Sky Tutorials
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IIT-JEE | NEET | Foundation

NEET

Time: 200 Minute **M.M. 720**

ALL INDIA SKY TEST SERIES

Pulse Batch – Neet

Date : 27/11/2023

SYLLABUS

PHYSICS	CHEMISTRY	BOTANY	ZOOLOGY
Heat & Thermodynamics	**Previous + Solution + Electrochemistry**	**Photosynthesis in higher plants**	**Locomtion and movement**

Please read the instructions carefully. You are allotted **5** minutes specifically for this purpose.

INSTRUCTIONS:

1. This Question paper is divided in to four parts physics, chemistry, botany, zoology and each part is further divided into two sections.
   Section –A contains 35 Questions Section B contains 15 questions. Please ensure that the Questions paper you have received contains **ALL THE QUESTIONS** in each Part.
2. **In Section A all the 35 Questions are compulsory and in Section B Contain 15 Question, out of these**
   15 Questions, candidates can choose to attempt any 10 Questions.
   Each Question has four choices (a), (b), (c), (d) out of which **only one is correct & Carry 4 marks each 1 mark** will be deducted for each wrong answer.

GENERAL INSTRUCTION

1. Use only **blue/black pen (avoid gel pen)** for darkening the bubble.
2. Indicate the correct answer for each question by filling appropriate bubble in your **OMR** answer sheet.
3. The answer sheet will be checked through computer hence; the answer of the question must be marked by –shading the circles against the question by dark **blue/black pen**
4. Blank papers, Clipboards, Log tables, Slide Rule, Calculator, Cellular Phones Papers and Electronic Gadgets in any form are **not** allowed to be carried inside the examination hall.

Name of the candidate: _____

Signature of the candidate: _____**Signature of the invigilator:** _____

PHYSICS

SECTION - A

1. Four molecules of a gas are having speeds of 1, 4, 8 and 16 ms^{-1}. The root mean square velocity of the gas molecules is
(a) 7.25 ms^{-1} (b) 52.56 ms^{-1}
(c) 84.25 ms^{-1} (d) 9.2 ms^{-1}

2. If the volume of a gas is doubled at constant pressure, the average translational kinetic energy of its molecules will
(a) be doubled (b) remain the same
(c) increase by a factor (d) become four times

3. If masses of all molecules of a gas are halved and their speed doubled. then the ratio of initial and final pressures is
(a) 2 : 1 (b) 1 : 2 (c) 4 : 1 (d) 1 : 4

4. What is the ratio of the total energy of all the molecules of one mole of O_2 to the total energy of all the molecules of two moles of helium at the same temperature?
(a) 1 : 2 (b) 2 : 1 (c) 2 : 3 (d) 3 : 2

5. The energy density $\frac{u}{V}$ of an ideal gas is related to its pressure P as
(a) $\frac{u}{V}=3P$ (b) $\frac{u}{V}=\frac{3}{2}P$
(c) $\frac{u}{V}=\frac{1}{3}P$ (d) $\frac{u}{V}=\frac{2}{3}P$

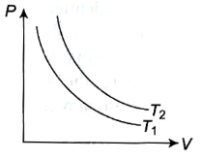
6. A sample of oxygen is compressed to half of its original volume at constant temperature. If the rms velocity of gas molecules was originially C, their new rms velocity is
(a) 4C (b) 2C (c) C (d) C/2

7. The temperature at which the root mean square velocity of the gas molecules would become twice of its value at 0^oC is
(a) 819^oC (b) 1092^oC
(c) 1100^oC (d) 1400^oC

8. The root mean square speed of the molecules of a diatomic gas is v. When the temperature is doubled, the molecules dissociated into two atoms. The new root mean square speed of the atom is
(a) $\sqrt{2}v$ (b) v (c) 2v (d) $4v$

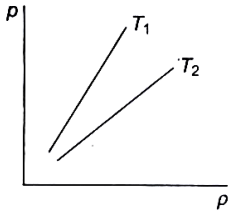
9. Calculate the ratio of the mean free paths of the molecules of two gases having molecular diameters 1 Å and 2 Å. The gases may be considered under identical conditions of temperature, pressure and volume.
(a) 2 : 1 (b) 3 : 1 (c) 4 : 3 (d) 4 : 1

10. Figure shows the pressure P versus volume V graphs volume V graphs for a certain mass of a gas as at two constant temperature T_1 and T_2. Which of the following inference is correct ?



(a) $T_1 = T_2$ (b) $T_1 > T_2$
(c) $T_1 < T_2$
(d) no inference can be drawn due to insufficient information

11. Figure shows graph of pressure vs density for an ideal gas at two temperature T_1 and T_2. Which of the following is correct?



(a) $T_1 > T_2$ (b) $T_1 = T_2$
(c) $T_1 < T_2$
(d) any of the three is possible

12. Suppose ideal gas equation follows VP^3 = constant. Intial temeperature and volume of the gas are T and V respectively. If gas expand to 27V then its temeperature will become
(a) T (b) 9T (c) 27T (d) T/9

13. A system is said to be in thermal equilibrium if
(a) the macroscopic variables do not change in time
(b) the microscopic variables do not change in time
(c) the macroscope variable change in time
(d) the microscopic variables change in time

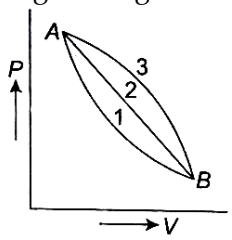
14. Internal energy of an ideal gas depend upon
(a) Temperature only
(b) Volume only
(c) Both volume and temperature
(d) Neither volume nor temperature

15. Helium gas is subjected to a polytropic process in which the heat supplied to the gas is four times the work done by it. The molar heat capacity of the gas for the process is: (R is universal gas constant)
(a) $R/2$ (b) R (c) 2R (d) 3R

16. The ratio of work done by an ideal diatomic gas to the heat supplied by the gas in an isobaric process is

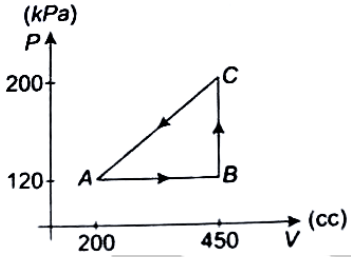
(a) $\frac{5}{7}$ (b) $\frac{3}{5}$ (c) $\frac{2}{7}$ (d) $\frac{5}{3}$

17. A given mass of a gas expands from state A to the state B by three paths 1, 2 and 3 as shown in the figure. If W_1, W_2 and W_3 respectively be the work done by the gas along the three paths then



(a) $W_1 > W_2 > W_3$ (b) $W_1 < W_2 < W_3$
(c) $W_1 = W_2 = W_3$ (d) $W_1 < W_2, W_1 < W_3$

18. Calculate the work done by the gas in the state diagram shown.

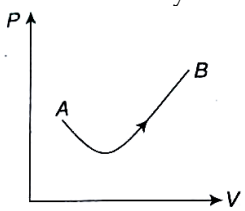


(a) 30 J (b) 20 J (c) -20 J (d) -10 J

19. A monoatomic gas is supplied heat Q very slowly keeping the pressure constant. The work done by the gas is

(a) $\frac{2}{5}Q$ (b) $\frac{3}{5}Q$ (c) $\frac{Q}{5}$ (d) $\frac{2}{3}Q$

20. Consider a process shown in the figure. During this process the work done by the system

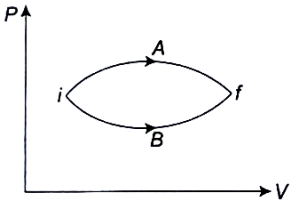


(a) Continuously increase
(b) Continuosuly decreases
(c) First increases, then decreases
(d) First decreases, then increases

21. When heat in given to a gas in an isobaric process, then
(a) The work is done by the gas
(b) Internal energy of the gas increase
(c) Both (a) and (b)
(d) None from (a) and (b)

22. Which of the following is correct in terms of increasing work done for the same initial and final state (Assume expansion of gas)
(a) Adiabatic > Isothermal < Isobaric
(b) Isobaric < Adiabatic < Isothermal
(c) Adiabatic < Isobaric < Isothermal
(d) None of these

23. In the figure given two processes A and B are shown by which a thermodynamic system goes from initial to final state. If ΔQ_A and ΔQ_B are respectively the heats supplied to the systems then



(a) $\Delta Q_A = \Delta Q_B$ (b) $\Delta Q \geq \Delta Q_B$
(c) $\Delta Q_A < \Delta Q_B$ (d) $\Delta Q_A > \Delta Q_B$

