

04/04/2025



Aakash

Medical | IIT-JEE | Foundations

Corporate Office: AESL, 3rd Floor, Incuspace Campus-2, Plot-13,
Sector-18, Udyog Vihar, Gurugram, Haryana-122015

CODE-A



AIM - 720

SIVE Mastery for 720)

MM : 720

PST-5

Time : 180 Mins.

Physics: Thermal Properties of Matter, Thermodynamics, Kinetic Theory, Oscillations, Waves

Chemistry: Some Basic Concepts of Chemistry, Structure of Atom, Classification of Elements and Periodicity in Properties, Redox Reactions

Botany: The living world, Morphology of flowering plants, Anatomy of flowering plants

Zoology: Locomotion and Movement, Neural Control and Coordination, Chemical Coordination and Integration

Instructions:

- (i) Duration of Test is 3 hrs.
- (ii) The Test consists of 180 questions. The maximum marks are 720.
- (iii) There are four parts in the question paper consisting of Physics, Chemistry, Botany and Zoology having 45 questions in each part of equal weightage.
- (iv) Each question carries +4 marks. For every wrong response, -1 mark shall be deducted from the total score. Unanswered/unattempted questions will be given no marks.
- (v) Use blue/black ballpoint pen only to darken the appropriate circle.
- (vi) Mark should be dark and completely fill the circle.
- (vii) Dark only one circle for each entry.
- (viii) Dark the circle in the space provided only.
- (ix) Rough work must not be done on the Answer sheet and do not use white fluid or any other rubbing material on the Answer sheet.

6 Aakashians scored a perfect 720/720 from Classroom Programs



720 | 720 | Mridul M Anand
3 Year Classroom



720 | 720 | Ayush Naugraiya
4 Year Classroom



720 | 720 | Arghyadeep Dutta
2 Year Classroom



720 | 720 | Aryan Yadav
1 Year Classroom



720 | 720 | Palansha Agarwal
2 Year Classroom



720 | 720 | Iram Quazi
1 Year Classroom

PHYSICS

1. In a calorimeter, 250 g of ice at 0 °C is mixed with 600 g of water at 18 °C. The final amount of ice in the system at equilibrium, will be

(1) 135 g
 (2) 175 g
 (3) Zero
 (4) 115 g

2. Body A is a black body and body B is a real body, both have same dimensions and are kept in same surroundings. Both the bodies are in thermal equilibrium with the surrounding, then

(1) Rate of emission will be more for body B
 (2) Rate of absorption will be more for body B
 (3) Rate of emission will be more for body A
 (4) Rate of emission for both bodies will be same

3. A glass container having linear coefficient of expansion equal to α is completely filled with a liquid of volume expansion coefficient as γ . On heating, liquid does not overflow then

(1) $\gamma \geq 3\alpha$
 (2) $\gamma \leq 2\alpha$
 (3) $\gamma \leq 3\alpha$
 (4) $\gamma \geq 2\alpha$

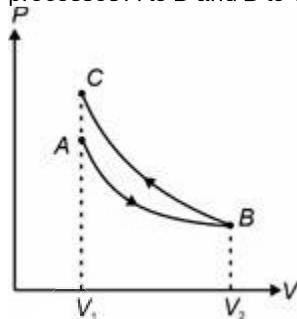
4. In a reversible isochoric change for an ideal gas, (symbols have their usual meaning)

(1) $Q = 0$
 (2) $\Delta T = 0$
 (3) $\Delta U = 0$
 (4) $W = 0$

5. A Carnot heat engine absorbs Q amount of heat from a reservoir at temperature T and rejects heat at temperature $\frac{T}{4}$. The amount of heat rejected is

(1) $\frac{Q}{4}$
 (2) $\frac{Q}{2}$
 (3) $\frac{3Q}{4}$
 (4) $\frac{Q}{5}$

6. An ideal gas is taken from state A to B and then from B to C as shown in pressure-volume diagram. The respective processes A to B and B to C are most likely to be



(1) Adiabatic and adiabatic
 (2) Adiabatic and isothermal
 (3) Isothermal and adiabatic
 (4) Isothermal and isobaric

7. Consider the following statements:

(A) The absolute zero is the temperature at which molecular motion ceases.
 (B) The temperature is never negative on Kelvin scale.
 The correct statement(s) is/are

(1) Only (A)
 (2) Only (B)
 (3) Both (A) and (B)
 (4) Neither (A) nor (B)

8. When a metallic ball is heated, the largest percentage increase will occur in its

(1) Mass
 (2) Volume
 (3) Radius
 (4) Area

9. Two liquids A and B are at 30° C and 40° C respectively. When mixed in equal masses the temperature of the mixture is found to be 38° C. Their specific heats ($S_A : S_B$) are in the ratio of

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

10. A cylindrical rod has temperature T_1 and T_2 at its ends. The rate of flow of heat is 80 cal/s. If its radius and length are doubled keeping temperature at the ends same, then rate of flow of heat will be

- (1) 80 cal/s
- (2) 40 cal/s
- (3) 120 cal/s
- (4) 160 cal/s

11. Consider the following statements about kinetic theory of gases:

- (A) The total kinetic energy of a gas is independent of its temperature.
- (B) The rms speed of gas molecules increases with increase in temperature.
- (C) All molecules of a gas move with the same velocity at a given temperature

Which of the above statements are correct?

- (1) Both (A) and (B)
- (2) Only (B)
- (3) Only (C)
- (4) Both (B) and (C)

12. **Assertion A:** In a transverse progressive sinusoidal wave, all particles of the medium execute simple harmonic motion.

Reason R: In a transverse progressive sinusoidal wave, all particles of the medium vibrate with the same phase.

- (1) Both (A) and (R) are true but (R) is not correct explanation of (A)
- (2) Both (A) and (R) are true and (R) is correct explanation of (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

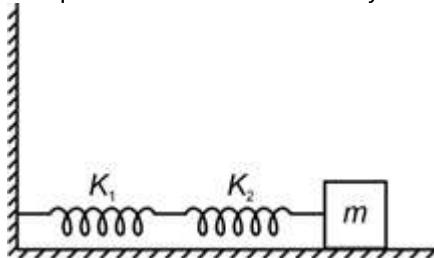
13. If displacement of a particle in SHM is given by x , then the total energy (E) of the particle is related as

- (1) $E \propto x$
- (2) $E \propto x^{1/2}$
- (3) $E \propto x^2$
- (4) $E \propto x^\circ$

14. The length of the second pendulum on the surface of earth is 1 m. To maintain the same time period, its length on the surface of the moon would be

- (1) 6 m
- (2) $\frac{1}{6}$ m
- (3) 1 m
- (4) $\frac{1}{4}$ m

15. Two springs of spring constants K_1 and K_2 are joined in series and a mass m is attached to them as shown. The time period of oscillations of the system is



- (1) $2\pi\sqrt{\frac{(K_1+K_2)m}{K_1K_2}}$
- (2) $2\pi\sqrt{\frac{m}{K_1+K_2}}$
- (3) $2\pi\sqrt{\frac{2(K_1+K_2)m}{K_1K_2}}$
- (4) $2\pi\sqrt{\frac{m}{K_1K_2}}$

16. An ideal gas is compressed at a constant pressure of 50 N/m² from a volume of 8 m³ to 4 m³ and 120 J heat is added to the gas. The change in internal energy of the gas is

