

FINAL TEST SERIES for NEET-2023

MM : 720

Test-4

Time : 3 Hrs. 20 Mins.

Topics covered :

- Physics** : Thermodynamics, Kinetic Theory, Oscillations, Waves
Chemistry : The p -Block Elements (Group-13 & 14), Organic Chemistry-(Some Basic Principles and Techniques), Hydrocarbons, Environmental Chemistry
Botany : Mineral Nutrition, Photosynthesis in Plants, Respiration in Plants
Zoology : Excretory Products and Their Elimination, Locomotion and Movement, Neural Control and Coordination

Instructions :

- There are two sections in each subject, i.e. Section-A & Section-B. You have to attempt all 35 questions from Section-A & only 10 questions from Section-B out of 15.
- 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.
- Use blue/black ballpoint pen only to darken the appropriate circle.
- Mark should be dark and completely fill the circle.
- Dark only one circle for each entry.
- Dark the circle in the space provided only.
- 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.

PHYSICS**Choose the correct answer :****SECTION - A**

- A particle is oscillating simple harmonically with frequency ' f '. The frequency of its kinetic energy is
 - f
 - $2f$
 - $\frac{f}{2}$
 - Zero
- If travelling wave given by $y = A \cos(\omega t - kx)$ superpose on another wave producing stationary wave having node at $x = 0$. The equation of other wave can be
 - $-A \cos(\omega t + kx)$
 - $-A \sin(\omega t + kx)$
 - $A \cos(\omega t - kx)$
 - $A \cos(\omega t + kx)$
- The number of possible overtones of air column in a closed pipe of length 83.2 cm and of diameter 6 cm, whose frequencies lie below 1000 Hz, will be (Velocity of sound in air = 340 m/s)
 - 5
 - 4
 - 10
 - 7
- Displacement of a particle executing a periodic motion is given by $x = 4 \cos^2\left(\frac{t}{2}\right) \sin(1000t)$. If this expression is considered as the superposition of N independent harmonic motions, then N is equal to
 - 4
 - 3
 - 2
 - 1

5. Two simple pendulums have time periods T and $\frac{5T}{4}$. They start SHM at the same time from the mean position in same direction. The phase difference between them after the bigger pendulum have complete one oscillation is

- (1) 30° (2) 90°
 (3) 135° (4) 120°

6. Column I contains the expression of the apparent frequency for the various cases of Doppler's effect in sound and column II contains few of these possible cases. Match the column I with column II and choose the correct option. (Symbols have their usual meanings)

	Column I		Column II
a.	$f' = \left(\frac{v}{v \pm v_s} \right) f$	(i)	Source and observer both are moving
b.	$f' = \left(\frac{v \pm v_o}{v} \right) f$	(ii)	Source is moving, observer is stationary
c.	$f' = \left(\frac{v \pm v_o}{v \pm v_s} \right) f$	(iii)	Source is stationary, observer is moving

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

7. A stretched string of length 1 m vibrates in 4 segment. The distance between consecutive node is

- (1) 10.5 m (2) 0.25 m
 (3) 0.75 m (4) 1.5 m

8. A body of mass m is situated in a potential field whose energy is given by $U(x) = U_0(1 - \cos kx)$, when U_0 and k are constants. Time period of small oscillations of the body is

- (1) $2\pi\sqrt{\frac{U_0^2}{k^2m}}$ (2) $2\pi\sqrt{\frac{km}{U_0}}$
 (3) $2\pi\sqrt{\frac{m}{kU_0}}$ (4) $2\pi\sqrt{\frac{m}{U_0k^2}}$

9. For a simple pendulum, graph between L and T^2 will be

- (1) Rectangular hyperbola
 (2) Parabola
 (3) Straight line passing through origin
 (4) Elliptical

10. A simple pendulum has time period T . The point of suspension is now moved upward according to the relation $y = 2t^2$, where y is vertical displacement. The time period now will be

($g = 10 \text{ m/s}^2$)

- (1) $\frac{7}{5}T$ (2) $\frac{5}{7}T$
 (3) $\sqrt{\frac{5}{7}}T$ (4) $\sqrt{\frac{7}{5}}T$

11. The vibrations of a string of length 130 cm fixed at both ends are represented by the equation

$$y = 6 \sin\left(\frac{\pi x}{15}\right) \cos(48\pi t)$$

where y and x are in cm and t in s. The maximum displacement of the point at $x = 5$ cm from one end is

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

12. In a certain organ pipe three successive resonance frequencies are observed at 425, 595 and 765 Hz respectively. If the speed of sound in air is 340 m/s, then the length of the pipe is nearly

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

13. Two blocks of masses m_1 and m_2 are suspended together by a massless spring of spring constant K . When the system is in equilibrium, m_1 is removed suddenly. Amplitude of oscillation of the remaining block is

- (1) $\frac{m_2g}{K}$ (2) $\frac{m_1g}{K}$
 (3) $\frac{(m_1 + m_2)g}{2K}$ (4) $\left(\frac{m_1m_2}{m_1 + m_2} \right) \frac{g}{K}$

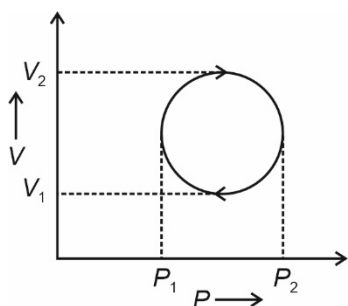
14. The internal energy of an ideal gas depends upon

- (1) Pressure (2) Volume
 (3) Temperature (4) Both (1) and (2)

15. When volume changes from V_0 to $2V_0$ at constant pressure P_0 of an ideal monoatomic gas, the change in internal energy of the gas will be

- (1) $\frac{3P_0V_0}{2}$ (2) $\frac{5P_0V_0}{2}$
 (3) $\frac{P_0V_0}{2}$ (4) P_0V_0

16. In the cyclic process shown by indicator, the work done by the gas is



- (1) $\frac{\pi}{4}(P_2 - P_1)^2$
 (2) $\frac{\pi}{4}(V_2 - V_1)^2$
 (3) $\pi(P_2V_2 - P_1V_1)$
 (4) $-\frac{\pi}{4}(P_2 - P_1)(V_2 - V_1)$

17. During isothermal expansion, the magnitude of slope of P - V graph

- (1) Decreases
 (2) Increases
 (3) Remains same
 (4) May increase or decrease

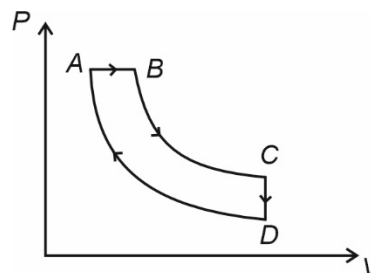
18. Choose the incorrect statement related to an isobaric expansion process.

- (1) $\frac{V}{T} = \text{constant}$
 (2) $W = P\Delta V$
 (3) $\Delta Q > W$
 (4) Heat given to a system is used up in raising the temperature only

19. If heat given to a system is 6 kcal and work done by the gas is 6 kJ, the change in internal energy is nearly

- (1) 19.2 kJ (2) 12.5 kJ
 (3) 25 kJ (4) Zero

20. In pressure-volume diagram given below, isobaric and isochoric parts respectively, are



- (1) AB, BC (2) CP, DP
 (3) AB, CD (4) DA, AB

21. A Carnot engine takes 3×10^6 cal of heat from a reservoir at 627°C , and gives it to a sink at 27°C . The work done by the engine is nearly

- (1) 4.2×10^6 J (2) 8.4×10^6 J
 (3) 16.8×10^6 J (4) Zero

22. Volume of one mole gas changes according to the $V = \frac{a}{T}$. If temperature change is ΔT , then work done will be

- (1) $R\Delta T$ (2) $-R\Delta T$
 (3) $\frac{R\Delta T}{\gamma - 1}$ (4) $R(\gamma - 1)\Delta T$

23. When a temperature of a gas filled in a closed vessel is increased by 1°C , its pressure increases by 0.4%. The initial temperature of gas was

- (1) 25 K (2) 250 K
 (3) 25°C (4) 250°C

24. The r.m.s. speed of gas molecules is given by

- (1) $2.5\sqrt{\frac{RT}{M}}$ (2) $1.73\sqrt{\frac{RT}{M}}$
 (3) $2.5\sqrt{\frac{M}{RT}}$ (4) $1.73\sqrt{\frac{M}{RT}}$

25. The molar specific heat at constant pressure of an ideal gas is $\frac{7}{2}R$. The ratio of specific heat at constant pressure to that of constant volume

- (1) $\frac{5}{7}$ (2) $\frac{9}{7}$
 (3) $\frac{7}{5}$ (4) $\frac{8}{7}$

26. If 2 moles of an ideal monoatomic gas at temperature T_0 is mixed with 4 moles of another ideal monoatomic gas at temperature $2T_0$, then the temperature of the mixture is

- (1) $\frac{5T_0}{3}$ (2) $\frac{3T_0}{2}$
 (3) $\frac{4T_0}{3}$ (4) $\frac{5T_0}{4}$

27. A simple harmonic wave having an amplitude a and time period T is represented by the equation $y = 5\sin\pi(t + 4)$ m. The frequency of oscillation of the wave will be

- (1) -4 Hz (2) 2 Hz
 (3) 1 Hz (4) 0.5 Hz

28. A simple pendulum of length l has a maximum angular displacement θ . The maximum kinetic energy of the bob is

- (1) $mgl(1 - \cos\theta)$ (2) $\frac{mgl}{2}$
 (3) mgl (4) $5mgl$

29. A source of sound of frequency 500 Hz is moving towards a stationary observer with velocity 30 m/s. The speed of sound is 330 m/s. The frequency heard by the observer will be

