehydrogenase

126. The first Cytokinin was discovered by ----(A)------ during investigation of callus tissue culture of ------(B)----

(A) A- Yabuta and Sumiki ; B- *Gibberella fujikuroi*

(B) A- Skoog and Miller ; B- *Nicotiana tabacum*

(C) A- Gane ; B- Rice seedlings

(D) A- Carns and Addicott ; B- *Avena*

127. Given below are two statements, one is labelled as Assertion (A) and other one labelled as Reason (R).
Assertion (A): Redifferentiation involves loss of the ability to divide and gaining specialization again.
Reason (R): Cells formed from Dedifferentiated cells always remain meristematic.
In light of the above statements, choose the *correct* answer from the options given below.

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

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

(C) (A) is true but (R) is false.

(D) Both (A) and (R) are false

128. The proteolytic enzyme found in the gastric juice of infants which helps in the digestion of milk proteins is

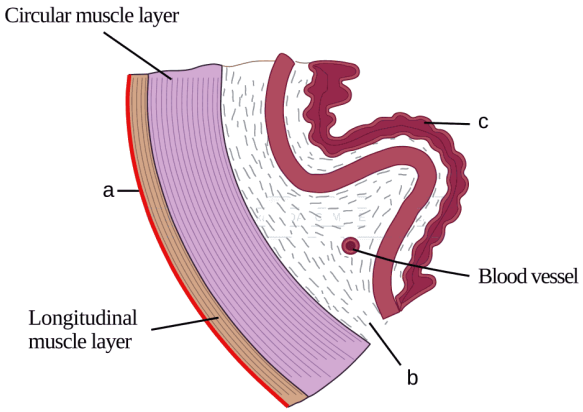
(A) Renin

(B) Rennin

(C) Salivary amylase

(D) Lysozyme

129.



The given diagram represent the T.S. of gut. Identify a, b and c.

(A) a - Mucosa, b - Submucosa, c - Serosa

(B) a - Serosa, b - Mucosa, c - Submucosa

(C) a - Submucosa, b - Mucosa, c - Serosa

(D) a - Serosa, b - Submucosa, c - Mucosa

130. Which of the following is NOT directly related to chloride shift?

(A) Carbonic anhydrase activity

(B) Bohr effect

(C) Haldane effect

(D) Bicarbonate transport

131. The partial pressure of oxygen of blood in pulmonary capillaries is ----(i)---- mmHg while in alveolar air it is -------(ii)----- mmHg.

(A) i - 40 ; ii- 104

(B) i - 45 ; ii- 40

(C) i - 90 ; ii - 105

(D) i - 95 ; ii - 125

132. Following are the parts of upper respiratory system
i) External nares ii) Nasal cavities iii) Internal nares iv) Nasopharynx v) Larynx vi) Trachea
Choose the *correct* answer from the options given below:

(A) i, ii, iii and iv

(B) i, ii, iv and v

(C) i, ii, v and vi

(D) i, ii, iii and v

133. Read the following statements with respect to LUNGS and select the correct option:
(A). They are the respiratory organs.
(B). They help in excretion of water and oxygen.
(C). They also excrete volatile substances present in spices.
(D). They help in exchange of gases
Choose the *correct* answer from the options given below:

(A) (A), (B) and (C) are correct
(B) (A), (C) and (D) are correct
(C) (A), (B), and (D) are correct
(D) (A), (B), (C) and (D) are correct

134. Identify the correct statements about ECG of a normal human being:
a) P-wave indicates atrial depolarization.
b) QRS complex indicates ventricular repolarization.
c) T-wave represents ventricular repolarization.
d) The interval between S and T represents the atrial systole.

(A) a and c only
(B) b and c only
(C) a, b and d only
(D) a and d only

135. Given below are two statements, one is labelled as Assertion (A) and other one labelled as Reason (R).
Assertion (A): Ligamentum arteriosum joins pulmonary trunk and aortic arch.
Reason (R): It is the remnant of fossa ovalis.
In light of the above statements, choose the *correct* answer from the options given below.