24. When 1 mole of a monatomic gas is mixed with 3 moles of a diatomic gas, the value of adiabatic exponent γ for the mixture is :
(a) 5/3 (b) 1.5 (c) 1.4 (d) 13/9

25. An amount Q of heat is added to a monoatomic ideal gas in a process in which the gas perform a work Q/2 on its surrounding. Find the molar heat capacity for the process.
(a) 2R (b) 3R (c) 4R (d) 6R

26. A solid floats submerged in a liquid. When the liquid is heated, which of the following is most likely to happen?
(a) Solid may sink
(b) Solid may float with a part outside the surface
(c) Solid may first sink and then rise upwards
(d) Solid may oscillate vertically

27. A uniform metal rod is used as a bar pendulum. If the room temperature rises by 10^oC, and the coefficient of linear expansion of the metal of the rod is 2×10^{-6} per ^oC, the period of the pendulum will have percentage increase of
(a) 3×10^{-3} (b) 4×10^{-3}
(c) 2×10^{-3} (d) 1×10^{-3}

28. The coefficient of linear expansion of crystal in one direction is α_1 and that in every direction perpendicular to it is α_2. The coefficient of cubical expansion is
(a) $\alpha_1 + \alpha_2$ (b) $2\alpha_1 + \alpha_2$
(c) $\alpha_1 + 2\alpha_2$ (d) None of these

29. On an X temperature scale, water freezes at $-125.0^o X$ and boils at $375.0^o X$. On a Y temperature scale, water freezes at $-70.0^o Y$ and boils at $-30.0^o Y$. The value of temperature on X – scale equal to the temperature of $50.0^o Y$ on Y-scale is
(a) $455.0^o X$ (b) $-125.0^o X$
(c) $1375.0^o X$ (d) $1500.0^o X$

30. Temperature at which Fahrenheit and kelvin pair of scales give the same reading will be.
(a) $\theta = -40$ (b) $\theta = 40$
(c) $\theta = 574.25$ (d) $\theta = 512.45$

31. In figure which strip brass or steel have higher coefficient of linear expansion.

(A) (B)

(a) Brass strip
(b) Steel strip
(c) Both strip has same coefficient of linear expansion
(d) Cannot be decided from given data

32. The length of two metallic rods at temperature θ are L_A and L_B and their linear coefficient of expansion are α_A and α_B respectively. If the difference in their length is to remain constant at any temperature then
(a) $L_A / L_B = \alpha_A / \alpha_B$ (b) $L_A / L_B = \alpha_B / \alpha_A$
(c) $\alpha_A = \alpha_B$ (d) $\alpha_A \alpha_B = 1$

33. A brass rod of length 50 cm and diameter 3.0 cm is joined to a steel rod of the same length and diameter. What is the change in length of the combined rod at $250^o C$, if the original lengths are at $40.0^o C$?
(Coefficient of linear expansion of brass = $2.0 \times 10^{-5} /^o C$, steel = $1.2 \times 10^{-5} /^o C$)
(a) 0.27 cm (b) 0.34 cm (c) 0.21 cm (d) 0.18 cm

34. If two balls of same metal weighing 5 gm and 10 gm strike with a target with the same velocity, the heat energy so developed is used for raising their temperature alone, then the temperature will be higher
(a) For bigger ball
(b) For smaller ball
(c) Equal for both the balls
(d) None is correct from the above three

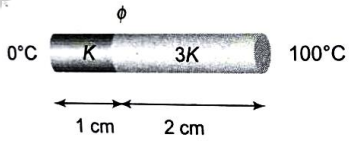
35. 1 g of a steam at $100^o C$ melt how much ice at $0^o C$? (Latent heat of ice = 80 cal/gm and latent heat of steam = 540 cal/gm)
(a) 1 gm (b) 2 gm (c) 4 gm (d) 8 gm

SECTION – B

36. Calculate the amount of heat (in calories) required to convert 5 gm of ice at $0^o C$ to steam at $100^o C$
(a) 3100 (b) 3200 (c) 3600 (d) 4200

37. An ice block at $0^o C$ is dropped from height 'h' above the ground. What should be the value of 'h' so that it melts completely by the time it reaches the bottom assuming the loss of whole gravitational potential energy is used as heat by the ice? [Given: $L_f = 80$ cal/gm]
(a) 33.6 m (b) 33.6 km (c) 8 m (d) 8 km

38. Two bars of thermal conductivities K and 3K and lengths 1 cm and 2 cm respectively have equal cross – sectional area, they are joined length wise as shown in the figure. If the temperature at the ends of this composite bar is $0^o C$ and $100^o C$ respectively (see figure), then the temperature φ of the interface is

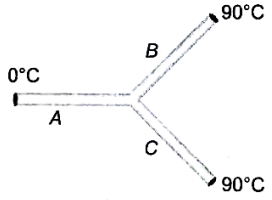


(a) $50^o C$ (b) $\frac{100}{3}{}^o C$ (c) $60^o C$ (d) $\frac{200}{3}{}^o C$

39. Two identical vessels are filled with equal amounts of ice. The vessels are made from different material. If the ice melts in the two vessels in times t_1 and t_2 respectively, then their thermal conductivities are in the ratio
(a) $\frac{t_1}{t_3}$ (b) $\frac{t_2}{t_1}$ (c) $t_2^2 : t_1^2$ (d) $t_1^2 : t_2^2$

40. The temperature gradient in a rod of 0.5 m length is $80^oC/m$. It the temperature of hotter end of the rod is 30^oC, then the temperature of the cooler end is
(a) 40^oC (b) -10^oC (c) 10^oC (d) 0^oC

41. Three rods made of the same material and having the same cross section have been joined as shown in the figure. Each rod is of the same length. The left and right ends are kept at 0^oC and 90^oC respectively. The temperature of the junction of the three rods will be.



(a) 45^oC (b) 60^oC (c) 30^oC (d) 20^oC

42. Two identical long, solid cylinders are used to conduct heat from temp T_1 to temp T_2. Originally the cylinders are connected in series and the rate of heat transfer is H. If the cylinders are connected in parallel then the rate of heat transfer would be.
(a) H/4 (b) 2H (c) 4H (d) 8H

43. A black body at high temperature TK radiates energy at the rate of E W/m^2. When the temperature falls to (T/2) K, the radiated energy will be.
(a) E/4 (b) E/2 (c) 2E (d) E/16

44. A cylindrical rod having temperature T_1 and T_2 at its ends. The rate of flow of heat is Q_1 cal/sec. If all the linear dimensions are doubled keeping temperature constant, then rate of flow of heat Q_2 will be.
(a) $4Q_1$ (b) $2Q_1$ (c) $\frac{Q_1}{4}$ (d) $\frac{Q_1}{2}$

45. A black body radiates 20 W at temperature 227^oC. If temperature of the black body is changed to 727^oC, then its radiating power will be.
(a) 120 W (b) 240 W (c) 320 W (d) 360 W

46. Heat travels through vacuum by
(a) Conduction (b) Convection
(c) Radiation (d) Both (a) and (b)

47. Consider a compound slab consisting of two different materials having equal thickness and thermal conductivities K and 2K respectively. The equivalent thermal conductivity of the slab is
(a) $\sqrt{2}K$ (b) 3K (c) $\frac{4}{3}K$ (d) $\frac{2}{3}K$

48. **Assertion:** A change in the temperature of a body causes change in its dimension.
Reason: The dimension of a body decrease due to the increase in its temperature.
(a) Both (A) and (R) are correct and (R) is not the correct explanation of (A)
(b) (A) is correct but (R) is not correct
(c) (A) is not correct but (R) is correct
(d) Both (A) and (R) are correct and (R) is the correct explanation of (A)

49. **Assertion:** Coefficent of absorption of radiation of an ideal black body is 1
Reason: An ideal black body emits radiation of all wave-length
(a) Both (A) and (R) are correct and (R) is not the correct explanation of (A)
(b) (A) is correct but (R) is not correct
(c) (A) is not correct but (R) is correct
(d) Both (A) and (R) are correct and (R) is the correct explanation of (A)

50. The unit thermal conductivity is
(a) $Wm^{-1}K^{-1}$ (b) JmK^{-1}
(c) $Jm^{-1}K^{-1}$ (d) WmK^{-1}

CHEMISTRY

SECTION - A

51. What will be the molality of a solution of glucose in water which is 10% w/W?
(a) 0.01 m (b) 0.617 m
(c) 0.668 m (d) 1.623 m