- (1) 545 Hz (2) 580 Hz
 (3) 458.3 Hz (4) 550 Hz

30. Two coherent sources of different intensities send waves which interfere. The ratio of maximum intensity to minimum intensity is 25 . The intensities of the sources are in the ratio of

- (1) $25 : 1$ (2) $5 : 1$
 (3) $9 : 4$ (4) $25 : 16$

31. Maximum velocity in SHM is V_m . The average velocity during motion from one extreme point to the other extreme point will be

- (1) $\frac{\pi V_m}{2}$ (2) $\frac{2V_m}{\pi}$
 (3) $\frac{4V_m}{\pi}$ (4) Zero

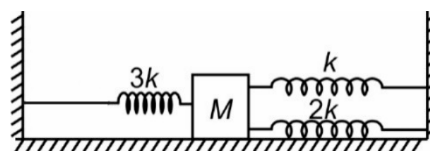
32. A string under a tension of 100 N produces 10 beats per second when it is sounded with a tuning fork. If tension in the string is increased by 21 N, then it sounds in unison with the same tuning fork. Frequency of tuning fork is

- (1) 90 Hz (2) 210 Hz
 (3) 110 Hz (4) 160 Hz

33. A tuning fork of frequency 420 Hz is sounded on a resonance tube. If the first and second resonance is obtained at 17 cm and 52 cm respectively, then velocity of sound in air is

- (1) 300 m/s (2) 520 m/s
 (3) 350 m/s (4) 294 m/s

34. Three light springs are connected to a block of mass M kept on a frictionless plane as shown in the figure. Frequency of small oscillation of the block will be



- (1) $\frac{1}{2\pi} \sqrt{\frac{5k}{6M}}$ (2) $\frac{1}{2\pi} \sqrt{\frac{6k}{M}}$
 (3) $\frac{1}{2\pi} \sqrt{\frac{6k}{5M}}$ (4) $\frac{1}{2\pi} \sqrt{\frac{M}{6k}}$

35. A particle is executing SHM with time period 8 second. Initially it is at its mean position. The ratio of distance travelled by the particle in 1 second and 2 seconds is

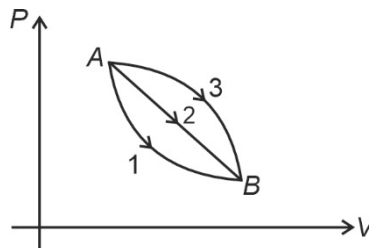
- (1) $\frac{1}{\sqrt{2}-1}$ (2) $\frac{1}{\sqrt{2}}$
 (3) $\frac{1}{2}$ (4) $\frac{1}{\sqrt{2}+1}$

SECTION - B

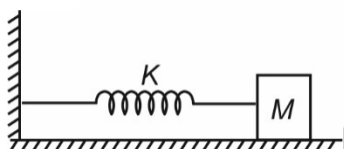
36. A simple pendulum of length L_1 has time period ' T_1 ' and another pendulum of length L_2 has time period ' T_2 ' then the time period of pendulum of length $(L_1 + L_2)$ is

- (1) $T_1 + T_2$ (2) $\sqrt{T_1 + T_2}$
 (3) $\sqrt{T_1 T_2}$ (4) $\sqrt{T_1^2 + T_2^2}$

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



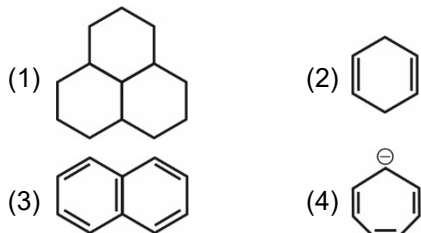
- (1) $W_1 < W_2 < W_3$ (2) $W_1 > W_2 > W_3$
 (3) $W_1 = W_2 = W_3$ (4) $W_3 > W_2 = W_1$

38. A simple pendulum has time period T . The point of suspension is now moved vertically upward with velocity $v = 3 \text{ m/s}$. The time period of pendulum become ($g = 10 \text{ m/s}^2$)
- (1) $3T$ (2) $7T$
 (3) T (4) $\sqrt{\frac{13}{10}}T$
39. A progressive wave of frequency 600 Hz is travelling with a velocity of 300 m/s. Minimum distance between two points having phase difference 60° is
- (1) $\frac{1}{4} \text{ m}$ (2) $\frac{1}{10} \text{ m}$
 (3) $\frac{1}{12} \text{ m}$ (4) $\frac{1}{24} \text{ m}$
40. When a wave is going from one medium to another, then which of the following is incorrect?
- (1) Its frequency either increases or decreases
 (2) Its wavelength changes
 (3) Its speed changes
 (4) Its frequency remains same
41. A horizontal spring block system is executing SHM with amplitude A as shown in the figure.
- 
- When block is passing through its equilibrium position, another block of mass M is placed on it and then two blocks stick together. New amplitude of oscillation becomes
- (1) $2A$ (2) $\frac{A}{2}$
 (3) $\sqrt{2}A$ (4) $\frac{A}{\sqrt{2}}$
42. Intensity level of a sound of I is 30 dB. The ratio $\frac{I}{I_0}$ is (where I_0 is threshold of hearing)
- (1) 300 (2) 1000
 (3) 3000 (4) 30
43. Velocity of sound measured in hydrogen and oxygen gas at a given temperature will be in the ratio of
- (1) 1 : 1 (2) 2 : 1
 (3) 1 : 3 (4) 4 : 1
44. Two equation of two S.H.M are $x = a \sin(\omega t - \alpha)$ and $y = b \cos(\omega t - \alpha)$. The phase difference between the two is
- (1) 0° (2) α°
 (3) 90° (4) 180°
45. The displacement equation of a particle is $x = 3 \sin 2t + 4 \cos 2t$. The maximum velocity of the particle will be
- (1) 10 (2) 5
 (3) 2 (4) 4
46. At what temperature the molecule of nitrogen will have same velocities as the molecules of oxygen at 127°C ?
- (1) 457°C (2) 273°C
 (3) 350°C (4) 77°C
47. An ideal gas is taken through a process in which the pressure and the volume are changed according to the equation $P = kV$. Molar heat capacity of the gas for the process is
- (1) $C = C_V + R$ (2) $C = C_V + \frac{R}{2}$
 (3) $C = C_V - \frac{R}{2}$ (4) $C = C_V + 2R$
48. First law of thermodynamics is a special case of
- (1) Newton's law
 (2) Law of conservation of energy
 (3) Charle's law
 (4) Law of conservation of mass
49. If ΔU and W represent the increase in internal energy and work done by the system respectively in a thermodynamics process, then which of the following is true?
- (1) $\Delta U = -W$, in an adiabatic process
 (2) $\Delta U = W$, in an isothermal process
 (3) $\Delta U = W$, in an adiabatic process
 (4) $\Delta U = -W$, in an isothermal process
50. In a thermodynamic process 400 J of heat is given to the gas and 100 J of work is also done on the gas. The change in internal energy of the gas will be
- (1) 500 J
 (2) 300 J
 (3) 400 J
 (4) Zero

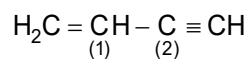
CHEMISTRY

SECTION - A

51. In which of the following molecules all atoms are coplanar?

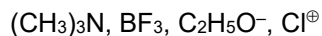


52. Select the correct option regarding the hybridisation of C₍₁₎, C₍₂₎ carbon atoms in the given molecule.



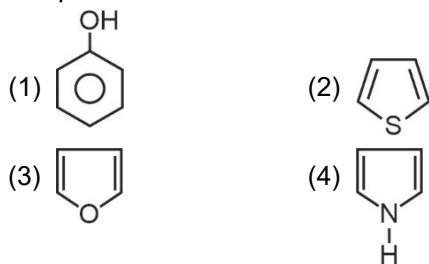
- (1) $sp^3 - sp^3$ hybridised carbon atoms
 (2) $sp^3 - sp^2$ hybridised carbon atoms
 (3) $sp^2 - sp$ hybridised carbon atoms
 (4) $sp^2 - sp^2$ hybridised carbon atoms
53. Nitrogen detection in an organic compound is carried out by Lassaigne's test. The blue colour formed corresponds to which of the following formula?
- (1) $\text{Fe}_4[\text{Fe}(\text{CN})_6]_3$ (2) $\text{Fe}_2[\text{Fe}(\text{CN})_6]$
 (3) $\text{Fe}_3[\text{Fe}(\text{CN})_6]_2$ (4) $\text{Fe}_4[\text{Fe}(\text{CN})_6]_2$
54. In the Kjeldahl method for estimation of nitrogen present in soil sample ammonia evolved from 0.70 g of sample neutralized 10 ml of 1 M H_2SO_4 . The percentage of nitrogen in the soil is
- (1) 40% (2) 50%
 (3) 45% (4) 35%

55. Consider the given species



The total number of nucleophiles are

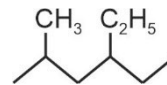
- (1) 0 (2) 2
 (3) 4 (4) 3
56. Which among the following is not a heterocyclic compound?



57. Which is not a non-degradable pollutant?

- (1) Polythene (2) B.H.C.
 (3) Natural polymers (4) D.D.T.