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

136. Mature human RBCs are

(A) Nucleated and biconvex
(B) Non nucleated and biconcave
(C) Nucleated and circular
(D) Non nucleated and oval

137. Read the following statements about open circulatory system and choose correct statements.
1. Blood is circulated through the body cavities.
2. Exchange of material takes place directly between blood and cells.
3. The blood flows with high pressure.
4. It is found in arthropods and most molluscs.

(A) 1,2 and 4 only
(B) 1 and 3 only
(C) 2 and 3 only
(D) 1,2,3 and 4

138. The symptoms like hazy urine, pain during micturition & intermittent pain below the rib cage in the back and sides are observed in _____.

(A) anaemia
(B) uremia
(C) ARF
(D) the occurrence of renal calculi.

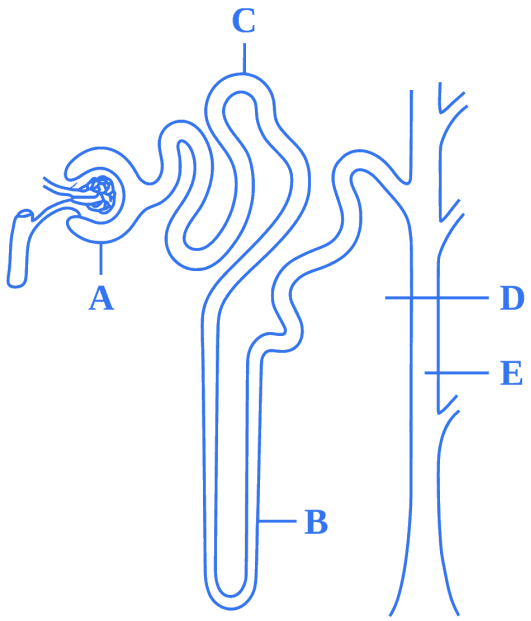
139. Given below are two statements:
Statement (I): Atrial natriuretic peptide stimulates Na+ and Cl^- reabsorption from collecting ducts, stimulates release of renin.
Statement (II): Increased excretion of Na^+ in urine is called Natriuresis.
In light of the above statements, choose the *most appropriate* answer from the options given below.

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

140. Which of the following correctly matches the substance with the process of its movement in nephron?

(A) Urea - Actively reabsorbed in PCT
(B) Glucose - Secreted in DCT
(C) Sodium ions - Passively reabsorbed in ascending limb of loop of Henle
(D) Hydrogen ions - Secreted in DCT

141.



In the given diagram of Nephron, Identified A, B, C, D and match their function (1 to 4) and select the correct option:
1- Site of ultrafiltration
2- Impermeable to water
3- Reabsorption of glucose/ useful molecules
4- Water reabsorption and regulation of pH of body fluids.

(A) 1-(A), 2-(B), 3-(D), 4-(C)
(B) 1-(A), 2-(B), 3-(C), 4-(D)
(C) 1-(A), 2-(C), 3-(D), 4-(B)
(D) 1-(A), 2-(D), 3-(B), 4-(C)

142. Arrange the following parts of the ear in the correct sequence of sound transmission from outside to inside.
1. Tympanic membrane
2. Cochlea
3. Pinna
4. Auditory ossicles
5. Oval window

(A) 3--1--4--5--2
(B) 1--3--4--2--5
(C) 3--4--1--5--2
(D) 1--4--3--5--2

143. The main function of the choroid layer in the eyeball is ____.

(A) Formation of image
(B) Supply nutrition and oxygen to the retina
(C) Control of eye movement
(D) Protection of cornea

144. Which of the following statements correctly differentiate between sympathetic and parasympathetic nervous systems?

(A) Sympathetic system uses acetylcholine at effector organs, while parasympathetic uses norepinephrine.
(B) sympathetic system originates from craniosacral region while parasympathetic from thoracolumbar region.
(C) sympathetic system prepares the body for emergency while parasympathetic system restores normal function.
(D) Both have the same type of ganglia.

145. The main function of the red nucleus is to

(A) regulate breathing and heart rate.
(B) control posture and muscle tone.
(C) secrete melatonin hormone.
(D) regulate auditory reflexes.