- (1) 320 J
- (2) -80 J
- (3) 80 J
- (4) -200 J

17. When an ideal gas is compressed isothermally, the result will be

- (1) Absorption of heat
- (2) Release of heat
- (3) Increase in internal energy
- (4) Decrease in internal energy

18. A body is executing simple harmonic motion starting from mean position with an angular frequency 5 rad/s. If the amplitude of motion is 8 cm, then the velocity of the body at 2 cm displacement is

- (1) $3\sqrt{60}$ cm/s
- (2) $5\sqrt{60}$ cm/s
- (3) $2\sqrt{60}$ cm/s
- (4) $7\sqrt{60}$ cm/s

19. The potential energy of a particle of mass m executing SHM along x -axis is given by $U = -U_0 \cos(\alpha x)$. If $\alpha \rightarrow 0$, then the period of small oscillations of the particle is

(1) $\frac{2\pi}{\alpha^2} \sqrt{\frac{m}{U_0}}$

(2) $2\pi \sqrt{\frac{m}{\alpha U_0}}$

(3) $\frac{2\pi}{\alpha} \sqrt{\frac{m}{U_0}}$

(4) $2\pi \sqrt{\frac{\alpha m}{U_0}}$

20. One mole of an ideal monoatomic gas is mixed with one mole of ideal diatomic gas. The specific heat capacity of the mixture at constant volume will be (R is universal gas constant)

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

(2) $2R$

(3) R

(4) $\frac{5}{3}R$

21. A particle is executing simple harmonic motion according to equation $y = A \sin \omega t + B$. The amplitude of the SHM is

(1) A

(2) $A + B$

(3) B

(4) $A - B$

22. The average speed of a certain gas is V at 300 K. The temperature at which the average speed becomes two times, will be

(1) 1200 K

(2) 600 K

(3) 900 K

(4) 1500 K

23. Two moles of an ideal diatomic gas is made to undergo a process in which its molar heat capacity C depends on its absolute temperature T as $C = \alpha T$. Heat absorbed by the gas when it is heated from temperature T_0 to $2T_0$, will be

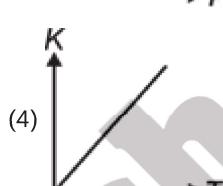
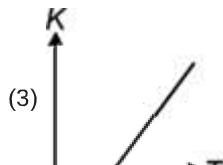
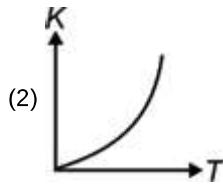
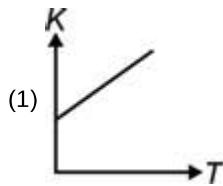
(1) $3\alpha T_0^2$

(2) $6\alpha T_0^2$

(3) $\frac{3\alpha T_0^2}{2}$

(4) $\frac{7\alpha T_0^2}{2}$

24. The graph which represents the variation of total kinetic energy (K) of an ideal gas with absolute temperature (T), is



25. A ball is moving in a room with a speed of 5 m/s perpendicular to the two walls separated by 10 m. The floor of the room is frictionless and the collisions are elastic. The motion of the ball is

(1) Non periodic

(2) Periodic but not simple harmonic

(3) Periodic as well as simple harmonic

(4) None of the above

26. A body of mass 2 kg is executing simple harmonic motion according to the equation $x = (0.03 \text{ m}) \sin(50t + \frac{\pi}{3})$, where t is in second. Its maximum kinetic energy is

(1) $\frac{3}{4} \text{ J}$

(2) $\frac{3}{2} \text{ J}$

(3) $\frac{9}{4} \text{ J}$

(4) $\frac{7}{4} \text{ J}$

27. The displacement of travelling wave is given as $y = A \sin \frac{2\pi}{\lambda} (bt - x)$ where t is time, x is distance and λ is the wavelength, all in SI units. The linear frequency of the wave is

(1) $\frac{Ab}{\lambda}$

(2) $\frac{2A\lambda}{b}$

(3) $\frac{\lambda}{b}$

(4) $\frac{b}{\lambda}$

28. Which of the following statements about kinetic theory of gases is wrong?

(1) The molecules do not interact with each other except during collisions.

(2) The molecules of a gas are in continuous random motion.

(3) The collisions amongst the molecules are considered to be inelastic in nature.

(4) The total kinetic energy of gas at given temperature remains conserved.

29. For one mole of an ideal gas, the value of $\frac{PV}{T}$ is nearly equal to (symbols have their usual meanings)

(1) $2 \text{ J mol}^{-1}\text{K}^{-1}$

(2) $8.31 \text{ J mol}^{-1}\text{K}^{-1}$

(3) $4.2 \text{ J mol}^{-1}\text{K}^{-1}$

(4) $5.6 \text{ J mol}^{-1}\text{K}^{-1}$

30. If the molar masses of two gases are M_1 and M_2 respectively, then the ratio of root mean square velocities ($v_1 : v_2$) at the same temperature will be

(1) $\frac{M_2}{M_1}$

(2) $\sqrt{\frac{M_2}{M_1}}$

(3) $\sqrt{\frac{M_1}{M_2}}$

(4) $\frac{M_1^2}{M_2^2}$

31. Total degrees of freedom of a rigid diatomic molecule is

(1) 3

(2) 4

(3) 5

(4) 6

32. Two tuning forks have frequencies 230 Hz and 234 Hz respectively. On sounding these forks together, the time interval between successive minimum intensities will be

(1) 0.5 s

(2) 0.125 s

(3) 0.25 s

(4) 4 s

33. A stationary wave is given by $y = 0.2 \sin(5x) \cos(300t)$, all parameters are in SI units. The distance between two successive nodes is

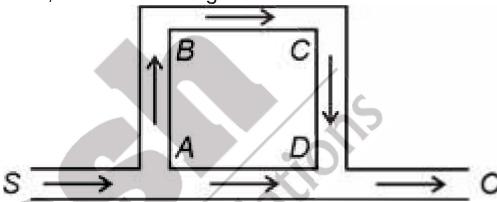
(1) $\frac{\pi}{5} \text{ m}$

(2) $\frac{2\pi}{5} \text{ m}$

(3) $\frac{\pi}{10} \text{ m}$

(4) $\frac{2\pi}{7} \text{ m}$

34. A sound wave starting from source S , follows two paths as shown, $AB = BC = CD = AD = \lambda$. If maximum sound is heard at O , then wavelength of sound cannot exceed the value



(1) λ

(2) 2λ

(3) 3λ

(4) $\frac{1}{2}\lambda$

35. Velocity of sound in air

(1) Increases with increase in pressure keeping temperature constant

(2) Decreases with increase in pressure keeping temperature constant

(3) Increases with increase in temperature

(4) Decreases with increase in temperature

- 36.** Match the columns and choose the correct option.
(Symbols have their usual meanings)

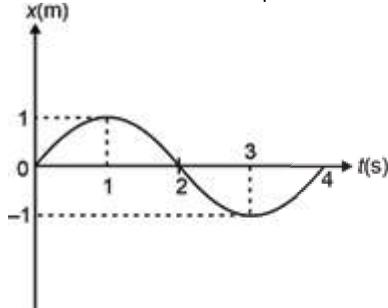
	Column I		Column II
(A)	Work done in isothermal process	(P)	$nC_p\Delta T$
(B)	Work done in adiabatic process	(Q)	$nC_v\Delta T$
(C)	Change in internal energy	(R)	$\frac{P_iV_i - P_fV_f}{\gamma-1}$
(D)	Heat exchange in isobaric process	(S)	$nRT \ln \frac{V_f}{V_i}$