58. The IUPAC name of the given compound is



- (1) 4-Ethyl-2-methylhexane
 (2) 2-Methyl-4-ethylhexane
 (3) 3-Ethyl-5-methylhexane
 (4) 5-Methyl-3-ethylhexane

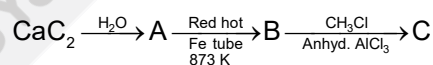
59. $\text{CH}_3 - \text{C} \equiv \text{C} - \text{CH}_3 \xrightarrow[\text{H}_2]{\text{Pd/BaSO}_4, \text{Na/liq NH}_3, \text{A}}$ products A and B respectively are

- (1) trans-2-butene and cis-2-butene
 (2) cis-2-butene and trans-2-butene
 (3) Both cis-2-butene
 (4) Both trans-2-butene

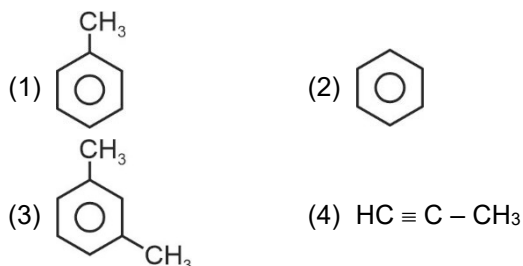
60. The product obtained at anode upon Kolbe's electrolysis of aqueous solution of sodium propanoate is

- (1) $\text{CH}_3\text{CH}_2\text{CH}_3$ (2) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$
 (3) CH_3CH_3 (4) H_2

61. Consider the following sequence of reactions



Major product is



62. Ozone in the stratosphere is depleted by

- (1) $\text{C}_2\text{F}_2\text{Cl}_2$ (2) $\text{C}_6\text{H}_6\text{F}_8$
 (3) CF_2Cl_2 (4) $\text{C}_6\text{H}_{11}\text{F}$

63. Three centre-two electron bond is present in

- (1) H_3BO_3 (2) $\text{Na}_2\text{B}_4\text{O}_7$
 (3) B_2H_6 (4) Both (2) and (3)

64. Reaction of diborane with ammonia gives initially

- (1) $\text{B}_2\text{H}_6 \cdot \text{NH}_3$ (2) $(\text{BN})_x$
 (3) $\text{B}_3\text{N}_3\text{H}_6$ (4) $[\text{BH}_2(\text{NH}_3)_2]^+ [\text{BH}_4]^-$




X, Y and Z respectively are

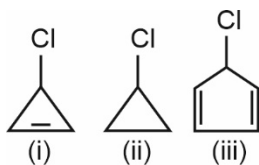
- (1) B_3H_4 , LiF , AlF_3 (2) B_2H_6 , LiF , AlF_3
 (3) BH_3 , $\text{Li}_3[\text{AlF}_6]$, LiF (4) B_3H_6 , LiF , $\text{Li}[\text{AlF}_4]$

66. Colour of bead formed when CoO is heated with glassy bead is

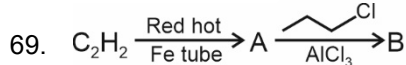
- (1) Red (2) Yellow
 (3) Green (4) Blue

67. Maximum enol content is observed in

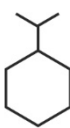
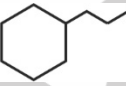
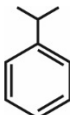
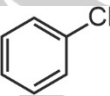
- (1) $\text{CH}_3 - \overset{\text{O}}{\parallel}{\text{C}} - \text{CH}_3$ (2) 
 (3) $\text{CH}_3 - \text{CHO}$ (4) $\text{CHO} - \text{CH}_2 - \text{CHO}$

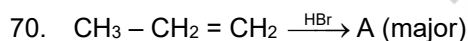
68. Order of rate of reaction of halides with AgNO_3 is

- (1) (i) > (ii) > (iii) (2) (iii) > (ii) > (i)
 (3) (i) > (iii) > (ii) (4) (iii) > (i) > (ii)




Product B is

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



- (1) $\text{CH}_3 - \overset{\text{Br}}{\text{CH}} - \text{CH}_3$
 (2) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{Br}$
 (3) $\text{CH}_3 - \overset{\text{Br}}{\text{CH}} - \overset{\text{Br}}{\text{CH}_3}$
 (4) 1 and 2 both are major product

71. Which among the following on reaction with NaNH_2 gives NH_3 gas?

- (1)  (2) $\text{Ph} - \text{C} \equiv \text{C} - \text{Ph}$
 (3) $\text{CH}_3 - \text{C} \equiv \text{CH}$ (4) $\text{CH}_3\text{CH}_2\text{CH}_3$

72. In absence of green-house gases

- (1) Average surface temperature will fall
 (2) Temperature will fall and approximately all water will freeze
 (3) Will destroy most of the living things
 (4) All of these

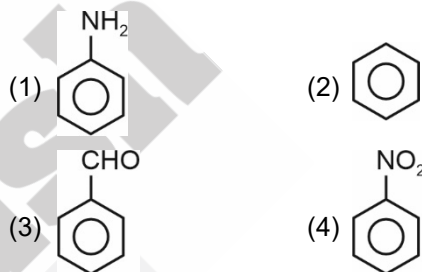
73. The number of π -electrons in benzene hexachloride (BHC) is

- (1) 6 (2) 4
 (3) 2 (4) 0

74. Total number of structural isomers (excluding cyclic structures) for C_4H_8 is

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

75. Among the following the rate of electrophilic aromatic substitution reaction will be slowest

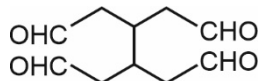
76. $\text{CH}_3\text{OCH}_2\text{CH}_2\text{CH}_3$ and $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$ are

- (1) Chain isomers
 (2) Metamers
 (3) Position isomers
 (4) Functional group isomers

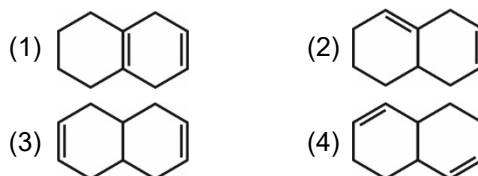
77. Which of the following carbocation is expected to be most stable?



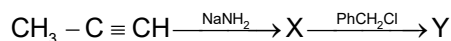
78. A single compound of the structure



is obtainable from ozonolysis of which of the following cyclic compounds?



79. In the reaction



X and Y are

- (1) $\text{CH}_3 - \text{C} \equiv \text{C} \text{Na}^+$, $\text{CH}_3 - \text{C} \equiv \text{CH}$
 (2) $\text{CH}_3 - \text{C} \equiv \text{C}^- \text{Na}^+$, $\text{CH}_3 - \text{C} \equiv \text{C} - \text{CH}_2 - \text{Ph}$
 (3) $\text{CH} \equiv \text{C} - \text{CH}_2^- \text{Na}^+$, $\text{CH} \equiv \text{C} - \text{CH}_2 - \text{CH}_2 - \text{Ph}$
 (4) $\text{Na}^+ \text{CH}_2 - \text{C} \equiv \text{C}^- \text{Na}^+$, $\text{Ph} - \text{CH}_2 - \text{CH}_2 - \text{C} \equiv \text{C} - \text{CH}_2 \text{Ph}$

80. $\text{CH}_3 - \text{C} \equiv \text{CH} \xrightarrow[60^\circ\text{C}]{\text{HgSO}_4, \text{H}_2\text{SO}_4} \text{X}$.

Compound X is a/an:

- (1) Ketone (2) Aldehyde
 (3) Alcohol (4) Ether

81. Given below are two statements

Statement I: Lithium and sodium tetrahydridoborates are known as borohydrides.**Statement II:** Both LiBH_4 and NaBH_4 are used as reducing agent in organic synthesis.

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

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

82. Given below are two statements.

Statement I: Zeolites are widely used as a catalyst in petrochemical industries.**Statement II:** ZSM-5 is not used to convert alcohols into gasoline directly.

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

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

83. $\overset{\ominus}{\text{C}}\text{H}_2 - \overset{\text{O}}{\parallel}{\text{C}} - \text{CH}_3$ and $\text{CH}_2 = \overset{\text{O}}{\underset{\text{:O:}^\ominus}{\text{C}}} - \text{CH}_3$ are

- (1) Resonating structures
 (2) Tautomers
 (3) Geometrical isomers
 (4) Optical isomers

84. Measurement of dissolved oxygen that would be needed by the microorganism to oxidise the compounds is known as

- (1) COD (2) BOD
 (3) OD (4) pOH

85. Earth is protected from UV rays by

- (1) O_2 (2) O_3
 (3) SO_2 (4) N_2

SECTION - B

86. Which one of the following is not a common component of photochemical smog?

- (1) Ozone (2) Chlorofluorocarbons
 (3) Acrolein (4) Peroxyacetyl nitrate

87. Which of the following group 14 elements does not show catenation?

- (1) Si (2) Ge
 (3) Pb (4) Sn

88. Number of B - O - B bonds in borax is

- (1) Two (2) Three
 (3) Four (4) Five

89. Boric acid on red hot heating produces

- (1) NaBO_2 (2) $\text{Na}_2\text{B}_4\text{O}_7$
 (3) B_2O_3 (4) $[\text{B}(\text{OH})_4]^-$

90. Which of the following species is not stable?

- (1) $[\text{AlF}_6]^{3-}$ (2) $[\text{Al}(\text{H}_2\text{O})_6]^{3+}$
 (3) $[\text{SiCl}_6]^{2-}$ (4) $[\text{Si}_3\text{O}_9]^{6-}$

91. SiC is also known as

- (1) Corundum (2) Carborundum
 (3) Feldspar (4) Mica





92. Select an incorrect one among the following statements.

- (1) Diamond is harder than graphite.
 (2) Diamond has higher thermal conductivity than graphite.
 (3) Diamond has less electrical conductivity than graphite.
 (4) Diamond has higher C-C bond order than graphite.