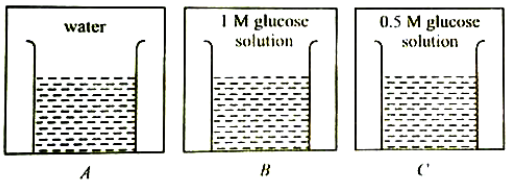
52. What will be the mole fraction of ethanol in a sample of spirit containing 85% ethanol by mass ?
(a) 0.69 (b) 0.82 (c) 0.85 (d) 0.60

53. Solubility of a substance is its maximum amount that can be dissolved in a specified amount of solvent. It depends upon
(i) nature of solute (ii) nature of solvent
(iii) temperature (iv) pressure
(a) (i), (ii) and (iii) (b) (i), (iii) and (iv)
(c) (i) and (iv) (d) (i), (ii), (iii) and (iv)

54. H_2S is a toxic gas used in qualitative analysis. If solubility of H_2S in water at STP in 0.195 m, what is the value of K_H ?
(a) 0.0263 bar (b) 69.16 bar
(c) 192 bar (d) 282 bar

55. How much oxygen is dissolved in 100 mL water at 298 K if partial pressure of oxygen is 0.5 atm and $K_H = 1.4 \times 10^{-3}$ mol/L/atm ?
(a) 22.4 mg (b) 22.4 g
(c) 2.24 g (d) 2.24 g

56. In three beakers labelled as (A), (B) and (C), 100 mL of water, 100 mL of 1 M solution of glucose in water and 100 mL of 0.5 M solution of glucose in water are taken respectively and kept at same temperature.



(a) Vapour pressure in all the three beakers is same.
(b) Vapour pressure of beaker B is highest.
(c) Vapour pressure of beaker C is highest.
(d) Vapour pressure of beaker B is lower than that of C and vapour pressure of beaker C is lower than that of A.

57. Which of the following solutions is an example is negative deviation from Raoult's law ?
(a) Acetone + Ethanol
(b) Carbon tetrachloride + Chloroform
(c) Acetone + Chloroform
(d) Water + Ethanol

58. Which of the following azeotropes is not correctly matched ?
(a) HNO_3 (68%) + H_2O (32%) : Maximum boiling azeotrope, boiling point = 393.5 K
(b) H_2O (43%) + HI (57%) : Minimum boiling azeotrope, boiling point = 290 K
(c) C_2H_5OH (95.5%) + H_2O (4.5%) : Minimum boiling azeotrope, boiling point = 351.15 K
(d) Chloroform (93.2%) + C_2H_5OH (6.8%) : Minimum boiling azeotrope, boiling point = 332.3 K

59. When acetone and chloroform are mixed together, hydrogen bonds are formed between them. Which of the following statements is correct about the solution made by mixing acetone and chloroform ?
(a) On mixing acetone and chloroform will form and ideal solution.
(b) On mixing acetone and chloroform positive deviation is shown since the vapour pressure increases.
(c) On mixing acetone and chloroform negative deviation is shown are since there is decrease in vapour pressure.
(d) At a specific composition acetone and chloroform will form minimum boiling azeotrope.

60. Match the column I with column II and mark the appropriate choice.

	Column I		Column II
(A)	$\Delta H_{mix} = 0, \Delta V_{mix} = 0$	(i)	Non-ideal solution
(B)	$\Delta H_{mix} \neq 0, \Delta V_{mix} \neq 0$	(ii)	Positive deviation
(C)	$\Delta H_{mix} < 0, \Delta V_{mix} < 0$	(iii)	Ideal solution
(D)	$\Delta H_{mix} > 0, \Delta V_{mix} > 0$	(iv)	Negative deviation

(a) (A) $\rightarrow$(i), (B) $\rightarrow$(iii), (C) $\rightarrow$(ii), (D) $\rightarrow$(iv)
(b) (A) $\rightarrow$(iii), (B) $\rightarrow$(i), (C) $\rightarrow$(iv), (D) $\rightarrow$(ii)
(c) (A) $\rightarrow$(ii), (B) $\rightarrow$(iii), (C) $\rightarrow$(iv), (D) $\rightarrow$(i)
(d) (A) $\rightarrow$(iii), (B) $\rightarrow$(ii), (C) $\rightarrow$(i), (D) $\rightarrow$(v)

61. 10% solution of urea is isotonic with 6% solution of a non-volatile solute X. What is the molecular mass of solute X ?
(a) 6 g mol^{-1} (b) 60 g mol^{-1}
(c) 36 g mol^{-1} (d) 32 g mol^{-1}

62. An aqueous solution of 2% non-volatile solute exerts a pressure of 1.004 bar at the normal boiling point of the solvent. What is the molecular mass of the solute?
(a) 23.4 g mol^{-1} (b) 41.35 g mol^{-1}
(c) 10 g mol^{-1} (d) 20.8 g mol^{-1}

63. A solution containing 12.5 g of non-electrolyte substance in 185 g of water shows boiling point elevation of 0.80 K. Calculate the molar mass of the substance. (K_b = 0.52 K kg mol^{-1})
(a) 53.06 g mol^{-1} (b) 25.3 g mol^{-1}
(c) 16.08 g mol^{-1} (d) 43.92 mol

64. Which of the following statement is not correct ?
(a) 5% aqueous solutions of NaCl and KCl are said to be isomolar.
(b) 1 M sucrose solution and 1 M glucose solution are isotonic.
(c) Molecular mass of acetic acid and benzoic acid is higher than normal mass in cryoscopic methods.
(d) For the same solution, $\frac{\Delta T_b}{\Delta T_f} = \frac{K_b}{K_f}$

65. Which of the following statements is correct about diffusion and osmosis ?
(i) In osmosis, a semipermeable membrane is used while diffusion is without membrane.
(ii) In osmosis, movement of molecules occurs in one direction while in diffusion, movement occurs in all direction.
(iii) In osmosis, only the solvent moves while in diffusion both solute and solvent move.
(a) (i) and (ii) (b) (i) only
(c) (ii) and (iii) (d) (i), (ii) and (iii)

66. Osmotic pressure is generally preferred for determining the molecular masses of protein because
(a) it is difficult to find out mole fraction of protein for calculations by other methods
(b) at elevated temperature the proteins are likely to decompose and osmotic pressure is measured around room temperature
(c) the apparatus involved in finding out osmotic pressure is simpler than other methods.
(d) it is easy to boil or freeze a solution containing proteins.

67. Correct order of boiling point is
(i) 10^{-4}M NaCl (ii) 10^{-4} M Urea
(iii) 10^{-3} M $MgCl_2$ (iv) 10^{-2} M NaCl
(a) (i) < (ii) < (iv) < (iii)
(b) (ii) < (i) = (iii) < (iv)
(c) (ii) < (i) < (iii) < (iv)
(d) (iv) < (iii) < (i) = (ii)

68. 0.001 molal solution of $[Pt(NH_3)_4Cl_4]$ in water had at freezing point depression of 0.0054 °C. If K_f for water is 1.80, the correct formula of the compound is
(a) $[Pt(NH_3)_4Cl_3]Cl$ (b) $[Pt(NH_3)_4Cl_4]$
(c) $[Pt(NH_3)_4Cl_2]Cl_2$ (d) $[Pt(NH_3)_4Cl]Cl_3$

69. Why is the molecular mass determined by measuring colligative property in case of some solutes is abnormal ?
(a) Due to association or dissociation of solute molecules
(b) Due to insolubility of solute molecules
(c) Due to decomposition of solute molecules
(d) Due to large size of solute molecules

70. What will be standard cell potential of galvanic cell with the following reaction ?
$2Cr_{(s)} + 3Cd^{2+}{}_{(aq)} \rightarrow 2Cr^{3+}{}_{(aq)} + 3Cd_{(s)}$
[Given: $E^o{}_{Cr^{3+}/Cr} = -0.74$ V and $E^o{}_{Cd^{3+}/Cd} = -0.40$ V]
(a) 0.74 V (b) 1.14 V
(c) 0.34 V (d) -0.34 V

71. In the cell, $Zn|Zn^{2+}\|Cu^{2+}|Cu$, the negative terminal is
(a) Cu (b) Cu^{2+} (c) Zn (d) Zn^{2+}

72. Which of the following reaction is possible at anode ?
(a) $2Cr^{3+} + 7H_2O \rightarrow Cr_2O_7^{2-} + 14H^+$
(b) $F_2 \rightarrow 2F^-$
(c) $(1/2)O_2 + 2H^+ \rightarrow H_2O$
(d) None of these

73. Which of the following is the correct cell representation for the given cell reaction ?
$Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$
(a) $Zn|Zn^{3+}||H^+|H_2$
(b) $Zn|Zn^{2+}||H^+, H_2|Pt$
(c) $Zn|ZnSO_4||H_2SO_4|Zn$
(d) $Zn|H_2SO_4||ZnSO_4|H_2$