146. With respect to the generation of nerve impulse, consider the following statements and identify the correct statement:
a) Any change to the membrane will cause Na^+ to enter into the membrane.
b) As a result, the potential difference is lowered.
c) This makes the membrane more permeable to Na^+
d) So there will be rapid influx of Na^+

(A) a, b and c only
(B) a, c and d only
(C) c and d only
(D) a, b, c and d.

147. All are the properties of nerve fibers EXCEPT

(A) Conductivity
(B) Refractory period
(C) Velocity
(D) Inhibition effect

148. The vomiting center is located in the

(A) Medulla oblongata
(B) Stomach and sometimes in duodenum
(C) GI tract
(D) Hypothalamus

149. Identify correct statements with respect to Thyroxine:
1. It regulates the basal metabolic rate of the body.
2. It promotes growth of the body.
3. It regulates reproductive cycles in females.
4. It decreases action of neurotransmittors- adrenaline or noradrenaline.
5. It enhances protein synthesis in growing individuals.

(A) Statement 1,2,3 and 4 are correct
(B) Statement 1,2,3 and 5 are correct
(C) All statements are correct
(D) All statements are wrong

150. Given below are two statements, one is labelled as Assertion (A) and other one labelled as Reason (R).
Assertion (A): Prolactin secretion from adenohypophysis is essential during lactation.
Reason (R): It helps in the ejection of milk from mammary glands.
In light of the above statements, choose the *correct* answer from the options given below.

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

151. How many of the following statements are INCORRECT?
(A). Intestinal mucosa produces hormones like secretin, cholecystokinin (CCK) and gastric inhibiting peptide.
(B). Secretin stimulates secretion of gastric juice.
(C). Secretin stimulates secretion of bile juice from the liver, pancreatic juice and intestinal juice.
(D). GIP promotes gastric secretion.

(A) One
(B) Two
(C) Three
(D) Four

152. Given below are a few statements about asexual reproduction. Select the INCORRECT statement.

(A) It inherits the genes of the parent.
(B) Morphologically identical individuals are called clones
(C) Progeny formed by asexual reproduction differs genetically from its parents
(D) It doesn't involve fusion of two compatible gametes

153. Given below are two statements, one is labelled as Assertion (A) and other one labelled as Reason (R).
Assertion (A): Cleavage polyembryony is found in *Citrus*
Reason (R): In Cleavage polyembryony, the zygote divides to form several embryos.
In light of the above statements, choose the *correct* answer from the options given below.

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

154. In dicots the fully developed embryo appears-------

(A) Globular shaped
(B) Cordate shaped
(C) Horse-shoe shaped
(D) Kidney shaped

155. Which of the following pair of plants has a nuclear type of endosperm?

(A) *Petunia* and *Balsam*
(B) *Adoxa* and *Asphodelus*
(C) Wheat and Sunflower
(D) *Balsam* and *Asphodelus*

156. Select the INCORRECT statement from the following with respect to double fertilization.

(A) The zygote develops into an embryo
(B) Syngamy is a type of generative fertilization
(C) Triple fusion is a type of vegetative fertilization
(D) Non-motile male gametes are carried through the pollen tube and it is called mesogamy.

157. Which of the following is NOT a secondary sexual character in boys?

(A) Skin becomes oily
(B) Development of underarm and chest hair
(C) Enlargement of penis and testicles
(D) High pitched voice

158. During pregnancy, the second trimester ranges from:

(A) 27^{th} to 40^{th} week
(B) 13^{th} to 26^{th} week
(C) 5^{th} to 12^{th} week
(D) 2^{nd} to 4^{th} week

159. Which layer of the blastocyst actively invades the endometrium?

(A) Inner cell mass
(B) Cytotrophoblast
(C) Syncytiotrophoblast
(D) Zona pellucida

160. Identify the CORRECT statement about CLEAVAGE in HUMAN ZYGOTE.
Statement (I): Cleavage is holoblastic.
Statement (II): First cleavage is meridional.
Statement (III): Second cleavage is horizontal.
Statement (IV): Third cleavage is horizontal.
In light of the above statements, choose the *most appropriate* answer from the options given below.