93. Boron nitride has its structure similar to

- (1) Diamond (2) Graphite
 (3) Benzene (4) Fullerene

94. Which among the following is not aromatic?

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

95. Match list I with List II

	List I Element		List II Melting point
a.	Si	(i)	1693 K
b.	Ge	(ii)	1218 K
c.	Sn	(iii)	600 K
d.	Pb	(iv)	505 K

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

96. Which of the following oxidation states are the most characteristic for lead and tin respectively?

- (1) +2, +2 (2) +2, +4
 (3) +4, +4 (4) +4, +2

97. **Assertion (A):** Heavy metals such as cadmium, mercury are dangerous to humans.**Reason (R):** Human body cannot excrete heavy metals such as cadmium, mercury.

- (1) Both (A) and (R) are correct and (R) is correct explanation of (A).
 (2) Both (A) and (R) are correct and (R) is not the correct explanation of (A).
 (3) (A) is correct but (R) is incorrect.
 (4) (A) is incorrect but (R) is correct.

98. Which is correct with respect to -I effect of the substituents?

- (1) $-\overset{+}{\text{NH}}_3 > -\text{NO}_2 > -\text{F}$ (2) $-\text{F} > -\text{NO}_2 > -\overset{+}{\text{NH}}_3$
 (3) $-\overset{+}{\text{NH}}_3 > -\text{F} > -\text{NO}_2$ (4) $-\text{F} > -\overset{+}{\text{NH}}_3 > -\text{NO}_2$

99. Given below are two statements

Statement I: BCl_3 easily accepts a lone pair of electrons from ammonia to form $\text{BCl}_3 \leftarrow \text{NH}_3$.**Statement II:** The trichlorides on hydrolysis in water form tetrahedral $[\text{M}(\text{OH})_4]^-$

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

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

100. In pyrosilicates number of oxygen atom(s) shared per SiO_4^{4-} unit is

- (1) 1 (2) 2
 (3) 3 (4) 0

BOTANY**SECTION - A**101. Find the **odd** one w.r.t. micronutrients

- (1) Iron (2) Manganese
 (3) Magnesium (4) Zinc

102. Find the **correct** statement

- (1) A large amount of transport of gases occur from one plant part to another.
 (2) In stems, the 'living' cells are organised in thin layers inside and beneath the bark.
 (3) Tightly packed parenchyma in stems and roots facilitate the exchange of air.
 (4) Stomata are the only structures in plants that help in gaseous exchange.

103. N_2 can be fixed by organism while living freely in soil, such as

- (1) *Rhizobium* and *Azotobacter*
 (2) *Frankia* and *Rhizobium*
 (3) *Anabaena* and *Azotobacter*
 (4) *Frankia* and *Nitrobacter*

104. In an earlier experiment it was shown that, in bright sunlight, small bubbles were formed around the green parts of an aquatic plants. Who identified these bubbles to be of oxygen?

- (1) Julius von Sachs (2) Cornelius van Niel
 (3) T.W. Engelmann (4) Jan Ingenhousz

105. Nitrogen is the component of all of the following, **except**

- (1) Vitamins (2) Proteins
 (3) Nucleic acids (4) Oxaloacetic acid

106. During photosynthesis, O_2 is released from water. This was proved by

- (1) Action spectrum of *Cladophora*
 (2) Radioisotopic techniques
 (3) Moll's half-leaf experiment
 (4) Comparative analysis on purple and green bacteria

107. Nickel is a component of enzyme

- (1) Nitrogenase (2) Transaminase
 (3) Urease (4) Catalase

108. **A:** Hydroponics has been successfully employed as technique for commercial production of some vegetables.
B: Hydroponics involve culturing plants in a soil-free, non-defined mineral solution.
In the light of above statement, mark the option true for them.
- (1) Both 'A' and 'B' are correct
(2) Only 'A' is incorrect
(3) Only 'B' is incorrect
(4) Both 'A' and 'B' are incorrect
109. ETS during photosynthesis and respiration, cannot function in the absence of
- (1) Fe and Cu (2) Ca and B
(3) B and Zn (4) Na and Ca
110. Element required for synthesis of nucleic acids and as enzyme activator is
- (1) Mg (2) K
(3) S (4) Cl
111. Fatty acids can enter the respiratory pathway after converting into
- (1) PGAL (2) DHAP
(3) BPGA (4) Acetyl CoA
112. Aldolase enzyme of EMP pathway catalyses
- (1) Splitting of DHAP
(2) Splitting of fructose-1,6-bisphosphate into DHAP and PGAL
(3) Conversion of the DHAP into PGAL
(4) Conversion of glucose-6-phosphate into fructose-6-phosphate
113. Two successive steps of decarboxylation occurs in
- (1) Calvin cycle
(2) Tricarboxylic acid cycle
(3) Glycolysis
(4) Light reaction
114. Glucose is converted to glucose -6-phosphate in a reaction catalysed by an enzyme which is activated by
- (1) Mg^{2+} (2) NADH
(3) Acetyl-CoA (4) Pyruvic acid
115. Match the columns and select the **correct** option.
- | | Column I | | Column II |
|----|-----------------|-------|---|
| a. | Stroma | (i) | Cyclic photophosphorylation |
| b. | Thylakoid lumen | (ii) | Enzymatic reactions synthesizing sugars |
| c. | Stroma lamellae | (iii) | Higher concentration of protons |
- (1) a(ii), b(iii), c(i) (2) a(i), b(ii), c(iii)
(3) a(ii), b(i), c(iii) (4) a(iii), b(i), c(ii)
116. During a transamination reaction, amino group donor and amino group acceptor respectively are
- (1) Oxaloacetic acid and glutamic acid
(2) Glutamic acid and oxaloacetic acid
(3) Aspartic acid and glutamic acid
(4) Glutamic acid and NH_4^+ ions
117. Photosystem II has absorption maxima at
- (1) 680 nm (2) 700 nm
(3) 580 nm (4) 720 nm
118. Nodules of which plant export the fixed N_2 as ureides to other plant parts?
- (1) Soyabean (2) *Aloe*
(3) Chilli (4) *Petunia*
119. To continue the Krebs cycle, regeneration of which molecule is required?
- (1) Malic acid (2) Citric acid
(3) NADPH (4) Oxaloacetic acid
120. Reaction center of PS-I
- (1) Has chlorophyll c and absorb the light at 780 nm
(2) Has chlorophyll a and absorb the light at 680 nm
(3) Has chlorophyll a and absorb the light at 700 nm
(4) Does not contain chlorophyll a in it
121. In mitochondrial ETC, ubiquinone is reduced to form
- (1) Ubiquinol by complex I and III
(2) Plastoquinone by complex II and III
(3) Ubiquinol by complex I and II
(4) Plastoquinone by complex III and IV
122. Read the following statements and state them as true (T) or false (F).
- (a) PEPcase enzyme is present in mesophyll cells of C_4 plants.
(b) During C_4 pathway 4-carbon OAA is formed in bundle-sheath cells of C_4 plants.
(c) C_4 acid releases CO_2 in bundle sheath cells of C_4 plants.
(d) Calvin cycle occurs in C_3 plants as well as in C_4 plants.
- Choose the **correct** option.
- (1) T, T, F, T (2) T, F, T, T
(3) F, F, T, T (4) T, F, T, F
123. Which of the following is **not** a step of Calvin cycle?
- (1) Reduction
(2) Regeneration
(3) Carboxylation
(4) Substrate level phosphorylation

124. Ethyl-alcohol concentration **cannot** exceed 13% in naturally fermented beverages because
- (1) High alcohol concentration kills the yeast
 - (2) Ethyl-alcohol is converted into pyruvic acid
 - (3) Microorganisms absorb the extra ethyl-alcohol
 - (4) Alcohol fermentation does not provide enough energy for survival of organism
125. The term 'trace elements' is used for
- (1) Beneficial elements
 - (2) Micronutrients
 - (3) Macronutrients
 - (4) All essential elements
126. Which of the following enzymes is found in mitochondrial matrix?
- (1) Citrate synthase
 - (2) Hexokinase
 - (3) Succinate dehydrogenase
 - (4) Phosphofructokinase
127. Carboxylation reaction of RuBisCO produces
- (1) 3-carbon molecules
 - (2) 5-carbon molecules
 - (3) 4-carbon molecules
 - (4) 2-carbon molecules
128. To make one molecule of maltose, how many turns of Calvin cycle are required
- (1) Three
 - (2) Six
 - (3) Twelve
 - (4) Nine
129. For ATP to produce, A is passed through B from intermembrane space to the matrix down the electrochemical proton gradient. Find A and B and select the **correct** option.
- | A | B |
|------------|-------|
| (1) P_i | F_1 |
| (2) Proton | F_0 |
| (3) Oxygen | F_1 |
| (4) ADP | F_0 |
130. Read the statements given below.
- A. Non-cyclic photophosphorylation takes place under optimum light and aerobic conditions.
 - B. Cyclic photophosphorylation takes place under low light intensity and when CO_2 concentration is low.
 - C. From PS I electrons move uphill to reduce $NADP^+$.
- Choose the **correct** option.
- (1) Only A and C are correct
 - (2) Only B is correct
 - (3) Only A and B are correct
 - (4) Only B and C are incorrect

131. Find the **incorrect** statement.
- (1) Photorespiration is highest in C_4 plants like *Sorghum*.
 - (2) Increase in concentration upto 0.05 percent can cause an increase in CO_2 fixation rates.
 - (3) Water stress causes the stomata to close hence reducing the CO_2 availability.
 - (4) Tropical plants have a higher temperature optimum than the plants adapted to temperate climates.
132. Find the **correctly** matched pair.
- (1) CO_2 saturation point is beyond $460 \mu/L^{-1}$ – C_4 plants
 - (2) Primary CO_2 acceptor is 3C compound – C_3 plants
 - (3) Efficient process of CO_2 fixation – C_3 plants
 - (4) Bundle sheath has agranal chloroplast – C_4 plants
133. During aerobic respiration various intermediates are formed at various locations in eukaryotic cells. At which location(s), following molecules are formed.
- a. Pyruvate
 - b. Acetyl CoA
 - c. $NADH + H^+$

	a	b	c
(1)	Cytosol only	Mitochondrial matrix only	Cytosol and mitochondrial matrix
(2)	Cytosol only	Mitochondrial matrix only	Cytosol only
(3)	Cytosol only	Mitochondrial matrix only	Mitochondrial matrix only
(4)	Mitochondrial matrix only	Cytosol only	Cytosol only