74. Mark the correct Nernst equation for the given cell.
$Pt_{(s)}|Br_{2(l)}|Br^-(M)||H^+(M)|H_{2(g)}(1\,bar)|Pt_{(s)}$
(a) $E_{cell} = E^o_{cell} - \frac{0.0591}{2}\log\frac{[Br^-]^2[H_2]}{[H^+]^2}$
(b) $E_{cell} = E^o_{cell} - \frac{0.0591}{2}\log\frac{[H^+]^2[Br^-]^2}{[Br_{2(l)}][H_2]}$
(c) $E_{cell} = E^o_{cell} - \frac{0.0591}{2}\log\frac{[H^+]^2[H_2]}{[Br_{2(l)}][Br^-]^2}$
(d) $E_{cell} = E^o_{cell} - \frac{0.0591}{2}\log\frac{[Br_{2(l)}][Br^-]^2}{[H^+]^2[H_2]}$

75. What will be the emf of the following concentration cell at 25°C ?
$Ag_{(s)}|AgNO_3(0.01M)||AgNO_3(0.05M)|Ag_{(s)}$
(a) 0.828 V (b) 0.0413 V
(c) -0.0413 V (d) -0.828 V

76. For the cell reaction : $2Cu^+{}_{(aq)} \rightarrow Cu_{(s)} + Cu^{2+}_{(aq)}$, the standard cell potential is 0.36 V. The equilibrium constant for the reaction is
(a) 1.2×10^6 (b) 7.4×10^{12}
(c) 2.4×10^6 (d) 5.5×10^8

77. Molar conductivity of 0.15 M solution of KCl at 298 K, if its conductivity is 0.0152 S cm^{-1} will be
(a) 124 $\Omega^{-1}cm^2mol^{-1}$
(b) 204 $\Omega^{-1}cm^2mol^{-1}$
(c) 104 $\Omega^{-1}cm^2mol^{-1}$
(d) 300 $\Omega^{-1}cm^2mol^{-1}$

78. Match the column I with column II and mark the appropriate choice.

	Column I		Column II
(A)	Kohlrausch's law	(i)	$\wedge^{o}_{eq} = \wedge^{o}_{c} + \wedge^{o}_{a}$
(B)	Molar conductivity	(ii)	$\wedge_{m} = \frac{K}{C}$
(C)	Degree of dissociation	(iii)	$\alpha = \frac{\wedge_{m}}{\wedge^{o}_{m}}$
(D)	Dissociation constant	(iv)	$K_a = \frac{C\alpha^2}{1-\alpha}$

(a) (A) $\rightarrow$(iii), (B) $\rightarrow$(iv), (C) $\rightarrow$(i), (D)$\rightarrow$(ii)
(b) (A) $\rightarrow$(i), (B) $\rightarrow$(ii), (C) $\rightarrow$(iii), $\rightarrow$(D) $\rightarrow$(iv)
(c) (A) $\rightarrow$(iv), (B) $\rightarrow$(i), (C) $\rightarrow$(ii), (D) $\rightarrow$(iii)
(d) (A) $\rightarrow$(ii) (B) $\rightarrow$(iii), (C) $\rightarrow$(iv), (D) $\rightarrow$(i)

79. Molar conductivity of NH_4OH can be calculate d by the equation.

(a) $\wedge^{o}_{NH_4OH} = \wedge^{o}_{Ba(OH)_2} + \wedge^{o}_{NH_4Cl^-} \wedge^{o}_{BaCl_2}$

(b) $\wedge^{o}_{NH_4OH} = \wedge^{o}_{BaCl_2} + \wedge^{o}_{NH_4Cl} - \wedge^{o}_{BaCl_2}$

(c) $\wedge^{o}_{NH_4OH} = \frac{\wedge^{o}_{Ba(OH)_2} + 2\wedge^{o}_{NH_4Cl} - \wedge^{o}_{BaCl_2}}{2}$

(d) $\wedge^{o}_{NH_4OH} = \frac{\wedge^{o}_{NH_4Cl} + \wedge^{o}_{Ba(OH_2)}}{2}$

80. The conductance of Ba^{2+} and Cl^- are respectively 127 and 76 ohm^{-1} cm^2 mol^{-1} at infinite dilution. What will be the equivalent conductance of $BaCl_2$ at infinite dilution?
(a) 139.5 ohm^{-1} eq^{-1} (b) 203 ohm^{-1}cm^{2}eq^{-1}
(c) 279 ohm^{-1} (d) 101.5 ohm^{-1} cm^2 eq^{-1}

81. The charge required for reducing 1 mole of MnO_4^- to Mn^{2+} is
(a) 1.93×10^5C (b) 2.895×10^5C
(c) 4.28×10^5C (d) 4.825×10^5C

82. If a current of 1.5 ampere flows through a metallic wire for 3 hours, then how many electrons would flow through the wire ?
(a) 2.25×10^{22} electrons
(b) 1.13×10^{23} electrons
(c) 1.01×10^{23} electrons
(d) 4.5×10^{23} electrons

83. How much time is required to deposit 1×10^{-3} cm thick layer of silver (density is 1.05 g cm^{-3}) on a surface of area 100 cm^2 by passing a current of 5 A through $AgNO_3$ solution ?
(a) 125 s (b) 115 s (c) 18.7 s (d) 27.25 s

84. How much metal will be deposited when a current of 12 empere with 75% efficiency is passed through the cell for 3 h? (Given : Z = 4×10^{-4})
(a) 32.4 g (b) 38.8g (c) 36.0 g (d) 22.4 g

85. Same amount of electric current is passed through the solutions of $AgNO_3$ and HCl. If 1.08 g of silver is obtained from $AgNO_3$ solution, the amount of hydrogen liberated at STP will be
(a) 1.008 g (b) 11.2 g
(c) 0.01 g (d) 1.1 g

Section –B

86. The statement that is not correct for periodic classification of elements is
(a) the properties of elements are periodic function of their atomic number
(b) non-metallic elements are less in number than metallic element
(c) for transition elements, the 3d orbitals are filled with electrons after 3p orbitals and before 4s orbitals
(d) the first ionization enthalpies of elements generally increase with increase in atomic number as we go along a period.

87. Which of the following order of energies of molecular orbitals of N_2 is correct?
(a) $(\pi 2p_y) < (\sigma 2p_z) < (\pi^* 2p_x) \approx (\pi^* 2p_y)$
(b) $(\pi 2p_y) > (\sigma 2p_z) > (\pi^* 2p_x) \approx (\pi^* 2p_y)$
(c) $(\pi 2p_y) < (\sigma 2p_z) > (\pi^* 2p_x) \approx (\pi^* 2p_y)$
(d) $(\pi 2p_y) < (\sigma 2p_z) < (\pi^* 2p_x) \approx (\pi^* 2p_y)$

88. Which is more reactive towards SN^1 reaction
(a) CH_3Br (b) $CH_3\,\underset{\displaystyle Br}{\underset{|}{C}}\,HCH_2$
(c) $(CH_3)_3C-Br$ (d) $Ph-CH_2-Br$

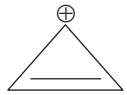
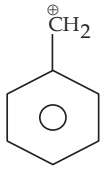
89. $CH_3CH=CH_2 \xrightarrow[H_2O_2/OH^-]{BH_3,THF}$ product will be
(a) $CH_3CH_2CH_2OH$ (b) 2 – propanol
(c) $CH_3CH(OH)CH_2OH$
(d) all of these

90. Total no. of chiral center in the following compound is

$$CH_3CH_2\,\underset{\displaystyle CH_3}{\underset{|}{C}}\,H-CH_2-CH_2-NH-\overset{+}{\underset{\displaystyle H}{\underset{|}{O}}}-CH_3$$

(a) 2 (b) 3 (c) 4 (d) 5

91. Tautomerism is shown by
(a) CH_3CHO (b) $(CH_3)_3C-CHO$
(c) $CH_2 = CHCHO$ (d) All of these

92. Which is more stable carbocation
(a)  (b) 
(c) CH_3^+ (d) $CH_3CH_2^+$

93. Which is more acidic in nature.
(a) Cl_3C-CH_2COOH (b) CF_3CH_2COOH
(c) CH_3CH_2COOH (d) $(CH_3)_2CH-COOH$

94. What is the name and symbol of the element with atomic number 112?
(a) Ununbium, Uub (b) Unnibium, Unb
(c) Ununnillum, Uun (d) Ununtrium, Uut

95. Predict the formulae of the binary compounds formed by combination of the following pairs of elements
(i) Magnesium and nitrogen
(ii) Silicon and oxygen
(a) MgN_2, SiO_2 (b) Mg_3N_2, SiO_2
(c) Mg_2N_3, Si_2O_3 (d) MgN, SiO_2