(A) All statements are correct
(B) I, II and III are correct
(C) I, II and IV are correct
(D) Only I and II are correct

161. Menarche, menstrual cycles and menopause in females are controlled by the following hormones EXCEPT:

(A) GnRH
(B) ICSH
(C) LH
(D) FSH

162. The nourishing cells in the seminiferous tubules are

(A) Follicular cells
(B) Leydig cells
(C) Interstitial cells
(D) Sustentacular cells

163. Identify correct function of following IUDs:

(A) Lippes loop - It attracts the macrophages stimulating them to accumulate in the uterine cavity.
(B) Cu-T - It delays pregnancy for longer period.
(C) Cu 7 - Makes the uterus unsuitable for implantation.
(D) LNG-20 - Suppresses sperm motility

164. Study the following statements and select the correct option:
Statement (I): Examples of Mendelian disorders are Turner's syndrome and Down's syndrome.
Statement (II): Mendelian disorders are caused due to alteration or mutation in the gene.
Statement (III): Chromosomal disorders are caused due to the absence or excess of one or more chromosomes

(A) Statement II is correct and I and III are incorrect
(B) Statement I, II and III are correct
(C) Statement I is incorrect and II, III are correct
(D) Statement I, II and III are incorrect

165. Which of the following statements are CORRECT?
Statement (I): Thalassemia is an autosomal, inherited recessive disease.
Statement (II): Haemoglobin molecule is made up of four polypeptide chain - 2α and 2β chains
Statement (III): The synthesis of α-chain are controlled by HBA 1 and HBA2 on chromosome 11
Statement (IV): The synthesis of β chain is controlled by single gene (HBB) on chromosome 16.

(A) All statements are correct
(B) All statements are incorrect
(C) Statement (I) and (II) are correct while (III) and (IV) are incorrect
(D) Statement (III) and (IV) are correct while (I) and (II) are incorrect

166. Read the following statements with respect to Phenylketonuria (PKU) and select the correct option.
(A). It is an inborn disorder caused due to dominant gene.
(B). When recessive genes are present in homozygous condition, Phenylalanine hydroxylase enzyme is not produced.
(C). This enzyme is essential for conversion of amino acid tyrosine into phenylalanine

(A) Statement A, B are correct and C is incorrect
(B) Statement B is correct and A and C are incorrect
(C) Statement A, B and C are incorrect
(D) Statement A, B and C are correct

167. Match List I with List II

List I Types of gene interaction.	**List II Examples.**
(A). Pleiotropy	(I). *Mirabilis jalapa*
(B). Codominance	(II). ABO blood group
(C). Incomplete dominance	(III). Sickle cell anemia
(D). Multiple allele	(IV). Coat color in cattle

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

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

168. How many of the following genotypes are representing tall plants with round seeds?
TTrr, Ttrr, TtRr, TTRr, ttrr, TtRR

(A) Two
(B) Three
(C) Four
(D) Six

169. In DNA, 20-100 base pairs which vary in every human being form _____.

(A) Short nucleotide sequences
(B) Variable number of Tandem repeats
(C) Large nucleotide sequence
(D) Variable length of ss base pairs

170. Given below are two statements about DNA fingerprinting.
Statement (I): The DNA probe used in DNA fingerprinting is a dsDNA obtained from organisms only.
Statement (II): The DNA probe is labeled with radioisotopes and added to nitrocellulose filter paper.
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 incorrect but Statement (II) is correct.
(D) Statement (I) is correct but Statement (II) is incorrect.

171. Identify the correct features of the genetic code.
i. It is a triplet code.
ii. It shows distinct polarity.
iii. It is overlapping.
iv. The genetic code was deciphered by Watson and Crick.