- (1) (A)-(S); (B)-(R); (C)-(P); (D)-(Q)
- (2) (A)-(S); (B)-(R); (C)-(Q); (D)-(P)
- (3) (A)-(P); (B)-(R); (C)-(Q); (D)-(S)
- (4) (A)-(P); (B)-(Q); (C)-(S); (D)-(R)

- 37.** A cup of tea cools from 90° C to 80° C in 5 minutes. The time taken by it to cool from 80° C to 70° C will be nearly (consider surrounding temperature to be 20° C)

- (1) 6 minutes
- (2) 8 minutes
- (3) 10 minutes
- (4) 9.5 minutes

- 38.** The displacement(x) vs time (t) graph of a particle performing simple harmonic motion is shown in the figure. The acceleration of the particle at $t = 4 \text{ s}$ is



- (1) $\frac{\pi^2}{8} \text{ m/s}^2$
- (2) $-\frac{\pi^2}{2} \text{ m/s}^2$
- (3) $\frac{\pi^2}{16} \text{ m/s}^2$
- (4) Zero

- 39.** The 2nd overtone of a closed organ pipe is same as that of 3rd overtone of an organ pipe open at both the ends. The ratio of the length of the closed pipe to the length of the open pipe is

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

- 40.** If the tension on a stretched string is quadrupled, then the ratio of the initial and final speed of a transverse wave along the string is

- (1) 1 : 2
- (2) 2 : 1
- (3) 1 : $\sqrt{2}$
- (4) $\sqrt{2} : 1$

- 41.** A wave travelling in positive x -direction with amplitude $A = 0.4 \text{ m}$, velocity of wave = 180 m s^{-1} and wavelength $\lambda = 60 \text{ m}$, then the correct expression for the wave is (ϕ_0 is initial phase at $t = 0$)

- (1) $y = 0.4 \sin \left(6\pi t + \frac{\pi x}{30} + \phi_0 \right)$
- (2) $y = 0.4 \sin \left(3\pi t + \frac{\pi x}{30} + \phi_0 \right)$
- (3) $y = 0.4 \sin \left(6\pi t - \frac{\pi x}{30} + \phi_0 \right)$
- (4) $y = 0.4 \sin \left(3\pi t - \frac{\pi x}{30} + \phi_0 \right)$

- 42.** If wavelengths of maximum intensity of radiation emitted by two stars are 10^{-6} m and $2 \times 10^{-6} \text{ m}$ respectively, the ratio of their respective temperatures is

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

- 43.** An ideal gas contained in a cylinder suddenly bursts, then the temperature of the gas

- (1) Remains constant
- (2) Increases
- (3) Decreases
- (4) Increases for monoatomic gas and decreases for diatomic gas

44. An ideal gas is expanding isothermally. If P represents pressure and V represents volume of the gas, then $\frac{\Delta P}{P}$ is equal to

(1) $\frac{3\Delta V}{V}$

(2) $\frac{2\Delta V}{V}$

(3) $\frac{-2\Delta V}{V}$

(4) $\frac{-\Delta V}{V}$

45. A monoatomic gas is contained in a container at pressure P . If it is compressed to $\frac{1}{8}$ of its original volume adiabatically, then the pressure of the gas will be

(1) $8P$

(2) $32P$

(3) $16P$

(4) $64P$

CHEMISTRY

46. The correct order of ionic radii of the given species is

(1) $\text{Ca}^{2+} < \text{K}^+ < \text{Al}^{3+}$

(2) $\text{Al}^{3+} < \text{K}^+ < \text{Ca}^{2+}$

(3) $\text{Ca}^{2+} < \text{Al}^{3+} < \text{K}^+$

(4) $\text{Al}^{3+} < \text{Ca}^{2+} < \text{K}^+$

47. Consider the following statements:

Statement I: If ℓ represents the azimuthal quantum number then the maximum number of electrons in a subshell is equal to $(2\ell + 2)$.

Statement II: Maximum number of electrons in a shell is equal to $2n^2$ where n is principal quantum number.

In the light of above statements, choose the correct option.

(1) Both statement I and statement II are correct

(2) Both statement I and statement II are incorrect

(3) Statement I is correct but statement II is incorrect

(4) Statement I is incorrect but statement II is correct

48. An organic compound contains 38.71% carbon, 9.67% hydrogen and remaining oxygen. The empirical formula of the compound would be

(1) $\text{C}_2\text{H}_4\text{O}$

(2) CH_3O

(3) CHO

(4) CH_2O

49. The volume of chlorine gas evolved at STP when an aqueous solution containing 1.17 g of sodium chloride is electrolysed completely is

(1) 2.24 L

(2) 4.48 L

(3) 0.224 L

(4) 0.448 L

50. Which of the following has the highest number of oxygen atoms at STP?

(1) 4.48 L carbon dioxide gas

(2) 5.4 g of water vapour

(3) 5.6 g of carbon monoxide gas

(4) 0.1 mol of sulphur dioxide gas

51. Consider the following statements:

(a) Mole fraction of solute in 1 molal aqueous solution is $\frac{1}{55.5}$

(b) Mole fraction does not change with changing temperature while molality does

(c) On dilution molarity of the solution increases
The incorrect statement(s) is/are

(1) (b) only

(2) (a) & (b) only

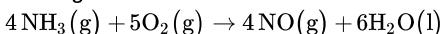
(3) (b) & (c) only

(4) (a), (b) and (c)

52. Two compounds AB_3 and A_2B are formed by the combination of two elements A and B. If 0.1 mol AB_3 weighs 11 g while 0.5 mol of A_2B weighs 35 g then the atomic weights of A and B respectively are

- (1) 25u and 30u
- (2) 20u and 30u
- (3) 25u and 40u
- (4) 20u and 40u

53. In the given reaction



If 1 mol of ammonia and 64 g of dioxygen are made to react to completion then

- (1) All the dioxygen will be consumed
- (2) 1.5 mol of NO will be produced
- (3) 2 mol of H_2O will be produced
- (4) Amount of excess reagent left will be 0.75 mol

54. Choose the incorrect statement:

- (1) 0.0082 has two significant figures
- (2) 1.004 has four significant figures
- (3) 1.00×10^2 has one significant figures
- (4) Infinite number of significant figures are present in 2 pens

55. Match the given columns and choose the option containing most appropriate match:

	Column I Quantity	Column II Total number of atoms
a.	2.24 mL of O_2 gas at STP	(i) 4.21×10^{24}
b.	1.4g of N_2 gas	(ii) 3.011×10^{21}
c.	6.022×10^{20} molecules of methane gas	(iii) 6.022×10^{22}
d.	1 mol of H_2SO_4	(iv) 1.204×10^{20}

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

56. Concentrated aqueous sulphuric acid solution is 98% H_2SO_4 by mass and has a density of 1.2 g mL^{-1} . Volume of this acid required to make 1 litre solution of 0.1 M H_2SO_4 is

- (1) 4.99 mL
- (2) 8.33 mL
- (3) 10.45 mL
- (4) 6.22 mL

57. Consider the following statements:

- a. Protons and neutrons are collectively known as nucleons
- b. All the isotopes of an element have same atomic number
- c. The mass of an electron is more than that of proton
- d. Electrons are the constituents of cathode rays.

Choose the option containing correct statements.