96. What is common between the following molecules:
SO_3, CO_3^{2-}, NO_3^- ?
(a) All have linear shape
(b) Al have trigonal planar shape
(c) All have tetrahedral shape
(d) All have trigonal pyramidal shape

97. Which type of overlapping is shown by p(p_x, p_y and p_z) – orbitals?
(a) Two end to end and one sidewise overlap
(b) Two sidewise and one end to end overlap
(c) Three sidewise overlaps
(d) Three end to end overlaps

98. Which of the following pairs will have same order?
(a) F_2 and O_2^{2-} (b) N_2 and CO_2
(c) O_2 and O_2^- (d) N_2 and N_2^+

99. Which of the following observation can be explained on the basis of hydrogen bonding?
(i) H – F has higher boiling point than other halogen acids.
(ii) H_2O has highest boiling point among hydrides of group 16 elements
(iii) NH_3 has lower boiling point than PH_3
(a) (i), (ii) and (iii) (b) (i) and (iii)
(c) (ii) and (iii) (d) (i) and (ii)

100. What is the pH at which $Mg(OH)_2$ begins to precipitate from a solution containing 0.1 M Mg^{2+} ions ?
[K_{sp} for $Mg(OH)_2 = 1.0\times10^{-11}$]
(a) 4 (b) 6 (c) 9 (d) 7

BOTANY

SECTION – A

101. Calvin studied reaction in green plant forming sugar by taking CO_2, H_2O and labelling with:
(a) C^{14} (b) C^{12} (c) H^1 (d) H^2

102. Non cyclic photophosphorylaiton occur in grana lamellae not in stroma lamellae because:
(a) Stroma lamellae lacks PS-II
(b) Stroma lamella lacks NADP reductase enzyme
(c) Stroma lamellae lacks required carriers
(d) Both (a) & (b)

103. CO_2 is necessary for photosynthesis. The chemical used to remove this gas most effectively from entering a control apparatus is:
(a) $NaCl_2$ (b) $NaNO_2$
(c) $CaCl_2$ (d) KOH

104. Van Niel demonstrated that photosynthesis is essentially a light dependent reaction in which hydrogen from a suitable oxidisable compound reduces carbon dioxide to carbohydrates. This study is based on the organisms of:
(a) Green bacteria and chlorella as a bacteria
(b) Iron and Sulphur bacteria
(c) Purple and green bacteria
(d) None is correct

105. A chromatographic separation of the leaf pigments shows that the colour that we see in leaves is not due to a single pigment but due to of which pigments:
(a) Only chlorophyll – a and chlorophyll – b
(b) Only chlorophyll – a and Xanthophyll
(c) Only chlorophyll a, b and Carotenoids
(d) All four pigments chlorophyll – a, chlorophyll – b, xanthophyll and carotenoids

106. Which of the following is not required for chemiosmosis?
(a) Membrane
(b) Proton pump
(c) Oxygen evolving complex
(d) ATPase

107. Which of the following statements are correct regarding synthesis of ATP in chloroplast during photosynthesis?
(A) Splitting of water in stroma helps in creation of proton gradient
(B) Cytochrome complex helps in the release of protons in the lumen of thylakoid by accepting electrons from hydrogen carrier.
(C) Movement of protons across the membrane to the stroma through the F_0 of the ATPase coupled with ATP synthesis.
(D) Reduction of $NADP^+$ to NADPH + H^+ is also a cause for creation of proton gradient.
(a) All statements are correct
(b) C & D (c) A & B (d) B, C & D

108. In C_4 plants photorespiration doesn't occur this is because they?
(a) Have time differentiation between light & dark reaction
(b) Have mechanism that increase the concentration of CO_2 at the enzyme site
(c) Have chloroplast dimorphism
(d) Have kranz anatomy

109. Non cyclic photophosphorylaiton occur in grana lamellae not in stroma lamellae because:
(a) Stroma lamellae lacks PS-II
(b) Stroma lamella lacks NADP reductase enzyme
(c) Stroma lamellae lacks required carriers
(d) Both (a) & (b)

110. Mark the incorrect match w.r.t. the colour of the pigments in the chromatogram.
(a) Chlorophyll a – Blue green
(b) Chlorophyll b – Yellow green
(c) Xanthophylls – Orange green
(d) Carotene – Yellow orange

111. Products of light reaction are
(a) O_2 and CO_2 (b) CO_2 and H_2O
(c) ATP and NADPH (d) ATP and CO_2

112. Read the following statements and choose the correct ones.
A. Carotenoids protect chlorophyll a from photooxidation.
B. Dark reactions are not directly light driven.
C. Chlorophyll a molecule shows maximum absorption in red and blue regions of the visible spectrum of light.
D. Light harvesting complexes are composed of hundreds of pigment molecules bound to lipids only.
(a) A, B & C (b) B, D & C
(c) A, C & D (d) D, B & A

113. Mark the correct option regarding accessory pigment molecules.
(a) Consists of reaction center, xanthophylls and carotenoids
(b) Consists of Chl-b, xanthophylls and carotenoids
(c) Absorb wider range of wavelength of incoming light to be utilised for photosynthesis
(d) Both (b) and (c)

114. The photochemical phase of photosynthesis includes
(A) Water splitting
(B) Light absorption
(C) Oxygen release
(D) Synthesis of NADPH
(E) Synthesis of starch
(a) Only (A) & (B) (b) (B), (C) & (E)
(c) (C), (D) & (E) (d) All except (E)

115. Action spectrum of photosynthesis corresponds closely to absorption spectrum of
(a) Chlorophyll a (b) Chlorophyll b
(c) Carotene (d) Xanthophyll

116. The protons and oxygen formed during photolysis of water are released
(a) Within the thylakoid lumen
(b) Outside the chloroplast
(c) In the stroma of the chloroplast
(d) In the vacuole of the cell

117. Non-cyclic photophosphorylation differs from cyclic photophosphorylation
(a) As it requires light energy
(b) In synthesis of ATP
(c) As it requires only PS I
(d) As it involves photolysis of water

118. Biosynthetic phase of photosynthesis
(a) Involves use of ATP and NADPH to form food
(b) Continues for long time if light is unavailable
(c) Occurs in thylakoids only
(d) Depends on light directly

119. The most abundant enzyme on earth
(a) Has much greater affinity for CO_2 than O_2
(b) Has active site for O_2 only
(c) Has carboxylase activity only
(d) Both (a) & (c)

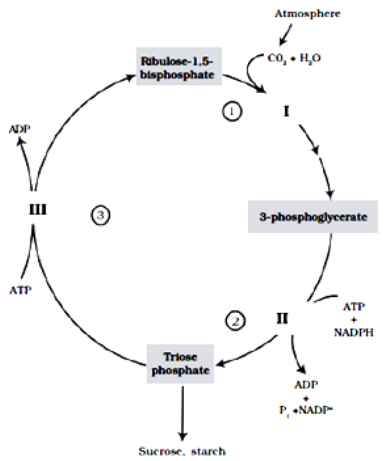
120. Choose incorrect statement w.r.t. mesophyll cells of C_4 -plants.
(a) Lack RuBisCO enzyme
(b) C_4 -acid is broken down to release CO_2 and a 3-carbon molecule
(c) Primary CO_2 acceptor molecule is PEP
(d) Have PEPCase enzyme

121. Select the odd one out w.r.t. C_4-plants?
(a) Adapted to dry tropical regions
(b) Have C_4-oxaloacetic acid as first CO_2 fixation product
(c) They do not use Calvin cycle as main biosynthetic pathway
(d) They tolerate high temperature

122. The cells of C_4 plants those are rich in RuBisCO enzyme, also have which of the following characteristic (s)?
(a) Intercellular spaces absent
(b) Thick walls impervious to gaseous exchange
(c) Large number of chloroplast
(d) More than one option are correct

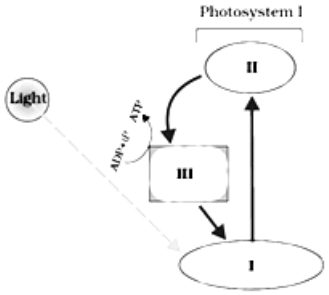
123. What is the correct ratio of ATP utilization in steps of calvin cycle?
(a) Reduction : Regeneration :: 1 : 1
(b) Reduction : Regeneration :: 2 : 1
(c) Reduction : Regeneration :: 2 : 2
(d) Reduction : Regeneration :: 1 : 2