(A) All correct
(B) Statement (i) and Statement (ii) are correct.
(C) Statement (iii) and (iv) are correct
(D) All wrong

172. During replication of DNA, each separated parent DNA strand acts as _____.

(A) sense strand
(B) antisense strand
(C) template strand
(D) parallel strand

173. To which Era does the 'Age of Reptiles' refer to?

(A) Palaeozoic
(B) Mesozoic
(C) Cenozoic
(D) Precambrian

174. Given below are two statements, one is labelled as Assertion (A) and other one labelled as Reason (R).
Assertion (A): Sympatric speciation occurs in a single population without geographical isolation.
Reason (R): The formation of species is due to reproductive isolation and mutation.
In light of the above statements, choose the *correct* answer from the options given below.

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

175. Large number of variations arise in natural populations of organisms due to _____.

(A) mutations
(B) gene flow
(C) genetic drift
(D) gene recombination

176. Reproductive isolation occurs due to all of the following EXCEPT

(A) Change in genetic material
(B) Structure of genital organs
(C) Change in gene pool
(D) Barriers like glacier

177. Match List I with List II

List I	List II
(A). Lamarck	(I). Mutation theory
(B). Darwin	(II). Natural selection theory
(C). Hugo de Vries	(III). Inheritance of acquired characters
(D). Weismann	(IV). Germplasm theory

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

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

178. Which of the following statements about Heroin is correct?

(A) It is a stimulant obtained from Coca leaves
(B) It is a hallucinogen obtained from *Cannabis*
(C) It is a depressant and slows down the activity of the body.
(D) It is an anesthetic obtained from Tobacco

179. Acute phase proteins (APPs) include the following EXCEPT:

(A) C Reactive protein (CRP)
(B) Mannose binding protein
(C) Alpha -1 acid glycoprotein
(D) Erythropoietin

180. Which one of the following is NOT a marine fish?

(A) *Harpadon*
(B) *Catla*
(C) *Sardinella*
(D) *Rastrelliger*

181. Asiatic poultry breeds are
i) New Hampshire ii) Brahma iii) Aseel iv) Cochin v) Langshan vi) Kadaknath vii) Leghorn
Choose the *correct* answer from the options given below:

(A) ii, i, iii, iv
(B) ii, iii, v, vi
(C) ii, iv, i, v, vi
(D) ii, iv, v

182. Find out correct statement:

(A) *Saccharum barberi* is a native of south India.
(B) Ganga 3, *Jowar* (Co-12) and *Bajra* have been successfully developed in India.
(C) *Jaya, Ratna* and *Padma* are semidwarf varieties of Wheat.
(D) CO 419, 421, 453 are high yielding varieties of Rice.

183. Pusa sawani and Pusa Sem 3 are the hybrid varieties of _____ and _____ respectively.

(A) *Brassica* and Flat bean
(B) Okra and *Brassica*
(C) Okra and Flat bean
(D) *Brassica* and Chili

184. Identify correct statements:
Statement (I): *Azotobacter* is a free living, nitrogen-fixing bacteria.
Statement (II): It is an aerobic, non-photosynthetic, non-nodule-forming bacteria
Statement (III): It is used as a biofertilizer for all leguminous plants.
Statement (IV): It is intimately associated with the roots of Gymnosperms.

(A) All statements are correct
(B) All statements are wrong
(C) Statement (I) and (II) are correct but (III) and (IV) are incorrect
(D) Statement (III) and (IV) are correct but (I) and (II) are incorrect

185. Rearrange the steps of gene cloning and choose the correct option:
i) Isolation of DNA from donor organism
ii) Isolation of a desired fragment
iii) Transferring the recombinant to the host cell
iv) Fragmentation of DNA by restriction endonuclease
v) Ligation of fragment to vector
vi) Culturing host cell in medium
Choose the *correct* answer from the options given below:

(A) i -- ii --iii -- v---iv--vi
(B) i--iv---ii--v---iii---vi
(C) ii --i---iii---v----iv---vi
(D) vi---ii----iii----iv-----v---i

186. By using the enzyme DNA ligase, foreign DNA is integrated into the vector. The combination of vector DNA and foreign DNA is called

(A) Complementary DNA
(B) Recombinant DNA
(C) Chimeric DNA
(D) Recombinant DNA as well as Chimeric DNA.