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

58. Consider the given sets of quantum numbers

- (a) $n = 4, l = 2, m_l = -2, m_s = +\frac{1}{2}$
- (b) $n = 3, l = 3, m_l = 3, m_s = -\frac{1}{2}$
- (c) $n = 2, l = 1, m_l = +1, m_s = +1$
- (d) $n = 1, l = 0, m_l = 0, m_s = 0$

Choose the option containing the sets which are not possible.

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

59. Match atomic orbitals given in column I with their respective number of radial nodes given in column II.

	Column I	Column II
a.	4s	(i) 0
b.	3p	(ii) 1
c.	$5d_{x^2-y^2}$	(iii) 2
d.	4f	(iv) 3

Choose the correct option.

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

60. From 100 mg of CO_2 when x mol are removed, 6.02×10^{20} molecules of CO_2 are left. The number of molecules removed is

- (1) 7.65×10^{22}
- (2) 7.65×10^{20}
- (3) 2.72×10^{22}
- (4) 2.72×10^{21}

61. Same mass of urea and acetic acid are dissolved in 1 L of water separately to make two solutions A and B respectively. Choose the correct statement.

- (1) Molar concentration of both the solutions is same
- (2) Mole fraction of the solute in solution A is more than that of solution B
- (3) Molarity of solution B is more than that of solution A
- (4) Molar concentration of A does not depend on temperatures

62. In the hydrogen atom, the de Broglie wavelength of an electron in the second Bohr orbit is (Bohr radius $a_0 = 52.9 \text{ pm}$)

- (1) $105.3 \pi \text{ pm}$
- (2) $211.6 \pi^2 \text{ pm}$
- (3) $211.6 \pi \text{ pm}$
- (4) $105.3 \pi^2 \text{ pm}$

63. Choose the correct statement.

- (1) Bohr's theory was able to explain the splitting of spectral lines in the presence of electric and magnetic field
- (2) Splitting of spectral lines in the presence of electric field is called Zeeman effect.
- (3) Splitting of spectral lines in the presence of magnetic field is called Stark effect
- (4) Bohr's theory could not explain the ability of atoms to form molecules by chemical bonds

64. The orbital for which the value of orbital angular momentum is not correctly matched?

- (1) $2s ; 0$
- (2) $3p ; \sqrt{2} \hbar$
- (3) $4d ; \sqrt{5} \hbar$
- (4) $5f ; \sqrt{12} \hbar$

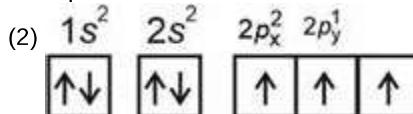
65. The maximum number of electrons that can be associated with the following set of quantum numbers is $n = 4, l = 2$ and $m_l = -1$

- (1) 2
- (2) 4
- (3) 6
- (4) 10

66. The incorrect statement among the following is

- (1) The value of m_l for a p-orbital can be -1

The electronic configuration of nitrogen atom is represented as



- (3) An orbital is designated by three quantum numbers

- (4) d_z^2 orbital has electron density along the z axis

67. Given below are two statements one is labelled as assertion (A) and other is labelled as reason (R).

Assertion (A): HNO_3 cannot disproportionate.

Reason (R): In HNO_3 , nitrogen and hydrogen are in their highest oxidation states while oxygen in its lowest oxidation state.

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

- (1) Both (A) and (R) are true but (R) is NOT the correct explanation of (A)

- (2) (A) is true but (R) is false

- (3) (A) is false but (R) is true

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

68. Consider the given sets of species

- a. Na^+ , Mg^{2+} , Ca^{2+} , K^+
- b. Ca^{2+} , Ar, K^+ , Cl^-
- c. O^{2-} , F^- , Al^{3+} , Si^{4+}
- d. CO , N_2 , O_2^{2+} , CN^-

Choose the option containing set(s) of isoelectronic species

- (1) a, c and d only

- (2) b only

- (3) b, c and d only

- (4) a, b, c and d

69. Consider the following statements:

Statement I: Cl_2O_7 and CO_2 are acidic oxides

Statement II: Al_2O_3 and BaO are amphoteric oxides

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

- (1) Both statement I and statement II are correct

- (2) Both statement I and statement II are incorrect

- (3) Statement I is correct but statement II is incorrect

- (4) Statement I is incorrect but statement II is correct

70. Match the list I with list II

	List I (Element)	List II (Atomic Number)
a.	Lawrencium	(i) 102
b.	Seaborgium	(ii) 105
c.	Dubnium	(iii) 103
d.	Nobelium	(iv) 106

The correct option is

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

71. Choose the incorrect match:

Element Electronic configuration

- (1) Rubidium [Kr]5s¹
- (2) Copper [Ar]3d¹⁰4s¹
- (3) Gallium [Ar]3d¹⁰4s²4p²
- (4) Bromine [Ar]3d¹⁰4s²4p⁵

72. The ratio of radius of 2nd Bohr orbit of Li²⁺ to the radius of first Bohr orbit of He⁺ is

- (1) 4 : 3
- (2) 2 : 4
- (3) 8 : 3
- (4) 8 : 5

73. Consider the following statements:

Statement I: Electron gain enthalpy values for all the noble gases are positive.

Statement II: If the value of electron gain enthalpy of Na⁺ is x eV then the value of first ionisation enthalpy of Na⁺ will be $-x$ eV.

In the light of above statements, choose the correct option.

- (1) Both statement I and statement II are correct
- (2) Both statement I and statement II are incorrect
- (3) Statement I is incorrect but statement II is correct
- (4) Statement I is correct but statement II is incorrect

74. Following are the electronic configurations of 4 elements:

- (A) [Ne]3s²3p²
- (B) [Ne]3s²3p⁴
- (C) [Ne]3s²3p¹
- (D) [Ne]3s²3p³

Which of these may have the highest first ionization enthalpy?

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

75. The correct order of electronegativity is

- (1) Si < C < N < O
- (2) N < Si < O < N
- (3) O < N < Si < C
- (4) C < N < O < Si

76. Which of the following given processes is endothermic?

- (1) Cl → Cl⁻
- (2) Na → Na⁻
- (3) O⁻ → O²⁻
- (4) K → K⁻

77. Choose the pair of elements (atomic numbers given in parenthesis) which do not belong to the same group?

- (1) A(48), B(80)
- (2) A(13), B(31)
- (3) A(19), B(38)
- (4) A(15), B(33)

78. Consider the following statements:

- (a). Chalcogens can be considered as representative elements
 - (b). All the elements of actinoid series are trans uranium elements
 - (c). All the elements of halogen family are gases
 - (d). Caesium is more electropositive as compared to barium
- Choose the option containing all correct statements:

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

79. If uncertainty in position and momentum of an electron are equal then the uncertainty in its velocity is.

(Take the mass of an electron = 9×10^{-31} kg, $\hbar = 6 \times 10^{-34}$)

(1) $\sqrt{1.62 \times 10^{27} \pi}$

(2) $\sqrt{8.1 \times 10^{27} \pi}$

(3) $\sqrt{\frac{1 \times 10^{28}}{54\pi}}$

(4) $\sqrt{\frac{1 \times 10^{28}}{81\pi}}$

80. Consider the following statements

- i. Paschen, Bracket and Pfund series of lines appear in the infrared region of the electromagnetic spectrum.
- ii. The value of wave function depends upon the coordinates of the electron in the atom
- iii. The probability of finding an electron at a point within an atom depends on Y
- iv. Two electrons in an orbital cannot have same set of first, three quantum numbers (i.e. n, l and m_l)