124. Observe the following scheme and give the correct answer.



	I	II	III
(a)	Translation	Reduction	Regeneration
(b)	Regeneration	Reduction	Decarboxylation
(c)	Fixation	Glycolytic reversal	Carboxylation
(d)	Carboxylation	Reduction	Regeneration

125. For following figure I, II & III would be?



	I	II	III
(a)	e- Acceptor	Reaction centre	$NADPH_2$
(b)	ETS	e- Acceptor	Reaction centre
(c)	P-700	e- Acceptor	ETS
(d)	PS I	ETS	PS I

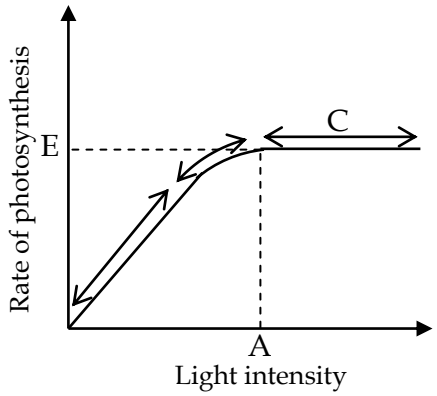
126. Increase in CO_2 concentration upto …….. percent can cause an increase in CO_2 fixation rate, beyond this the level can become damaging over long periods.
(a) 0.03 % (b) 0.04 %
(c) 0.045 % (d) 0.05 %

127. Why proton gradient is essential for generation of ATP?
(a) Breaking of proton gradient provide energy for making bond between ADP & Pi
(b) Breaking of proton gradient allow passage of ATP for cell functioning
(c) Proton gradient activates ETS
(d) All the above

128. The fact that C_3 plants respond to higher CO_2 concentration by showing increased rates of photosynthesis leading to higher productivity has been used for some green house crops like?
(a) Tomato (b) Potato
(c) Bell pepper (d) Both (a) & (c)

129. Regarding to CO_2 concentration as rate limiting factor of photosynthesis select out the wrong statement?
(a) At low light conditions neither C_3 nor C_4 plants respond to high CO_2 conditions
(b) At high light conditions only C_4 plants show increase in rates of photosynthesis
(c) C_4 plants shown saturation at 360 $\mu l L^{-1}$
(d) C_3 plants show saturation beyond 360 $\mu l L^{-1}$

130. In this given curve A & C represents what?



(a) A – Light saturation point, C – Chlorophyll limitation
(b) A – Chlorophyll limitation, C – Light saturation
(c) A – CO_2 saturation, C – Chlorophyll limitation
(d) A – Chlorophyll limitation, C – CO_2 saturation

131. During cyclic photophosphorylation?
(a) Only PS-I is functional
(b) The excited electron passes on to NADP reductase
(c) The electron move in lamellae of the grana from higher to lower redox potential
(d) More than one option is correct

132. Under water stress condition, the rate of photosynthesis declines because of?
(a) Reduced leaf water potential
(b) Increased leaf water potential
(c) Stomatal closure and the resultant decreases in CO_2 supply
(d) More than one option is correct

133. Select the incorrect statement w.r.t. Hatch and Slack pathway?
(a) PEP is regenerated in mesophyll
(b) Few number of chloroplasts in bundle sheath
(c) RUBP carboxylase is absent in mesophyll
(d) Multilayered bundle sheath

134. The major limiting factor for photosynthesis is?
(a) Light (b) CO_2
(c) Temperature (d) Water

135. The C_4 plants show –
(a) Transpiration absent in day and no photorespiration
(b) Low transpiration and no photorespiration
(c) High transpiration and photorespiration
(d) Low transpiration and photorespiration

SECTION - B

136. Light saturation occur at photosynthesis is?
(a) 3% of full sunlight
(b) 10% of full sunlight
(c) 20% of full sunlight
(d) 50% of full sunlight

137. Which of the following reactions of photosynthesis is temperature sensitive?
(a) Light reaction (b) Dark reaction
(c) Both (d) None of above

138. Half leaf experiment proves that?
(a) Light is essential for photosynthesis
(b) CO_2 is essential for photosynthesis
(c) O_2 releases during photosynthesis
(d) Chlorophyll is essential for photosynthesis

139. Read the following statements:
(A) F_0 part of ATPase is associated with breakdown of proton gradient
(B) A H-carrier contributes in creation of proton gradient.
(C) Movement of electrons in ETS is coupled to pumping of protons into the lumen.
(D) Formation of NADPH + H^+ is related with the creation of proton gradient.
How many of the above statements are correct?
(a) Two (b) One (c) Four (d) Three

140. The C_4 and C_3 plants differ from each other in
(a) Type of pigments involved in photosynthesis
(b) The primary acceptor of CO_2 during carbon fixation
(c) Type of end products of photosynthesis
(d) Number of NADPH that are consumed during the starch synthesis process

141. RuBisCO in C_4 plants shows minimum oxygenase activity due to
(a) Abundance of RuBisCO
(b) Formation of C_4 acid
(c) Decarboxylation of C_4 acid
(d) Cyclic photophosphorylation

142. The first step in photosynthesis is
(a) Excitation of chlorophyll by light
(b) Ionisation of water
(c) ATP synthesis
(d) Production of assimilatory power

143. Agranal chloroplasts are found in
(a) Mesophyll of pea leaves
(b) Bundle sheath of wheat leaves
(c) Mesophyll of maize leaves
(d) "Bundle sheath of sugarcane leaves

144. The oxygen evolved during photosynthesis comes from water molecules. Which one of the following pairs of elements is involved in this reaction?
(a) Mg and Cl (b) Mn and Cl
(c) Mn and K (d) Mg and Mo

145. Oxygenic photosynthesis occurs in:
(a) *Oscillatoria* (b) *Rhodospirillum*
(c) *Chlorobium* (d) *Chromatium*

146. In leaves of C_4 plants malic acid synthesis during CO_2 fixation occurs in
(a) Guard cells (b) Epidermal cells
(c) Mesophyll cells (d) Bundle sheath

147. In C_4 plants, the bundle sheath cells
(a) Have thin walls to facilitate gaseous exchange
(b) Have large intercellular spaces
(c) Are rich in PEP carboxylase
(d) Have a high density of chloroplasts

148. PGA as the first CO_2 fixation product was discovered in photosynthesis of
(a) Alga (b) Bryophyte
(c) Gymnosperm (d) Angiosperm

149. Stroma in the chloroplasts of higher plant contains:
(a) Light-dependent reaction enzymes
(b) PEPcase
(c) Chlorophyll
(d) Light-independent reaction enzymes

150. Plants adapted to low light intensity have
(a) Larger photosynthetic unit size than the sun plants
(b) Higher rate of CO_2 fixation than the sun plants
(c) More extended root system
(d) Leaves modified to spines

ZOOLOGY

SECTION - A

151. Which set clearly identify striated muscles?
(a) Cylindrical, Syncytial and Unbranched
(b) Spindle, Unbranched and Uninucleated
(c) Cylindrical, Striped and Nucleated
(d) Cylindrical, Striped and Branched

152. A sarcomere is best described as a
(a) movable structural unit within a myofibril bounded by H zones.
(b) fixed structural unit within a myofibril bounded by Z lines.
(c) fixed structural unit within a myofibril bounded by A bands.
(d) movable structural unit within a myofibril bounded by Z lines.

153. Which of the following is the store house of calcium in muscles?
(a) Sarcosome
(b) Sarcoplasmic reticulum
(c) Creatine phosphate
(d) Sarcomere

154. The axon terminals of a nerve cell and the sarcolemma of a skeletal muscle cell join at the_____
(a) motor unit
(b) synaptic cleft
(c) action potential
(d) neuromuscular junction

155. Identify the joint between sternum and the ribs in humans.
(a) Fibrous joint
(b) Gliding joint
(c) Cartilaginous joint
(d) Angular joint

156. Which of the following is an autoimmune disorder ?
(a) Myasthenia gravis
(b) Osteoporosis
(c) Muscular dystrophy
(d) Gout

157. Which of the following is not the feature of red muscle fibres?
(a) They have plenty of mitochondria.
(b) They have high content of myoglobin.
(c) They have high amount of sarcoplasmic reticulum.
(d) They are called aerobic muscles.

158. Read the following statements (A to D) and select the one option that contains both correct statements.
A. Z-line is present in the centre of the light band.
B. Thin filaments are firmly attached to the M-line.
C. The central part of thick filaments, not overlapped by thin filaments is called Z-band.
D. Light band contains only thin filaments.
(a) A and D (b) B and C
(c) A and C (d) B and D

159. Select the correct statement with respect to locomotion in humans.
(a) Accumulation of uric acid crystals in joints causes their inflammation.
(b) The vertebral column has 10 thoracic vertebrae.
(c) The joint between adjacent vertebrae is a fibrous joint.
(d) The decreased level of progesterone causes osteoporosis in old people

160. Three of the following pairs of the human skeletal parts are correctly matched with their respective inclusive skeletal category and one pair is not matched. Identify the non-matching pair.