134. NADP reductase enzyme is
- (1) Located on the lumen side of thylakoid membrane
 - (2) Attached to cytochrome b_6f complex
 - (3) Located on the stromal side of thylakoid membrane
 - (4) Located on the outer membrane of chloroplast
135. Find the **incorrect** match w.r.t. scientists and their research material used in experiment regarding photosynthesis.
- (1) Jan Ingenhousz → *Hydrilla*
 - (2) Cornelius von Niel → Purple and green sulphur bacteria
 - (3) Joseph Priestley → Mint plant
 - (4) T.W. Engelmann → Anaerobic bacteria

SECTION - B

136. Find the **odd** one out w.r.t. ATP synthase
- (1) It is composed of $F_0 - F_1$ component
 - (2) F_1 headpiece is a peripheral membrane protein
 - (3) F_0 is an integral membrane protein
 - (4) F_0 is the site of ATP synthesis
137. Decarboxylation of pyruvate and formation of acetyl CoA is catalysed by
- (1) Pyruvate dehydrogenase
 - (2) PEP case
 - (3) Pyruvate kinase
 - (4) Hexokinase
138. R.Q values of organic acids is more than unity because
- (1) Organic acids contain high proportion of carbon as compared to oxygen
 - (2) More CO_2 is liberated than O_2 consumed in respiration
 - (3) They contain high proportion of hydrogen as compared to oxygen
 - (4) More oxygen is consumed than CO_2 liberated in respiration
139. Find the **correct** option
- (1) Deficiency symptoms of N, P and K is seen first in younger parts of plants
 - (2) Mo, N, K and S deficiency do not cause inhibition of cell division
 - (3) Micronutrients are not used as components of fertilisers
 - (4) Sulphur is a constituent of coenzymes
140. To form one sucrose molecule and one glucose molecule in C_3 plant, net ATP and NADPH required are
- (1) 18 ATP and 12 NADPH
 - (2) 54 ATP and 36 NADPH
 - (3) 6 ATP and 12 NADPH
 - (4) 12 ATP and 18 NADPH
141. How many protons are pumped by complex II from matrix to inter-membrane space?
- (1) Zero
 - (2) Two
 - (3) Four
 - (4) Five
142. Photosystem-II
- (1) Does not have LHCs
 - (2) Lies on the outer surface of thylakoids
 - (3) Is associated with release of O_2
 - (4) Participates in cyclic as well as non-cyclic flow of electrons
143. Volatile form of nitrogen that is formed by ammonification of biomass is
- (1) N_2
 - (2) NH_3
 - (3) N_2O
 - (4) NO_2
144. Complete oxidation of $NADH + H^+$ and $FADH_2$ forms _____ ATP molecules respectively. Choose the **correct** option to fill in the blank.
- (1) 2 and 3
 - (2) 3 and 4
 - (3) 3 and 2
 - (4) 2 and 2
145. Colours seen on chromatogram by chlorophyll a and chlorophyll b are respectively
- (1) Bright or blue green and yellow-orange
 - (2) Yellow-orange and yellow
 - (3) Bright or blue green and yellow-green
 - (4) Yellow green and yellow-orange
146. The graphic curve showing the amount of energy of different wavelengths of lights absorbed by a pigment is called
- (1) Redox potential
 - (2) Absorption spectrum
 - (3) Excitation energy
 - (4) Action spectrum
147. Find the option with micro-organism **correctly** matched with metabolic process it is involved in.
- (1) *Frankia* → denitrification
 - (2) *Nitrosomonas* → ammonification
 - (3) *Rhodospirillum* → nitrification
 - (4) *Beijerinckia* → nitrogen fixation
148. Oxygen scavenging for making the conditions favourable for N_2 fixation in root nodules, is done by
- (1) Leg-haemoglobin
 - (2) Nitrogenase
 - (3) Nitrate reductase
 - (4) Cytochrome
149. Which of the following represents the component of complex-I of mitochondrial electron transport system?
- (1) Cyt b, Cyt c_1
 - (2) FMN, Fe-S
 - (3) FAD, Fe-S
 - (4) Cyt a, Cyt c_3
150. Following are certain steps involved in root nodule formation. Find the **correct** sequence of these steps
- a. Curling of root hair
 - b. Division of *Rhizobium* near root hairs.
 - c. Infection thread formation.
 - d. Division of inner cortical and pericycle cell.
- (1) d → b → a → c
 - (2) c → b → a → d
 - (3) b → a → c → d
 - (4) b → c → a → d

ZOOLOGY

SECTION - A

151. Semi-circular canals of internal ear are located
- (1) Outside to the ear ossicles
 - (2) Outside to the ear drum
 - (3) Above the cochlea
 - (4) Below the cochlea
152. Ions responsible for unmasking of active sites for myosin that leads to cross bridge formation during muscle contraction are
- (1) Ca^{2+}
 - (2) Mg^{2+}
 - (3) Na^+
 - (4) K^+
153. At rest, the axonal membrane of a neuron is comparatively more permeable to which ions?
- (1) Sodium
 - (2) Potassium
 - (3) Chloride
 - (4) Protein anions
154. Match column I with column II w.r.t. organisms and type of excretory organs.

Column I

- a. *Amphioxus*
- b. *Pheretima*
- c. Prawns
- d. *Rana*

Column II

- (i) Nephridia
- (ii) Green glands
- (iii) Flame cells
- (iv) Kidney

Choose the **correct** option.

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

155. How many items given in the box below are directly related with a skeletal muscle fibre?

Sarcoplasm, Sarcolemma, Sarcomere, Myofibrils, Myofilaments

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

156. Inner area of the cerebral hemisphere forms white matter due to concentration of
- (1) Myelinated tracts
 - (2) Cell bodies
 - (3) Nissl's granules
 - (4) Ganglia
157. The osmoreceptors of the body when activated by decrease in blood volume do **not** trigger the release of
- (1) Aldosterone from adrenal cortex
 - (2) Renin from kidney
 - (3) Vasopressin from neurohypophysis
 - (4) ANF from heart

158. Choose the **incorrect** statement w.r.t. relaxed muscle fibre.

- (1) Ca^{2+} concentration in sarcoplasm is comparatively low
- (2) Has polarised sarcolemma
- (3) The length of A-band is less in comparison to contracted muscle fibre
- (4) H-zone lengthens as compared to contracted muscle fibre

159. All of the following are present in the cerebral cortex, **except**

- (1) Motor area
- (2) Sensory area
- (3) Association area
- (4) Cerebral aqueduct

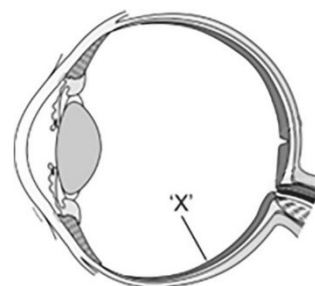
160. Choose the **incorrect** statement w.r.t. haemodialysis.

- (1) Blood is taken out from a convenient artery
- (2) Dialysing fluid have the same composition as that of plasma
- (3) Blood is mixed with an anticoagulant before pumping in the dialysing unit
- (4) The cellophane membrane of the unit is permeable to nitrogenous wastes

161. White skeletal muscle fibres do **not**

- (1) Carry out anaerobic oxidation
- (2) Contain plenty of mitochondria
- (3) Contain sarcoplasmic reticulum
- (4) Possess myoglobin

162. In the diagram of the eye given below, identify the structure marked as 'X'.



Select the **correct** option for 'X'.