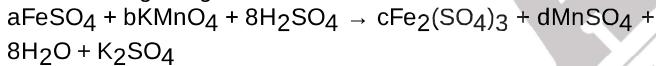
Choose the set containing all incorrect statements:

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

81. Oxidation number of Cr atom in CrO_5 and $\text{K}_2\text{Cr}_2\text{O}_7$ respectively are

- (1) +5 and +6
- (2) +6 and +6
- (3) +6 and +5
- (4) +5 and +5

82. On balancing the given redox reaction



The coefficients a, b, c and d respectively are

- (1) 10, 2, 5, 2
- (2) 10, 14, 5, 6
- (3) 2, 4, 8, 5
- (4) 2, 10, 5, 8

83. The number of moles of $\text{K}_2\text{Cr}_2\text{O}_7$ needed to oxidise three moles of sulphite ions into sulphate ions in acidic solution is

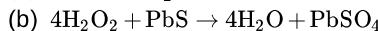
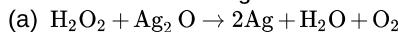
(1) $\frac{2}{5}$

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

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

(4) 1

84. Consider the following chemical reactions.



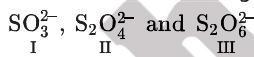
Role of hydrogen peroxide in the above reactions is respectively

- (1) Oxidising agent in (a) and reducing agent in (b)
- (2) Reducing agent in (a) and oxidising agent in (b)
- (3) Reducing agent in both (a) and (b)
- (4) Oxidizing agent in both (a) and (b)

85. Standard reduction potentials at 25°C of Li^+/Li , Ba^{2+}/Ba , Na^+/Na and Mg^{2+}/Mg are -3.05 , -2.90 , -2.71 and -2.37 V respectively. Which of the following is the strongest oxidising agent?

- (1) Na^+
- (2) Li^+
- (3) Mg^{2+}
- (4) Ba^{2+}

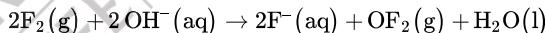
86. Consider the following anions



The correct order of oxidation number of sulphur is

- (1) II < I < III
- (2) I < II < III
- (3) II < III < I
- (4) III < II < I

87. Consider the given equation



The oxidation state of fluorine changes from

- (1) 0 to -1
- (2) 0 to $+1$
- (3) -1 to 0
- (4) $+1$ to 0

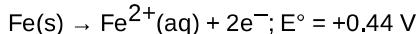
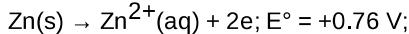
88. Match the list I with list II

	List I (Reaction)		List II Types of redox reaction
a.	$P_4 + 3 OH^- + 3H_2O \rightarrow PH_3 + 3H_2PO_4^-$	(i)	Combination reaction
b.	$Cd + 2HCl \rightarrow CdCl_2 + H_2$	(ii)	Decomposition reaction
c.	$2KClO_3 \xrightarrow{\Delta} 2KCl + 3O_2$	(iii)	Displacement reaction
d.	$Fe + S \rightarrow FeS$	(iv)	Disproportionation reaction

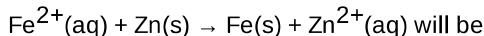
Select the correct match from the options given below.

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

89. Electrode potential for the following half-cell reaction are



The EMF for the cell reaction



- (1) -0.32 V
- (2) +1.20 V
- (3) -1.20 V
- (4) +0.32 V

90. Given below are two statements.

Statement I: When copper rod is dipped in silver nitrate solution, colour of solution becomes blue due to formation of Cu^{+} ions

Statement II: Six moles of electrons are lost by one mole of ferric oxalate when treated with $KMnO_4$ in acidic medium.

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

- (1) Both statement I and statement II are correct
- (2) Both Statement I and statement II are incorrect
- (3) Statement I is correct but statement II is incorrect
- (4) Statement I is incorrect but statement II is correct

91. Which of the following statements is **incorrect**?

- (1) Potato, brinjal and makoi belongs to genus *Solanum*.
- (2) Families Convolvulaceae and Solanaceae are included in the order Poales.
- (3) Term phylum is used for animals, while division is commonly used for plants.
- (4) Species is a group of organisms capable of interbreeding and producing fertile offsprings.

92. The flowers are actinomorphic in

- (a) Gulmohur
- (b) Bean
- (c) Cassia
- (d) Mustard
- (e) *Datura*

The **correct** ones are

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

BOTANY

93. The floral formula of a plant is

$$\% \text{♀}^\alpha K(5) C_{1+2+(2)} A_{(9)+1} G_1$$

. This floral formula does **not** show that

- (1) Calyx is gamosepalous
- (2) Gynoecium is monocarpellary
- (3) Inflorescence is racemose
- (4) Corolla is polypetalous

94. Match **Column-I** with **Column-II** and select the **correct** option.

	Column-I		Column-II
(a)	Superior ovary	(i)	Australian acacia
(b)	Half-inferior ovary	(ii)	Guava
(c)	Inferior ovary	(iii)	Plum
(d)	Phyllodes	(iv)	China rose

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

95. Select the **odd** one out w.r.t. alternate phyllotaxy.

- (1) China rose
- (2) Mustard
- (3) Sunflower
- (4) Guava

96. Read the following statements and select the **correct** option.

Statement A: In lily, the calyx and corolla are not distinct and are termed as perianth.

Statement B: There may be a variation in the length of filaments within a flower, as in *Salvia* and mustard.

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

97. In which of the following plants the axillary buds modify to form tendrils?

- (1) Watermelon
- (2) *Citrus*
- (3) *Bougainvillea*
- (4) Cactus

98. In maize seed, the plumule is enclosed by a sheath, called as

- (1) Coleorhiza
- (2) Coleoptile
- (3) Testa
- (4) Scutellum

99. In which of the following plants mature seeds are endospermic?

- (1) Castor
- (2) Pea
- (3) Bean
- (4) Gram

100. Match **column-I** with **column-II** w.r.t. aestivation in corolla and select the **correct** option.

	Column-I		Column-II
(a)	Valvate	(i)	<i>Cassia</i>
(b)	Twisted	(ii)	Pea
(c)	Imbricate	(iii)	Cotton
(d)	Vexillary	(iv)	<i>Calotropis</i>

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

101. Identify the **incorrect** statement w.r.t. regions of the root.

(1) The apex of the root is covered by a thimble-like structure and is made up of parenchymatous cells

(2) The cells of the layer, which is few millimetre above the root cap divide repeatedly to produce new cells

The cells proximal to the meristematic region undergo
(3) longitudinal division resulting in increase in the girth of root

Some epidermal cells from the region of maturation form
(4) very fine and delicate thread-like structures called root hairs

102. Match the placentation given in **Column-I** with the plants given in **Column-II** and select the **correct** option.

	Column-I		Column-II
(a)	Marginal	(i)	<i>Dianthus</i>
(b)	Axile	(ii)	Lemon
(c)	Parietal	(iii)	<i>Argemone</i>
(d)	Free central	(iv)	Pea

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

103. Read the following assertion (A) and reason (R) statements and choose the **correct** option.

Assertion (A): When ovary grows into fruit without fertilization, such fruits are called parthenocarpic fruits.

Reason (R): Parthenocarpic fruits are seedless.