	Pairs of skeletal parts		**Category**
(a)	Sternum and ribs	-	Axial skeleton
(b)	Clavicle and glenoid	-	Pelvic girdle cavity
(c)	Humerus and ulna	-	Appendicular skeleton
(d)	Malleus and stapes	-	Ear ossicles

161. Which of the following option shows the correctly matched bones (given in column I) with its pair (given in column II)?

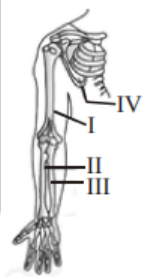
	Column-I		**Column – II**
A.	Carpals	I.	Bones that form the fingers and toes
B.	Tarsals	II.	Bones that form wrist
C.	Phalanges	III.	Bones that form the palms of the hands
D.	Metatarsals	IV.	Bones that form the ankles

(a) A – II, B – IV, C – I, D – III
(b) A – I, B – II, C – III, D – IV
(c) A – III, B – II, C – IV, D – I
(d) A – IV, B – I, C – III, D – II

162. Which of the following match is incorrect?
(a) 8th, 9th and 10th pairs of ribs - do not articulate directly with the sternum but join the sixth rib with the help of hyaline cartilage.
(b) Glenoid cavity - articulates with the head of the humerus to form the shoulder joint.
(c) Fibrous joint - flat skull bones which fuse end-toend with the help of dense fibrous connective tissues in the form of sutures, to form the cranium.
(d) Increase in Ca^{++} level - leads to the binding of calcium with a subunit of troponin on actin filaments and thereby remove the masking of active sites for myosin.

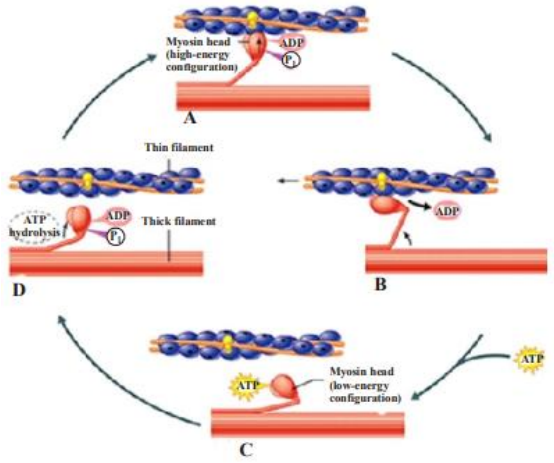
163. The H-zone in the skeletal muscle fibre is due to
(a) The central gap between myosin filaments in the A-band.
(b) The central gap between actin filaments extending through myosin filaments in the A-band.
(c) Extension of myosin filaments in the central portion of the A-band.
(d) The absence of myofibrils in the central portion of A-band.

164. The given diagram represents the bones of human arm. Identify the bones marked as I, II, III & IV.



	I	II	III	IV
(a)	Clavicle	Ulna	Radius	Humerus
(b)	Humerus	Radius	Ulna	Scapula
(c)	Scapula	Radius	Ulna	Clavicle
(d)	Humerus	Ulna	Radius	Scapula

165. The given figure represents the cross bridge cycle in skeletal muscle. What does the step B in the figure represents?



(a) Attachment of myosin head to actin forming cross bridge.
(b) Release of phosphate. Myosin changes shape to pull actin.
(c) Attachment of new ATP to myosin head. The cross bridge detaches.
(d) Splitting of ATP into ADP and Pi. Myosin cocks into its high energy conformation.

166. The label X in the given figure of an act in filament represents

(a) actin (b) myosin
(c) tropomyosin (d) troponin

167. The intercalated discs of_____ muscle_____.
(a) smooth; provide strong mechanical adhesion and rapid electrical communication
(b) skeletal; are the basis for all voluntary muscle action
(c) skeletal; make possible both fast twitches and slow twitches
(d) cardiac; provide strong mechanical adhesion and rapid electrical communication

168. "X" is a large triangular flat bone situated in the dorsal part of the thorax between the "Y" and the seventh ribs. Identify "X" and "Y".
(a) X - Patella ; Y - Third
(b) X - Clavicle ; Y -Eight
(c) X - Scapula ; Y - Sixth
(d) X - Scapula ; Y – Second

169. Which one of the following is the correct description of certain part of a normal human skeleton?
(a) Parietal bone and the temporal bone of the skull are joined by fibrous joint.
(b) First vertebra is axis which articulates with the occipital condyles.
(c) The 9th and 10th pairs of ribs are called the floating ribs.
(d) Glenoid cavity is a depression to which the thigh bone articulates.

170. Select the correct statement regarding the specific disorder of muscular or skeletal system.
(a) Myasthenia gravis – Autoimmune disorder which inhibits sliding of myosin filaments.
(b) Gout – Inflammation of joints due to extra deposition of calcium.
(c) Muscular dystrophy – Age related shortening of muscles.
(d) Osteoporosis – Decrease in bone mass and higher chances of fractures with advancing age.

171. Which of the following functional characteristics of muscle is correctly matched with its appropriate descriptive term?
I. Elasticity- Ability of a muscle fibre to recoil and resume its resting length after being stretched.
II. Excitability- Ability to respond to any change in the environment (inside or outside the body)
III. Extensibility- Ability to be stretched
IV. Contractility- Ability to shorten forcibly when adequately stimulated
(a) I and III only (b) II and IV only
(c) I, II, and III only (d) All of these

172. Match the columns :

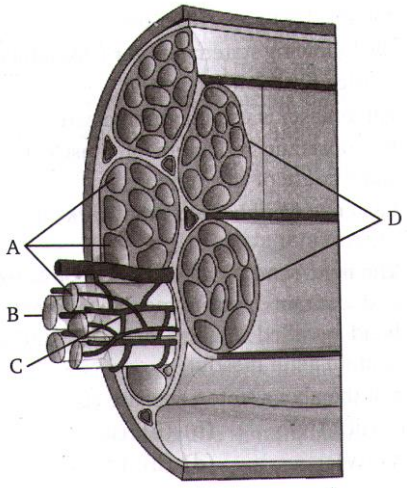
	Column – I		**Column – II**
A.	Ciliary movement	(i)	Limbs, jaws, tongue
B.	Muscular movement	(ii)	Passage of ova through female reproductive tract
C.	Flagellar movement	(iii)	Macrophages and leucocytes
D.	Amoeboid movement	(iv)	Sperms

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

173. Choose the incorrect statement:
(a) The coordinated movement of cilia in the trachea helps in removing dust particles inhaled alongwith the atmospheric air.
(b) Locomotion requires a perfect coordinated activity of muscular, skeletal and neural systems
(c) About 20 – 30% of the human adult body weight is contributed by the muscles
(d) Skeletal muscles are striated

174. Read the following statements for a special type of muscle in mammals.
I. These muscles are striated
II. The central nervous system does not control the activities of these muscles directly
III. These muscles are found in the blood pumping organ
The statements provided above, as a whole is for which type of muscle?
(a) Skeletal muscle (b) Smooth muscle
(c) Cardiac muscle (d) Both (a) and (c)

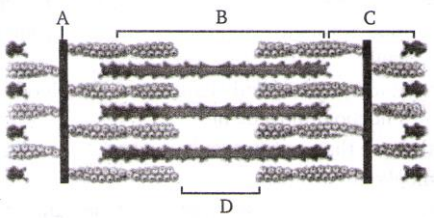
175. Identify A, B, C and D in the diagrammatic sectional view of a muscle?