- (1) Retina
- (2) Sclera
- (3) Choroid
- (4) Ciliary body

163. The increase in osmolarity from cortex to medullary interstitium is mainly due to

- (1) Urea only
- (2) H^+ and K^+
- (3) NH_4^+ and NaCl
- (4) Urea and NaCl

164. Fibrous joints
- (1) Allow slight movements
 - (2) Are present between the adjacent vertebrae in the vertebral column
 - (3) Are present between skull bones
 - (4) Comprise a disc of white fibrocartilage
165. The **correct** sequence of the three layers of cells from inside to outside in the retina is
- (1) Bipolar cells → ganglion cells → photoreceptor cells
 - (2) Photoreceptor cells → ganglion cells → bipolar cells
 - (3) Ganglion cells → photoreceptor cells → bipolar cells
 - (4) Ganglion cells → bipolar cells → photoreceptor cells
166. In human kidney, the cortex extends in between the medullary pyramids as renal columns called
- (1) Renal pelvis
 - (2) Columns of Bertini
 - (3) Minor calyx
 - (4) Major calyx
167. Joint which allows free movement of human thumb is
- (1) Ball and socket joint
 - (2) Saddle joint
 - (3) Gliding joint
 - (4) Pivot joint
168. Unipolar neurons are usually found in
- (1) Dorsal root ganglion of spinal nerve
 - (2) Embryonic stage in humans
 - (3) Retina of human eye
 - (4) Cerebral cortex
169. Which of the following is **not** the component of filtration membrane of nephron?
- (1) Endothelium of glomerular blood capillaries
 - (2) Squamous epithelium of Bowman's capsule
 - (3) Basement membrane between endothelium of glomerular blood capillaries and epithelium of Bowman's capsule
 - (4) Columnar epithelium of Bowman's capsule
170. According to sliding filament theory,
- (1) Dark and light myofilaments move from their original position and slide towards each other
 - (2) Dark myofilaments shorten and slide towards light myofilaments
 - (3) Neither dark nor light myofilaments shorten during muscle contraction
 - (4) Light myofilaments participate in it by extending their heads to form cross bridges
171. Select the **odd** one out w.r.t. electrical synapses.
- (1) Transmission of an impulse across electrical synapse is very similar to impulse conduction along a single axon.
 - (2) Impulse transmission across an electrical synapse is always faster.
 - (3) Electrical synapses are rare in our system.
 - (4) At electrical synapses, the membrane of pre- and post-synaptic neurons are not in close proximity
172. Osmoregulatory structures in *Rotifers* are
- (1) Protonephridia
 - (2) Green glands
 - (3) Malpighian tubules
 - (4) Nephrons
173. A condition of sustained muscle contraction occurring due to hypocalcemia is called
- (1) Tonus
 - (2) Tetanus
 - (3) Tetany
 - (4) Arthritis
174. The hypothalamus of an experimental monkey is surgically removed without damaging any other structures. The function which is **least** likely to be affected is
- (1) Osmoregulation
 - (2) Regulation of body temperature
 - (3) Biological clock
 - (4) Movement and coordination
175. A part of brain stem which contains centres for controlling respiration, cardiovascular reflexes and gastric secretion is
- (1) Midbrain
 - (2) Thalamus
 - (3) Medulla oblongata
 - (4) Hypothalamus
176. The total number of tarsals in an adult man is equal to the number of which bones in an adult man?
- (1) Thoracic vertebrae
 - (2) Facial bones
 - (3) Cranial bones
 - (4) Ear ossicles
177. Choose the **incorrect** statement w.r.t. tropomyosin.
- (1) Tropomyosin runs close to the 'F' actins throughout its length.
 - (2) It is characterised by two filaments.
 - (3) A complex protein troponin is distributed at regular intervals on tropomyosin.
 - (4) During muscle contraction, tropomyosin masks the binding site for myosin on the actin filaments.

178. Choose a bone of appendicular skeleton which has two curvatures and two ends. One end articulates with acromion process of scapula and other end articulates with a flat bone present on the ventral midline of thorax.
- (1) Collar bone (2) Sternum
(3) Coxal bone (4) Hyoid bone
179. Urea is absorbed and transported back into medullary interstitium by
- (1) Ascending limb of Henle's loop
(2) Descending limb of Henle's loop
(3) DCT
(4) Collecting tubule
180. Projections of renal pelvis are known as
- (1) Renal columns (2) Renal calyces
(3) Medullary pyramids (4) Columns of bertini
181. In humans, peritubular capillaries around the renal tubules are formed by branching of
- (1) Afferent arteriole (2) Renal portal vein
(3) Efferent arteriole (4) Vasa recta
182. Which of the following statements is **incorrect**, when we do physical exercises?
- (1) The energy demand is increased for maintaining an increase in muscular activity.
(2) The supply of oxygen is decreased due to muscle fatigue.
(3) There is increase in respiration rate as well as heart rate.
(4) There is increase in blood flow *via* blood vessels.
183. The site of information processing and control among the following is
- (1) Autonomous neural system
(2) Somatic neural system
(3) Peripheral neural system
(4) Central neural system
184. Neurons are excitable cells because their membranes are in a
- (1) Polarised state
(2) Depolarised state
(3) Repolarised state
(4) Hyperpolarised state
185. **Assertion (A):** At the site of excitation, the nerve fibre becomes once more responsive to further stimulation within a fraction of a second.

Reason (R): The rise in the stimulus-induced permeability to Na^+ is extremely short lived that is quickly followed by rise in permeability of K^+ which restores the resting membrane potential at the site of excitation.

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

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

SECTION - B

186. In which of the following animals, kidneys do not play any significant role in removal of major forms of its nitrogenous wastes?
- (1) *Scoliodon* (2) *Catla*
(3) *Carcharodon* (4) *Pteropus*
187. Juxtamedullary nephrons differ from cortical nephrons in presence of
- (1) PCT
(2) Peritubular capillaries
(3) Very long loop of Henle
(4) DCT
188. If the cardiac output of an adult human is 6.25 litre per minute, then calculate the approximate amount of blood filtered by the kidneys per minute and select the **correct** option.
- (1) 125 mL (2) 1250 mL
(3) 690 mL (4) 560 mL
189. Choose the **incorrect** statement w.r.t. loop of Henle.
- (1) Reabsorption is minimum in its ascending limb.
(2) The descending limb is permeable to water and completely impermeable to electrolytes.
(3) The ascending limb is impermeable to water but allow transport of electrolytes actively or passively.
(4) Ascending limb plays a significant role in the maintenance of high osmolarity of medullary interstitial fluids.
190. Select the set of organisms exhibiting the same excretory structure
- (1) *Planaria* and *Amphioxus*
(2) *Pheretima* and *Balanoglossus*
(3) *Nereis* and *Fasciola*
(4) *Planaria* and *Pteropus*

191. Read the following statements (A) and (B). Choose the **correct** option.

Statement (A): All locomotions are movements but all movements are not locomotions.

Statement (B): All voluntary muscles are striated but all striated muscles are not voluntary.

- (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

192. About _____ per cent of the body weight of a human adult is contributed by muscles.

Choose the option that **correctly** fills the blank.

- (1) 20-30 (2) 30-40
- (3) 40-50 (4) 50-60

193. The part of functional unit of contraction of a skeletal muscle, where actin protein is completely absent during resting state is called

- (1) 'I' band (2) Z-line
- (3) A-band (4) 'H' zone

194. Ethmoid is a cranial bone present in

- (1) Anterior part of base of cranium
- (2) Posterior part of base of cranium
- (3) Anterior part of roof of skull
- (4) Posterior part of roof of skull

195. How many bones of thoracic cavity participate in the formation of rib cage in an adult man?

- (1) 24 (2) 26
- (3) 37 (4) 25

196. All of the following are differential features between dendrites and axon, **except**

	Dendrite	Axon
(1)	Afferent process	Efferent process
(2)	Nissl's granules present	Nissl's granules absent
(3)	Shorter in length	Longer in length
(4)	Myelinated	Unmyelinated

197. During hearing, the vibrations are passed through the oval window and generate waves in the lymph that induces a ripple in the 'A'. These movements of 'A' bend the hair cells, pressing them against 'B'. Identify 'A' and 'B' and choose the **correct** option.

	A	B
(1)	Reissner's membrane	Basilar membrane
(2)	Basilar membrane	Reissner's membrane
(3)	Tectorial membrane	Basilar membrane
(4)	Basilar membrane	Tectorial membrane

198. Choose the **correct** statement w.r.t. micturition.

- (1) The internal sphincter relaxes while the external sphincter contracts.
- (2) CNS passes on motor messages to initiate contraction of smooth muscles of bladder and simultaneous relaxation of the urethral sphincter to carry out release of urine.
- (3) Signal for micturition is initiated only by stretching of ureters.
- (4) The skeletal muscles of the bladder contract to build pressure that facilitate micturition.

199. Macula lutea is a pigmented spot situated

- (1) At the posterior pole of the eye medial to blind spot
- (2) At the posterior pole of the eye lateral to blind spot
- (3) In the centre of fovea
- (4) In the centre of blind spot

200. The layer of cells which covers the cerebral hemisphere is thrown into prominent folds called

- (1) Dura mater
- (2) Arachnoid
- (3) Cerebral medulla
- (4) Cerebral cortex





Scan the QR Code for Detailed Video Solutions

(*Video will be available to access post 8 p.m. 31st March, 2023 onwards)



Corporate Office: Aakash Tower, 8, Pusa Road, New Delhi-110005, Ph.011-47623456

FINAL TEST SERIES for NEET-2023

MM : 720

Test-4

Time : 3 Hrs. 20 Mins.

Answers

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

FINAL TEST SERIES for NEET-2023

MM : 720

Test-4

Time : 3 Hrs. 20 Mins.

Answers and Solutions**PHYSICS****SECTION - A**

1. Answer (2)

Kinetic energy oscillates with double the frequency of oscillation of particle.

2. Answer (1)

At $x = 0$, $y_{\text{net}} = 0$, hence a node is formed at $x = 0$

Equation of other wave should be

$$\Rightarrow y_2 = -A \cos(\omega t + kx)$$

3. Answer (2)

$$\lambda = 4(l + e)$$

$$= 4(83.2 + 0.6r) = 3.4 \text{ m}$$

$$f = \frac{v}{\lambda} = 100 \text{ Hz}$$

As only odd harmonics are present

 \therefore Number of overtones below 1000 Hz are only 4.