187. Given below are two statements, one is labelled as Assertion (A) and other one labelled as Reason (R). Assertion (A) : Bt corn, has adverse effects on Monarch butterfly populations. Reason (R) : It has adverse effects on Monarch butterfly populations, which are not the original target of the pesticide. In light of the above statements, choose the correct answer from the options given below.

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

188. Identify the INCORRECT pair (Substance and their GM crop)

(A) Provitamin A - Rice
(B) Vitamin E - Canola
(C) Iron - Rice
(D) Fructans - Potato

189. The gene of ---(i)---- has been isolated from -----(ii)----- and transferred to -----(iii)---- and this gene work against pest like *Zabrotes subfasciatus* and -----(iv)----.

(A) i) α-amylase inhibitor ii) *Agrobacterium tumefaciens* iii) Potato iv) *Callosobruchus chinensis*
(B) i) Cry gene ii) *Bacillus thuringiensis* iii) Brassica iv) Bt-Toxin
(C) i) Cry gene ii) *Bacillus thuringiensis* iii) Tomato iv) *Callosobruchus chinensis*
(D) i) α-amylase inhibitor ii) Adzuki bean iii) Tobacco iv) *Callosobruchus chinensis*

190. Which of the following associations is NOT an example of commensalism?

(A) Interaction between sea anemone that has stinging tentacles and the clown fish that lives among them
(B) Epiphytic Orchid on Mango tree
(C) Cattle egret and grazing cattle
(D) Tick on Dog

191. The principle of 'competitive exclusion' was stated by

(A) Verhulst and Pearl
(B) Darwin
(C) G.F Gause
(D) MacArthur

192. In animals, if the organisms is unable to migrate, it may go into ------during winter.

(A) Dormancy
(B) Hibernation
(C) Aestivation
(D) Normal sleep

193. The dissolved salt concentration is ---- in the fresh water of the streams.

(A) less than 5 ppt
(B) 50 ppt
(C) 30-35 ppt
(D) more than 100 ppt

194. Ecosystem services are

(A) The harmful effects of ecosystem
(B) Benefits humans obtain from ecosystems
(C) Artificial inputs to ecosystems
(D) Addition of pollutants

195. Which of the following statements is INCORRECT about ecological pyramids?

(A) All pyramids are always upright
(B) They represent trophic structure and function.
(C) Energy pyramids are always upright
(D) In aquatic ecosystem, the biomass pyramid may be inverted

196. Identify the correct sequence of processes in the decomposition of organic matter.
A. Humification
B. Fragmentation
C. Catabolism
D. Leaching

(A) A $\rightarrow$ B $\rightarrow$ C $\rightarrow$ D
(B) B $\rightarrow$ C $\rightarrow$ A $\rightarrow$ D
(C) C $\rightarrow$ B $\rightarrow$ D $\rightarrow$ A
(D) B $\rightarrow$ D $\rightarrow$ C $\rightarrow$ A

197. Match List I with List II

List I	List II
(A). Endangered	(I). High risk of extinction as a result of rapid population decline 30% to 50%
(B). Vulnerable	(II). Category containing species that are pervasive and abundant after careful assessment
(C). Near threatened	(III). High risk of extinction as a result of rapid population decline 50% to 70%
(D). Least concern	(IV). May meet the criteria for threatened status in the near future

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

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

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

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

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

198. Identify the group that correctly represents invasive species in India.

(A) *Lantana, Parthenium* and *Eichhornia*

(B) *Azadirachta, Ficus* and *Mangifera*

(C) *Nerium*, Hibiscus and *Ocimum*

(D) *Nelumbo, Salvia* and *Hydrilla*

199. In 2001, Bharat stage II emission norms were set for CNG and LPG vehicles. It stipulates that emission of sulphur be controlled at ____ ppm in Diesel and ____ ppm in Petrol.

(A) 350,150

(B) 150, 50

(C) 100, 250

(D) 25, 50

200. Which of the following is NOT an example of particulate pollutant?

(A) Smog

(B) Pesticides

(C) Radioactive elements

(D) Carbon dioxide

- End of Question Paper -