Option	A	B	C	D
(a)	Muscle	Blood capillary	Sarcolemma	Fascicle
(b)	Muscle fibre	Sarcolemma	Blood capillary	Muscle bundle
(c)	Muscle cell	Muscle bundle	Fascicle	Plasma membrane
(d)	Muscle fibre	Plasma membrane	Fascicle	Blood capillary

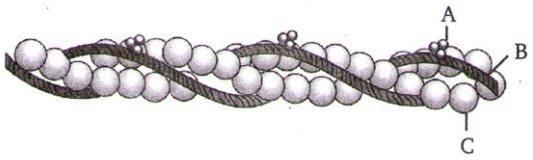
176. Which of the following is correct?
(a) Repeated activation of the muscles can lead to the accumulation of lactic acid
(b) Lactic acid accumulation in muscle cells occur due to aerobic breakdown of glycogen
(c) The reaction time of fibres is same in different types of muscles
(d) The amount of sarcoplasmic reticulum is very low in while muscle fibres

177. Identify A, B, C and D from the diagrammatic representation of a sarcomere.



Option	A	B	C	D
(a)	Z – line	I – band	A – band	H – zone
(b)	Z- line	A – band	I – band	H – zone
(c)	I – band	A – band	Z – line	H – zone
(d)	I – band	H – zone	Z – line	A - band

178. Identify the myofilament and parts labelled as A, B and C:



	Myofilament	A	B	C
(a)	Thin (actin) filament	Troponin	Tropomyosin	F – actin
(b)	Thin (actin) filament	Tropomyosin	Troponin	F – actin
(c)	Thick (actin) filament	Tropomyosin	Troponin	F – actin
(d)	Thick (myosin) filament	Troponin	Tropomyosin	F - actin

179. Find out which of the following statement are true (T)/False(F) and choose the correct option for muscle fibres/ filaments:
I. F – actin is a polymer of momomeric 'G' (globular) actins
II. Tropomyosin is distributed at regular intervals on troponin in the thin filament
III. The globular head and short arm of meromyosin is called heavy meromyosin (HMM) whereas the tail of meromyosin is called light meromyosin (LMM)
IV. Each myosin monomer (meromyosin) forms a tadpole – like structure

Option	I	II	III	IV
(a)	T	F	T	T
(b)	T	F	F	T
(c)	F	T	T	T
(d)	T	F	T	F

180. The contraction of muscle fibres occur by the sliding of:
(a) Thin filament over the thick filaments
(b) Thin filament over the actin filament
(c) Thick filament over the myosin filament
(d) Thick filament over the thin filament

181. The regulatory proteins of skeletal muscles are:
(a) Tropomyosin and troponin
(b) Myosin and actin
(c) Myosin and tropomyosin
(d) Actin and tubulin

182. The skull is composed of two sets of bones: cranial and facial, that total to ____A___ bones. Cranial bones are ___B____ whereas facial bones are ___C____ in number, ___D___ U – shaped bone called hyoid is present at the base of the buccal cavity and is also included in the skull. Each middle ear contains __E___ bones.

Option	A	B	C	D	E
(a)	8	22	14	1	3
(b)	22	8	14	1	6
(c)	22	8	14	1	3
(d)	29	8	14	1	6

183. Skull of human beings is:
(a) Monocondylic (b) Dicondylic
(c) Tricondylic (d) Tetracondylic

184. Intervertebral discs are:
(a) Cartilaginous
(b) Made of muscles only
(c) Bony
(d) Solely the salts of $CaCO_3$

185. Identify **A, B, C** and **D** w.r.t. the number of bones in different types of vertebrae:

Types of vertebra	Adult stage	Embryonic stae
Cervical	7	**A**
Thoracic	**B**	12
Lumbar	5	5
Sacral	**C**	5
Coceyx	1	**D**

Option	A	B	C	D
(a)	7	12	4	1
(b)	8	12	1	4
(c)	7	12	1	1
(d)	7	12	1	4

SECTION - B

186. An adult human vertebral column is formed by _____serially arranged units called vertebrae and is dorsally placed.
(a) 33 (b) 26 (c) 20 (d) 45

187. Read the following statements:
(i) First vertebra is atlas which articulates with the occipital condyles
(ii) The number of cervical are seven in almost all mammals including human beings
(iii) Sternum is a flat bone on the ventral mid – line of thorax
(iv) There are 12 pairs of ribs in adult human beings
(v) Vertebral column protects spinal cord
How many of the above statements are correct?
(a) Five (b) Four (c) Two (d) Three

188. Match the columns:

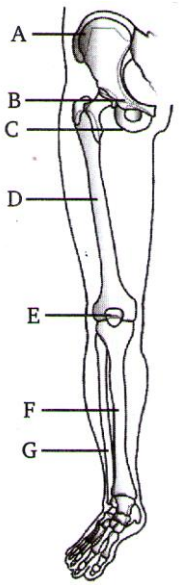
	Column – I		Column – I
A.	True ribs	(i)	11^{th} and 12^{th} pair
B.	False ribs	(ii)	Four fused pieces
C.	Floating ribs	(iii)	First seven pairs
D.	Coccyx	(iv)	8^{th}, 9^{th}, and 10^{th} pair

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

189. Scapula is large triangular bone located in the dorsal part of the thorax between:
(a) 2^{nd} and 7^{th} ribs (b) 2^{nd} and 3^{rd} ribs
(c) 7^{th} and 10^{th} ribs (d) 11^{th} and 12^{th} ribs

190. Read the following statements:
(i) Clavicle is triangular
(ii) The dorsal, flat, triangular body of scapula has a slightly elevated ridge called spine
(iii) Spine of scapula projects a flat, expanded process called the acromion
(iv) Clavide articulates with acromion
(v) Collar bone is long and selender with two curvatures
Which of the above statements are correct?
(a) (i), (ii), (iii), (iv) (b) (ii), (iii), (iv), (v)
(c) (i) and (iv) (d) (i) and (iv)

191. Identify the parts labelled as A, B, C, D, E, F, G and H for the right pelvic girdle and lower limb bones



Option	A	B	C	D	E	F	G
(a)	Ilium	Ischium	Pubis	Femur	Patella	Tibia	Fibula
(b)	Pubis	Ilium	Ischium	Femur	Patella	Tibia	Fibula
(c)	Ilium	Pubis	Ischium	Femur	Patella	Fibula	Tibia
(d)	Ilium	Pubis	Ischium	Femur	Patella	Tibia	Fibula

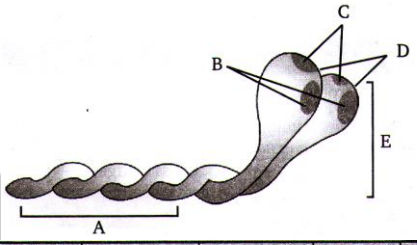
192. Choose the incorrect statement:
(a) Pelvic girdle consists two pairs of coxal bones
(b) The two pairs of pelvic girdle meet ventrally to form the pubic symphysis
(c) The coxal bone is fored of three freely moving bones ____ ilium ischium and pubis
(d) More than one option

193. Patella:
(a) Is cranial bone
(b) Is a cup – shaped covering the knee dorsally
(c) Is a rectangular bone
(d) Is knee cap

194. Macrophages and leucocytes exhibit:
(a) Ciliary movement
(b) Flageller movement
(c) Amoeboid movement
(d) Gilding movement

195. Find out the correct sequence of muscle structures/components present one with the other.
(a) Muscle fibre → Muscle bundle → Myofilament → Myofibril
(b) Muscle bundle → Muscle fibre → Myofilament → Myofibril
(c) Muscle bundle → Muscle fibre → Myofibril → Myofilament
(d) Muscle fibre → Myofilament → Muscle bundle → Myofibril

196. Identify the different parts A, B, C, D and E of the myosin monomer:



Options	A	B	C	D	E
(a)	Tail	Made of heavy meromysin (HMM)	Made of light meromysin (LMM)	Cross arm	Head
(b)	Head	ATP binding sites	Actin binding sites	Cross arm	Tail
(c)	Made of heavy meromysin (HMM)	ATP binding sites	Actin binding sites	Cross arm	Made of light meromysin (LMM)
(d)	Tail	ATP binding sites	Actin binding sites	Head	Cross arm

197. Appendicular skeleton is composed of:
(a) 136 bones
(b) Bones of limbs
(c) Bones of pectoral and pelvic girdle
(d) More than one options

198. Match the column:

	Column – I		Column – II
A.	Ball and socket joint	(i)	Between atlas and axis
B.	Pivot joint	(ii)	Between the carpals
C.	Hinge join	(iii)	Between carpal and metacarpal of thumb
D.	Gliding joint	(iv)	Between humerus and pectoral girdle
E.	Saddle joint	(v)	Knee joint

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

199. Match the columns:

	Column – I		Column – II
A.	Tetany	(i)	Inflammation of joints
B.	Osteoporosis	(ii)	Caused due to decreased estrogen
C.	Gout	(iii)	Rapid spasma
D.	Arthritis	(iv)	Inflammation of joints due to accumulation of uric acid crystal

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

200. Which one of the following is showing the correct sequential order of vertebrae in the vertebral column of human beings?
(a) Cervical – lumber – thoracic – sacral - coccygeal
(b) Cervical – thoracic – sacral – lumbar – coccygeal
(c) Cervical – sacral – thoracic – lumbar – coccygeal
(d) Cervical – thoracic – lumbar – sacral – coccygeal