4. Answer (2)

$$y = 4 \cos^2\left(\frac{t}{2}\right) \sin(1000t)$$

$$= 2(1 + \cos t) \cdot \sin(1000t)$$

$$= 2 \sin(1000t) + \sin(1001t) + \sin(999t)$$

5. Answer (2)

$$\omega_1 = \frac{2\pi}{T}$$

$$\omega_2 = \frac{2\pi}{5T} \times 4 = \frac{8\pi}{5T}$$

$$\Delta\phi = \omega_{\text{rel}} \cdot t = \left[\frac{2\pi}{T} - \frac{8\pi}{5T} \right] \times \frac{5T}{4} = \frac{2\pi}{5T} \times \frac{5T}{4} = \frac{\pi}{2}$$

6. Answer (2)

Source is moving, observer is stationary	$f' = \left(\frac{v}{v \pm v_s} \right) f$
Source is stationary, observer is moving	$f' = \left(\frac{v \pm v_o}{v} \right) f$
Source and observer both are moving	$f' = \left(\frac{v \pm v_o}{v \pm v_s} \right) f$

7. Answer (2)

$$2\lambda = L$$

$$\lambda = 0.5 \text{ m}$$

$$\text{Distance between consecutive nodes} = \frac{\lambda}{2}$$

$$= \frac{0.5}{2}$$

$$= 0.25 \text{ m}$$

8. Answer (4)

$$F = \frac{-dU}{dx} = 2U_0 k \sin(kx)$$

$$= -U_0 k^2 x \text{ (for small angle } \sin\theta \approx \theta)$$

$$a = \frac{-U_0 k^2}{m} x$$

$$\text{hence } T = 2\pi \sqrt{\frac{m}{U_0 k^2}}$$

9. Answer (3)

$$T = 2\pi\sqrt{\frac{L}{g}}$$

$$T^2 = \alpha L$$

10. Answer (3)

$$T \propto \frac{1}{\sqrt{g_{\text{eff}}}}$$

$$\Rightarrow \frac{T_1^2}{T_2^2} = \frac{14}{10} = \frac{7}{5}$$

$$\Rightarrow T_2 = \sqrt{\frac{5}{7}}T_1$$

11. Answer (1)

$$A = 4 \sin\left(\frac{\pi x}{15}\right)$$

$$\text{At } x = 5 \Rightarrow A = 4 \sin(\pi/3)$$

$$= 6 \times \frac{\sqrt{3}}{2} = 3\sqrt{3} \text{ cm}$$

12. Answer (3)

Here only odd harmonics are present. Hence it is a closed pipe.

$$425 : 595 : 765 = 5 : 7 : 9$$

$$\text{Hence } \frac{5v}{4l} = 425$$

$$\Rightarrow \frac{5 \times 340}{4l} = 425$$

$$\Rightarrow l = 1 \text{ m}$$

13. Answer (2)

$$A = \frac{(m_1 + m_2)g}{K} - \frac{m_2 g}{K} = \frac{m_1 g}{K}$$

14. Answer (3)

Internal energy of the gas depends on temperature.

15. Answer (1)

$$\Delta U = \frac{nR\Delta T}{\gamma - 1}$$

$$nR\Delta T = P_0(2V_0 - V_0)$$

$$= P_0 V_0$$

$$\gamma = \frac{5}{3}$$

$$\Delta U = \frac{P_0 V_0}{\left(\frac{5}{3} - 1\right)}$$

$$= \frac{3P_0 V_0}{2}$$

16. Answer (4)

Area under P - V curve is work done

$$W = -\pi \left(\frac{P_2 - P_1}{2}\right) \frac{(V_2 - V_1)}{2}$$

$$= -\frac{\pi}{4}(P_2 - P_1)(V_2 - V_1)$$

17. Answer (1)

$$\frac{dP}{dV} = -\frac{P}{V}$$

18. Answer (4)

$$Q = \Delta U + W$$

19. Answer (1)

$$Q = \Delta U + W$$

$$6 \times 4.2 = \Delta U + 6$$

$$\Delta U = 19.2 \text{ kJ}$$

20. Answer (3)

In isobaric process pressure is constant, and in isochoric process volume is constant.

21. Answer (2)

$$\eta = 1 - \frac{T_2}{T_1} = 1 - \frac{300}{900}$$

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

$$\eta = \frac{W}{Q}$$

$$\frac{2}{3} = \frac{W}{2 \times 10^6 \times 4.2}$$

$$W = 8.4 \times 10^6 \text{ J}$$

22. Answer (2)

$$PV = RT, \quad P = \frac{RT}{V} = \frac{RT^2}{a}$$

$$V = \frac{a}{T} \quad \therefore dV = -\frac{a}{T^2} dT$$

$$W = \int PdV = \int \frac{RT^2}{a} \left(-\frac{a}{T^2} dT\right)$$

$$= -R\Delta T$$

23. Answer (2)

$$\text{We know } \frac{P_1}{T_1} = \frac{P_2}{T_2}$$

$$\text{Let } P_1 = P$$

$$P_2 = P + \frac{0.4P}{100}$$

$$= P \left(\frac{1004}{1000} \right)$$

$$\text{Let } T_1 = T \therefore T_2 = (T + 1)$$

$$\frac{P}{T} = \frac{P \left(\frac{1004}{1000} \right)}{(T + 1)}$$

$$T = 250 \text{ K}$$

24. Answer (2)

$$v_{\text{r.m.s}} = \sqrt{\frac{3RT}{M}}$$

$$= 1.73 \sqrt{\frac{RT}{M}}$$

25. Answer (3)

$$\frac{C_P}{C_V} = \gamma$$

$$C_P = \frac{\gamma R}{\gamma - 1}$$

$$\frac{7R}{2} = \frac{\gamma R}{\gamma - 1}$$

$$7\gamma - 7 = 2\gamma$$

$$\gamma = \frac{7}{5}$$

26. Answer (1)

$$\frac{1}{2}(n_1 + n_2)fRT = \frac{1}{2}n_1fRT_1 + \frac{1}{2}n_2fRT_2$$

$$\left(2 + \frac{4}{3} \right) T = 2T_0 + 8T_0$$

$$T = \frac{10T_0}{6}$$

$$T = \frac{5T_0}{3}$$

27. Answer (4)

$$y = 5 \sin(\pi t + 4\pi)$$

$$\omega = \pi$$

$$2\pi f = \pi$$

$$f = 0.5 \text{ Hz}$$

28. Answer (1)

$$\frac{1}{2}mv^2 = mgh$$

$$= mgl(1 - \cos\theta)$$

29. Answer (4)

$$v' = \left(\frac{v}{v - v_s} \right) v = \left(\frac{330}{330 - 30} \right) \times 500$$

$$= 110 \times 5$$

$$= 550 \text{ Hz}$$

30. Answer (3)

$$\frac{(\sqrt{l_1} + \sqrt{l_2})^2}{(\sqrt{l_1} - \sqrt{l_2})^2} = 25$$

$$\frac{\sqrt{l_1} + \sqrt{l_2}}{\sqrt{l_1} - \sqrt{l_2}} = 5$$

$$\sqrt{l_1} + \sqrt{l_2} = 5\sqrt{l_1} - 5\sqrt{l_2}$$

$$6\sqrt{l_2} = 4\sqrt{l_1}$$

$$\frac{\sqrt{l_1}}{\sqrt{l_2}} = \frac{3}{2}$$

$$\frac{l_1}{l_2} = \frac{9}{4}$$

31. Answer (2)

$$v_{\text{avg}} = \frac{2A}{T}$$

$$= \frac{4A}{T} = \frac{2A\omega}{2\pi} = \frac{2v_m}{\pi}$$

32. Answer (3)

If tension in the wire is changed, its fundamental frequency also changes.

$$f = \frac{1}{2l}v = \frac{1}{2l}\sqrt{\frac{T}{\mu}} = k\sqrt{T}$$

$$\text{Initially, } f - k\sqrt{100} = 10$$

$$\text{Finally, } f - k\sqrt{121} = 0$$

$$\text{On solving } \Rightarrow f = 110 \text{ Hz}$$

33. Answer (4)

$$\lambda = 2(l_2 - l_1) = 2(52 - 17) = 70 \text{ cm}$$

$$\text{Now } v = f\lambda \Rightarrow v = 420 \times 70 \times 10^{-2} \text{ m/s}$$

$$= 294 \text{ m/s}$$

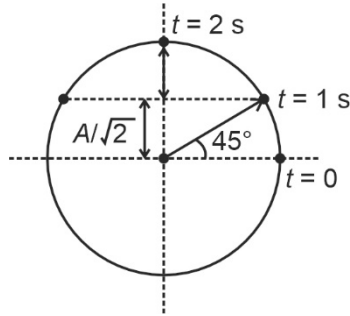
34. Answer (2)

$$K_{\text{eff}} = 6K$$

$$f = \frac{1}{2\pi} \sqrt{\frac{6K}{M}}$$

35. Answer (2)

Phasor method



In 1 second $\Rightarrow I_1 = \frac{A}{\sqrt{2}}$

In 3 second $\Rightarrow I_2 = A$

Hence $\frac{I_1}{I_2} = \frac{1}{\sqrt{2}}$

SECTION - B

36. Answer (4)

$$T = 2\pi \sqrt{\frac{\ell}{g}}$$

$$L_1 = \frac{T_1^2 g}{4\pi^2}$$

$$L_2 = \frac{T_2^2 g}{4\pi^2}$$

$$L_1 + L_2 = \frac{T^2 g}{4\pi^2}$$

$$\frac{T^2 g}{4\pi^2} = \frac{T_1^2 g}{4\pi^2} + \frac{T_2^2 g}{4\pi^2}$$

$$T = \sqrt{T_1^2 + T_2^2}$$

37. Answer (1)

Area under the pressure versus volume graph is work.

38. Answer (3)

$$g_{\text{eff}} = g + 0 = g$$

$$T \propto \frac{1}{\sqrt{g_{\text{eff}}}} \Rightarrow \frac{T_1}{T_2} = \frac{10}{10}$$

$$T_2 = T$$

39. Answer (3)

$$\Delta\phi = \frac{2\pi}{\lambda} \cdot \Delta x \Rightarrow \Delta x = \frac{\lambda}{2\pi} \cdot \Delta\phi$$

$$\Delta x = \frac{v}{f \cdot 2\pi} \cdot \frac{\pi}{3} = \frac{300}{600 \cdot 2\pi} \times \frac{\pi}{3} = \frac{1}{12} \text{ m}$$

40. Answer (1)

When a wave travel from one medium to other medium frequency remains same.