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

(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(3) (A) is true but (R) is false

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

104. When stamens are united in a single bundle then it is called

- (1) Monoadelphous
- (2) Monothealous
- (3) Monoecious
- (4) Conjoint

105. Syncarpous condition is seen in

- (1) Tomato and mustard
- (2) Lotus and rose
- (3) Mustard and lotus
- (4) Rose and tomato

106. The floral formula

$$\oplus \textcircled{♀} K_{2+2} C_{x4} A_{2+4} G_{(2)}$$

is exhibited by

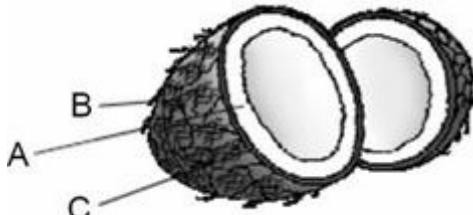
- (1) Mustard
- (2) Groundnut
- (3) Aloe
- (4) *Colchicum*

107. The below given floral diagram represents which one of the following families?



- (1) Solanaceae
- (2) Cruciferae
- (3) Liliaceae
- (4) Brassicaceae

108. On the basis of given labelled diagram, select the **correct** statements and choose the option accordingly.



[Here, A is seed, B is mesocarp and C is endocarp]

- (i) (A) is the structure that develops from ovule after fertilisation.
- (ii) (B) is fleshy, juicy and edible.
- (iii) (C) is hard and stony
- (iv) This drupe fruit develops from monocarpellary superior ovary.

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

109. Select the **mismatched** pair w.r.t. taxonomic categories of organisms.

- (1) *Solanum* — Dicotyledonae
- (2) *Mangifera* — Anacardiaceae
- (3) *Triticum* — Poales
- (4) *Sesbania* — Convolvulaceae

110. All of the following are **correct** regarding rules of binomial nomenclature, **except**

- (1) Biological names are generally taken from Latin language irrespective of their origin
- (2) The first word denoting genus starts with a small letter, while specific epithet starts with capital letter
- (3) The name of author or discoverer is written after specific epithet in abbreviated form
- (4) All the three words genus, species epithet and author citation collectively form binomial epithet

111. All are defining properties of living beings, **except**

- (1) Metabolism
- (2) Consciousness
- (3) Reproduction
- (4) Cellular organisation

112. Read the following assertion (A) and reason (R) statements and select the **correct** option.

Assertion (A): Both sieve tube and companion cells are ontogenetically related.

Reason (R): The companion cells help in maintaining the pressure gradient in the sieve tubes.

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

(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(3) (A) is true but (R) is false

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

113. In grasses, some cells in the adaxial epidermal cells along the veins modify themselves into large empty, colourless cells that are called

(1) Bulliform cells

(2) Subsidiary cells

(3) Companion cells

(4) Bundle sheath cells

114. Standardisation of scientific name for animal, is done by

(1) ICNB

(2) ICNCP

(3) ICZN

(4) ICBN

115. The type of tissue/cells commonly found in the pulp of guava , pear and also responsible for gritty texture of these fruits is/are

(1) Parenchyma

(2) Collenchyma

(3) Sclereids

(4) Sclerenchyma fibres

116. Identify the **wrong** statement w.r.t. collenchyma.

(1) It is an elastic, living, mechanical tissue

(2) At the corners of these cells, thickening of cellulose, hemicellulose and pectin are developed

(3) It is present in majority of monocotyledonous plants

(4) It resists bending of young stems and pulling out and tearing of young leaves due to wind action.

117. Isobilateral leaf differ from dorsiventral leaf as in the former

(1) Stomata is usually more in number on lower epidermis

(2) Mesophyll is not differentiated into palisade and spongy parenchyma

(3) Vascular bundles differ in size due to reticulate venation

(4) Bundle sheath is absent

118. The guard cells in the leaves of grasses are

(1) Bean shaped

(2) Kidney shaped

(3) Dumb-bell shaped

(4) Barrel shaped

119. Select the meristem which is **odd** one out w.r.t. its origin.

(1) Interfascicular cambium

(2) Apical meristem

(3) Intercalary meristem

(4) Intrafascicular cambium

120. Dicotyledonous stem differ from monocotyledonous stem as in the former

(1) Hypodermis is constituted by the sclerenchymatous cells

(2) The vascular bundles are conjoint and closed

(3) Ground tissue is not differentiated into cortex and pith

(4) Water containing cavities in vascular bundles are absent

121. Which of the following statements is **not** correct w.r.t. trichomes?

(1) They may be branched or unbranched

(2) They help in preventing the water loss due to transpiration

(3) They are usually unicellular

(4) They may be soft or stiff

122. Read the following statements and select the **correct** option.

Statement A: Intercalary meristems are found in grasses where they help to regenerate the parts removed by the grazing herbivores.

Statement B: The cells of secondary meristems in dicot plants divide in radial directions to increase the girth of the plant.

(1) Both statements A and B are correct

(2) Both statements A and B are incorrect

(3) Only statement A is correct

(4) Only statement B is correct

123. The common feature between a dicot leaf and a monocot stem is presence of

(1) Conjunctive tissue between xylem and phloem

(2) Bundle sheath cells around vascular bundles

(3) Pith and medullary rays

(4) Ring arrangement of vascular bundles

124. Read the following statements and select the **correct** option.

Statement A: In racemose inflorescence, the shoot axis continue to grow indefinitely.

Statement B: In cymose inflorescence, the flowers are borne in an acropetal succession.

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

125. Which of the following is an ornamental plant of fabaceae family?

- (1) Muliathi
- (2) Sweet pea
- (3) Sunhemp
- (4) Gloriosa

126. Which among the following characteristics is **not** found in the plants of family to which *Sesbania* belongs?

- (1) Vexillary aestivation of corolla
- (2) Unilocular ovary with many ovules
- (3) Reticulate venation in leaves
- (4) Actinomorphic flowers with axile placentation

127. Read the following statements (A - D)

- (A) The outer wall of guard cells are thick while the inner walls (towards the stomatal pore) are very thin.
- (B) Stomata regulates the process of transpiration and gaseous exchange.
- (C) All the tissues on the inner side of the hypodermis constitute the stele.
- (D) In Sunflower root, hypodermis is protective in function and pith is well-developed

In the light of above statements, select the option for **incorrect** one(s).

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

128. Caspary strips are found to be present in

- (1) Epidermis of leaves
- (2) Pericycle of roots
- (3) Endodermis of roots
- (4) Epidermis of stem

129. Semi-lunar patches of sclerenchymatous pericycle is a feature of

- (1) Dicot leaf
- (2) Monocot stem
- (3) Dicot stem
- (4) Monocot leaf

130. Select the **odd** one out w.r.t. racemose inflorescence.

- (1) Radish
- (2) Lupin
- (3) *Solanum*
- (4) Mustard

131. Which of the following is **not** the function of root?

- (1) Spreading out branches bearing leaves, flowers and fruits
- (2) Provide anchorage to the plant parts
- (3) Synthesis of plant growth promoters
- (4) Storage of reserve food materials

132. State true (T) or false (F) for the following statements and select the **correct** option.

- (A) Tracheids are found in all categories of vascular plants except pteridophytes.
- (B) Xylem fibres have obliterated central lumen.
- (C) Xylem parenchyma help in the radial conduction of water.

	A	B	C
(1)	T	T	T
(2)	F	F	T
(3)	T	F	F
(4)	F	T	T

- (1) 1
- (2) 2
- (3) 3
- (4) 4

133. Read the following statements and select the option for **correct** one(s).

- (A) Higher the category, greater is the difficulty of determining the relationship to other taxa at same level.
- (B) Photoperiod affects reproduction in seasonal breeders, both plants and animals.
- (C) The fungi, filamentous algae and protonema of mosses, all easily multiply by fragmentation.
- (D) Systematics does not takes into account the evolutionary relationship between organisms.

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

134.Select the **correctly** matched pair.

- (1) Epiblema – Initiation of lateral roots and vascular cambium
- (2) Endodermis – Starch sheath in stem
- (3) Cuticle – Prevents water loss in roots
- (4) Albuminous cells – Absent in gymnosperms

135.In which of the following plants roots originate from base of the stem and constitute fibrous root system?

- (1) Banyan tree
- (2) Wheat
- (3) Rhizophora
- (4) Mustard

ZOOLOGY

136.Complete the analogy w.r.t. the types of neurons found in humans by selecting the correct option.

Embryonic stage : Cell body with one axon only :: Cerebral cortex : _____ .

- (1) Cell body with one axon and two or more dendrites
- (2) Cell body with one axon and one dendrite
- (3) Cell body with no axon
- (4) Cell body with two axons and two or more dendrites

137.In humans, during repolarisation of neurons

- (1) Na^+ voltage-gated channels remain open
- (2) K^+ voltage-gated channels get closed
- (3) Influx of Na^+ occurs in the axoplasm
- (4) Rapid outflow of K^+ occurs in the ECF from axoplasm

138.All of the following are true for the part of human hind brain that contains centre for the regulation of gastric secretions, except

- (1) Can regulate cardiovascular reflexes
- (2) Is not a part of brain stem
- (3) Continues into spinal cord
- (4) Contains respiratory rhythm centre

139.In humans, Nissl's granules are found in

- (a) Axon
- (b) Short branching fibres that project out of the perikaryon
- (c) Cell body

Choose the correct option.

- (1) (a) and (b)
- (2) (b) only
- (3) (b) and (c)
- (4) (c) only

140.If a girl to skip her meal due to heavy workload, then the hunger centre present in the 'X' part of her brain will be activated. Identify 'X' and select the correct option.

- (1) Hypothalamus
- (2) Cerebellum
- (3) Pons
- (4) Mid brain

141. Assertion(A) : In humans, the inner part of the cerebral hemisphere is called the white matter.

Reason(R) : Nerve fibre tracts covered with myelin sheath constitute the inner part of the cerebral hemispheres and give an opaque white appearance.

In the light of above statements, select the correct option.

- (1) Both (A) and (R) are true; (R) explains (A) correctly
- (2) Both (A) and (R) are true; (R) does not explain (A) correctly
- (3) (A) is true; (R) is false
- (4) (A) is false; (R) is true

142.Select the incorrect statement.

Unmyelinated nerve fibres in PNS are enclosed by
 (1) Schwann cells that do not form a myelin sheath around the axon.

(2) Neurons can detect, receive and transmit stimuli.

During depolarization of a neuron, the outer surface of
 (3) neuronal membrane becomes positively charged whereas the inner side becomes negatively charged.

At the resting stage, the axonal membrane is not exactly
 (4) at the equilibrium potential for K^+ .

143.In a chemical synapse, what will happen if the receptors for neurotransmitters are removed from the post-synaptic membrane?

Action potential will still generate a new potential in the
 (1) post-synaptic membrane as it has crossed the threshold potential.

(2) Neurotransmitters will not be released from the pre-synaptic membrane

(3) Ion channels will still open in the post-synaptic membrane.

(4) Synaptic transmission to the post-synaptic membrane will not occur

144.The correct order of cranial meninges from inside to outside w.r.t human brain is

(1) Arachnoid → Dura mater → Pia mater

(2) Pia mater → Arachnoid → Dura mater

(3) Dura mater → Pia mater → Arachnoid

(4) Pia mater → Dura mater → Arachnoid

145.If we observe the neural organisation of *Hydra* under the microscope, we can see

(1) A prominent brain

(2) A number of ganglia along with brain

(3) A network of neurons

(4) A brain but without ganglia

146.Read the statements given below w.r.t. humans and select the correct option.

Statement A: Transmission of nerve impulse takes place towards the synaptic knob in a neuron which participates in a chemical synapse.

Statement B: Transmission of an impulse across electrical synapses is very similar to impulse conduction along a single axon.

(1) Both statements A and B are correct

(2) Both statements A and B are incorrect

(3) Only statement A is correct

(4) Only statement B is correct

147.How many of the functions mentioned in the box below are regulated by the limbic system of human brain along with the hypothalamus?

Autonomic response, Olfaction, Motivation, Emotional reactions, Sexual behaviour

Select the correct option.

(1) Four

(2) Three

(3) Two

(4) Five

148.Choose the option representing only the correct features w.r.t. nodes of Ranvier.

- (a) Possess myelin sheath
- (b) Absent in unmyelinated nerve fibres
- (c) Possess axolemma
- (d) Possess axoplasm

(1) (a), (b) and (c)

(2) (b), (c) and (d)

(3) (a), (c) and (d)

(4) (a), (b) and (d)

149.In humans, _____ present in the forebrain secretes a peptide hormone to induce vigorous uterine contractions during parturition.

Fill in the blank by selecting the correct option.

(1) Thalamus

(2) Posterior pituitary

(3) Hypothalamus

(4) Association area

150.Hormones are produced in trace amounts as very few molecules of any hormone are required to produce changes in the target cells. Which of the following statements is also true for hormones?

All hormones can readily penetrate the cell membrane of the target cell

(2) They are termed as intercellular messengers.

The action mechanism of every water-soluble hormone (3) involves the formation of the hormone-receptor complex with the genome.

They are large nutrient molecules that remain in blood circulation for a long time.

151.Complete the analogy by selecting the correct option.

Testosterone : Steroidal: : PRL: _____

(1) Steroidal

(2) Amino-acid derived

(3) Mineralocorticoid

(4) Proteinaceous

152. In case of emergency, the stress hormones secreted from the adrenal medulla

- (1) Are responsible for stimulating the process of glycogenesis
- (2) Cause pupillary constriction and decrease in the rate of heart beat
- (3) Induce deep breathing and decrease the rate of respiration
- (4) Stimulate lipolysis and proteolysis for gluconeogenesis

153. Read the following statements w.r.t humans:

Statement A: Goitre can be caused by both hyposecretion and hypersecretion of thyroxine hormone.

Statement B: Ovaries secrete only steroid hormones. Choose the correct option.

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

154. Thyroxine is similar to cortisol in

- a. Inhibiting any immune reaction
 - b. Chemical nature
 - c. Stimulating the production of RBCs
 - d. Controlling carbohydrate, fat and protein metabolism
- Choose the correct option.

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

155. Assertion (A): At the effector sites, the response produced by cortisol is faster as compared to the effect shown by steroid LH.

Reason (R): Protein hormones interact with the receptors that are present on the surface of the membrane, whereas the steroid hormones act via receptors that are present within the cell.

In the light of above statements, choose the correct option.

- (1) Both (A) and (R) are true and (R) correctly explains (A)
- (2) Both (A) and (R) are true but (R) does not explain (A) correctly
- (3) Both (A) and (R) are false
- (4) (A) is false but (R) is true

156. All of the following are true w.r.t aldosterone, except

- (1) Regulates the homeostasis of Na^+ and K^+
- (2) Is released by the innermost layer of adrenal cortex called zona glomerulosa
- (3) Can adjust blood pressure and blood volume via acting through the receptors present in the kidneys
- (4) Makes the collecting duct more permeable to water

157. The common feature between progesterone, estrogen and oxytocin is that, all of them

- (1) Do not enter the target cells
- (2) Have the same chemical nature
- (3) Are secreted from the same source gland
- (4) Act on mammary glands

158. If the hypophyseal portal system in a man is surgically removed, then transport of which of the following will not get affected?

- (1) Anti-diuretic hormone
- (2) GnRH
- (3) Somatostatin
- (4) FSH

159. Choose the hormone which acts via second messengers and is released by the glands that are present in the abdomen.

- (1) Catecholamines
- (2) Cortisol
- (3) Thymosin
- (4) Melatonin

160. Choose the incorrect option w.r.t androgens in males.

- (1) Influence the libido
- (2) Play a major stimulatory role in the process of spermatogenesis
- (3) Can influence increase in muscle mass
- (4) Produced by the cells that are present in the intratubular spaces of testes

161. Amongst all of the following, which hormone is not released by an organised endocrine gland present in adult humans?

- (1) MSH
- (2) Thymosin
- (3) Prolactin
- (4) CCK

162. In humans, under normal physiological conditions, all of the following structures are involved in the regulation of body temperature, except

- (1) Thymus
- (2) Pineal gland
- (3) Hypothalamus
- (4) Thyroid gland

163. Choose the proteinaceous hormone that inhibits gastric motility.

- (1) GIP
- (2) Renin
- (3) ANF
- (4) Gastrin

164. Flagellar movement is exhibited by the human sperm as well as

- (1) Pseudopodia formed in *Amoeba*
- (2) Microfilaments present in our body
- (3) Choanocytes in *Euspongia*
- (4) Circulating lymphocytes in our body

165. All of the following are true for the type of muscle fibres that help in changing the diameter of the lumen of the blood vessels, **except**

- (1) Tapering ends
- (2) Branched and multinucleated
- (3) Possess cell junctions
- (4) Do not show striations

166. Choose the correct option w.r.t the maximally contracted skeletal muscle fibres.

- (1) Length of the thick and thin myofilaments decreases
- (2) Length of 'H' zone increases
- (3) Distance between the successive 'Z' lines remains unchanged
- (4) Length of 'A' band remains unchanged

167. In humans, at the point of fusion of ilium, ischium and pubis, there is a cavity to which the thigh bone articulates. This cavity is called

- (1) Glenoid cavity
- (2) Acromion
- (3) Acetabulum
- (4) Pubic symphysis

168. Choose the option that represents the correct sequence of events that occur during skeletal muscle contraction.

- I. Formation of cross-bridges
 - II. Release of acetylcholine at the neuro-muscular junction
 - III. Pumping of Ca^{+2} back into sarcoplasmic reticulum
 - IV. Sliding of actin filaments over myosin
 - V. Release of Ca^{+2} into sarcoplasm
- (1) II, I, V, III, IV
 - (2) I, II, V, III, IV
 - (3) II, V, I, IV, III
 - (4) IV, II, I, III, V

169. Match column I and II w.r.t structure of skeletal muscle fibres and choose the correct option.

	Column I	Column II
a.	'I' band	(i) Has only myosin filaments
b.	'A' band	(ii) Has only actin filaments
c.	'H' zone	(iii) Has both actin and myosin filaments
d.	'Z' line	(iv) A membrane to which actin filaments are attached

(1) a(i), b(ii), c(iii), d(iv)

(2) a(ii), b(iii), c(i), d(iv)

(3) a(iii), b(iv), c(ii), d(i)

(4) a(iv), b(i), c(iii), d(ii)

170. Consider the comparison given below w.r.t red muscle fibres and white muscle fibres

- (A) Latter possess less amount of sarcoplasmic reticulum
 - (B) Former contain large number of mitochondria
 - (C) Latter depend mainly upon aerobic process for energy
 - (D) Former contract for a longer period without fatigue
- Select the option that includes only the incorrect sets of features w.r.t them.

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

171. Select the incorrect match w.r.t joints present in humans.

- (1) Ball and socket joint – Between humerus and pectoral girdle
- (2) Pivot joint – Between atlas and axis
- (3) Gliding joint – Between the carpal
- (4) Hinge joint – Between carpal and metacarpal of thumb

172. Each myofibril contains many serially arranged units called

- (1) Muscle fibre
- (2) Sarcomere
- (3) Myofilament
- (4) Muscle bundle

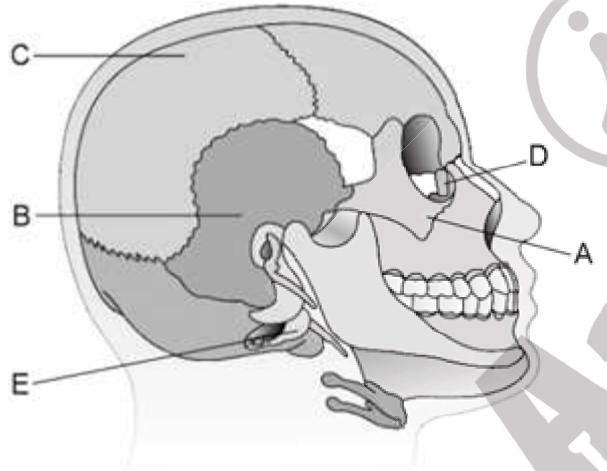
173. Match column I with column II w.r.t diseases and their description.

Column I	Column II
a. Gout	(i) Auto-immune disorder affecting the neuromuscular junction
b. Tetanus	(ii) Lack of relaxation between successive stimuli in sustained muscle contraction
c. Osteoporosis	(iii) Age-related disorder characterised by decreased bone mass
d. Myasthenia gravis	(iv) Inflammation of joints due to accumulation of uric acid crystals

Choose the correct option.

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

174. Observe the following diagram of a human skull and choose the incorrect option w.r.t the given labellings.



- (1) 'A' and 'D' are paired facial bones.
- (2) Like mandible, 'C' is also an unpaired bone.
- (3) 'E' is a bony projection at the base of the skull that articulates with atlas vertebra.
- (4) Like the parietal bone of skull, 'B' is also a paired cranial bone.

175. Which of the following is correct w.r.t the bones and their number in an adult human?

- (1) Thoracic vertebrae – 8
- (2) True ribs – 7
- (3) Ankle bones in both hind limbs – 14
- (4) Pectoral girdle – 6

176. Choose the odd one w.r.t the bones of the appendicular skeleton of humans.

- (1) Ulna
- (2) Ribs
- (3) Tibia
- (4) Metacarpals

177. All of the following statements are true, **except**

- (1) In humans, fibula articulates directly with the femur to form knee joint.
- (2) Almost all mammals have seven cervical vertebrae.
- (3) In humans, clavicle is a long slender bone with two curvatures.
- (4) In humans, sternum is a flat bone on the ventral midline of thorax.

178. The head of meromyosin is an active ATPase enzyme and has binding sites for _____ and active sites for _____.

Select the correct option to fill in the blanks respectively.

- (1) ADP, myosin
- (2) ADP, tropomyosin
- (3) ATP, actin
- (4) ATP, troponin

179. In an accident, a man suffered from a severe fracture in the longest bone of his body. This longest bone is called

- (1) Tibia
- (2) Sternum
- (3) Femur
- (4) Patella

180. Choose the muscular disorder among the following that can be inherited.

- (1) Tetany
- (2) Myasthenia gravis
- (3) Muscular dystrophy
- (4) Arthritis