41. Answer (4)

Conservation of momentum

$$mA\omega = 2mA'\omega'$$

$$mA\sqrt{\frac{K}{m}} = 2mA'\sqrt{\frac{K}{2m}}$$

$$A' = \frac{A}{\sqrt{2}}$$

42. Answer (2)

$$L = 10 \log_{10} \left(\frac{I}{I_0} \right)$$

$$30 = 10 \log_{10} \left(\frac{I}{I_0} \right)$$

$$\frac{I}{I_0} = 10^3$$

$$= 1000$$

43. Answer (4)

$$v = \sqrt{\frac{\gamma RT}{M}}$$

$$\frac{v_1}{v_2} = \sqrt{\frac{M_2}{M_1}}$$

$$= \sqrt{\frac{32}{2}}$$

$$= 4 : 1$$

44. Answer (3)

$$x = a \sin(\omega t - \alpha)$$

$$y = b \cos(\omega t - \alpha)$$

$$= b \sin \left(\omega t - \alpha + \frac{\pi}{2} \right)$$

$$\Delta\phi = \frac{\pi}{2}$$

45. Answer (1)

$$x = 3 \sin 2t + 4 \cos 2t$$

$$A = \sqrt{3^2 + 4^2}$$

$$A = 5$$

$$x = 5 \sin(2t + \phi)$$

$$v = \frac{dx}{dt} \Rightarrow v = 10 \sin(2t + \phi)$$

$$v_{\max} = 10 \text{ m/s}$$

46. Answer (4)

$$v_{\text{r.m.s}} \propto \sqrt{\frac{T}{M}}$$

$$\left(\frac{T}{M}\right)_{\text{O}_2} = \left(\frac{T}{M}\right)_{\text{N}_2}$$

$$T_{\text{N}_2} = 400 \times \frac{28}{32}$$

$$= 350 \text{ K}$$

$$= 77^\circ\text{C}$$

47. Answer (2)

$$C = C_V + \frac{R}{1-n}$$

$$P = kV$$

$$PV^{-1} = k$$

$$C = C_V + \frac{R}{2}$$

48. Answer (2)

Heat supplied to a gas raises its internal energy and does some work against expansion, so it is a special case of law of conservation of energy.

49. Answer (1)

$$Q = \Delta U + W$$

For adiabatic process

$$Q = 0$$

$$W = -\Delta U$$

50. Answer (1)

$$Q = \Delta U + W$$

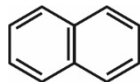
$$400 = \Delta U - 100$$

$$\Delta U = 500 \text{ J}$$

CHEMISTRY

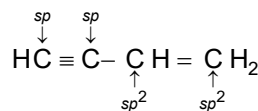
SECTION - A

51. Answer (3)



all atoms are sp^2 hybridise so all atoms are coplanar.

52. Answer (3)



53. Answer (1)

$\text{Fe}_4[\text{Fe}(\text{CN})_6]_3$ give blue colour.

54. Answer (1)

10 ml of 1 M H_2SO_4 corresponds to 10 mmol

It will neutralize 20 mmol of NH_3

$$\text{Weight of N} = \frac{14 \times 20}{1000} \text{ g} = 0.280 \text{ g}$$

Thus 0.70 g sample of organic compounds contains 0.280 g of nitrogen.

The percentage of nitrogen in the organic sample is $\frac{0.280}{0.70} \times 100 = 40\%$.

55. Answer (2)

$(\text{CH}_3)_3\text{N}$ and $\text{C}_2\text{H}_5\text{O}^-$ are nucleophiles as these can donate a l.p. of electrons.

56. Answer (1)

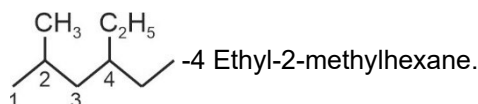
Phenol is not a heterocyclic compound.

57. Answer (3)

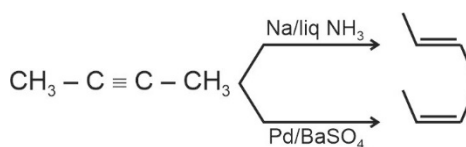
Pollutants which are slowly degradable, remain in the environment in an unchanged form for many decades. DDT, plastic materials, heavy metals and B.H.C.

Natural polymers are decomposed by microbial activities.

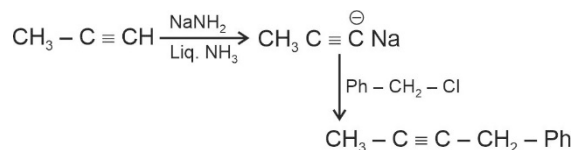
58. Answer (1)



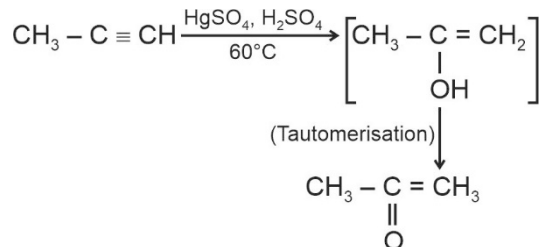
59. Answer (1)



79. Answer (2)



80. Answer (1)



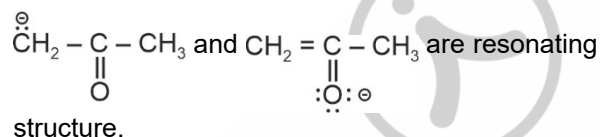
81. Answer (3)

Both statements are correct.

82. Answer (1)

ZSM-5 is used to convert alcohols directly into gasoline.

83. Answer (1)



84. Answer (2)

BOD is an analytical parameter representing the amount of dissolved oxygen consumed by aerobic bacteria growing on the organic material present in the water sample at a specific temperature over a specific time period.

85. Answer (2)

Earth is protected from UV rays by ozone layer.

SECTION - B

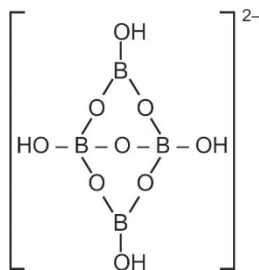
86. Answer (2)

Ozone, Acrolein and peroxyacetyl nitrate are the common components of photochemical smog.

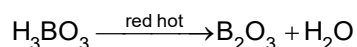
87. Answer (3)

 Pb does not show catenation due to the inability $p\pi - p\pi$ bond formation.

88. Answer (4)



89. Answer (3)



90. Answer (3)

 Six large sized chlorine atoms cannot be accommodated around Si^{4+} so, $[\text{SiCl}_6]^{2-}$ does not exist.

91. Answer (2)

 SiC is known as carborundum while Al_2O_3 is known as corundum.

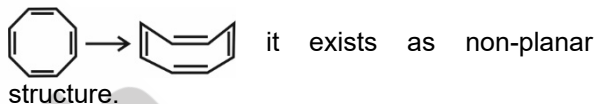
92. Answer (4)

The bond order in diamond is 1 and in graphite is 1.5.

93. Answer (2)

BN has graphite like structure.

94. Answer (4)



95. Answer (3)

Element	MP
Si	1693 K
Ge	1218 K
Sn	505 K
Pb	600 K

96. Answer (2)

 Sn^{+4} and Pb^{+2} are the most stable oxidation states of Sn and Pb.

97. Answer (1)

Human body cannot excrete heavy metals such as cadmium, mercury so these are dangerous to humans.

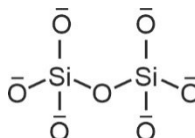
98. Answer (1)

 The correct order of $-I$ effect of the substituents is $-\overset{+}{\text{NH}_3} > -\text{NO}_2 > -\text{F}$

99. Answer (3)

Both the statements are correct.

100. Answer (1)

 Pyrosilicates contain $\text{Si}_2\text{O}_7^{6-}$ ions which are formed by joining two SiO_4^{4-} units. One oxygen atom is shared between them.


BOTANY**SECTION - A**

101. Answer (3)
Magnesium is a macronutrient.
102. Answer (2)
Very little gaseous transport occur between plant parts.
Loosely packed parenchyma facilitate gaseous exchange.
Stomata and lenticels help in gaseous exchange.
103. Answer (3)
Anabena and *Azotobacter* can fix N_2 in free living state.
104. Answer (4)
Jan Ingenhousz showed in an elegant experiment with an aquatic plant that in bright sunlight, small bubbles were formed around the green parts while in the dark no bubbles were formed. Later he identified these bubbles to be of oxygen.
105. Answer (4)
Nitrogen is a component of vitamins, proteins and nucleic acid.
106. Answer (2)
Radioisotopic techniques were used to prove that O_2 evolved by the green plants comes from H_2O .
107. Answer (3)
Nickel is a component of urease enzyme.
108. Answer (3)
Hydroponics involve culturing plants in a soil-free, defined mineral solution.
109. Answer (1)
Fe and Cu can be reversibly oxidised and reduced during electron transport chain for photosynthesis and respiration.
110. Answer (1)
Mg is required to synthesize DNA and RNA.
111. Answer (4)
Fatty acids convert into acetyl CoA which enters the Krebs cycle.
112. Answer (2)
Fructose 1,6-bisphosphate $\xrightarrow{\text{Aldolase}}$ DHAP + PGAL.
113. Answer (2)
Two successive steps of decarboxylation occurs during Krebs cycle.
114. Answer (1)
 Mg^{2+} is an activator of hexokinase and pyruvate kinase
115. Answer (1)
Dark reaction (biosynthetic phase) occurs in stroma.
Cyclic photophosphorylation occurs in stroma lamellae.
During light reaction, proton concentrated in thylakoid lumen.
116. Answer (2)
Glutamic acid (amino donor) + Oxaloacetic acid (amino acceptor) \rightarrow α -ketoglutaric acid + Asparagic acid
117. Answer (1)
Absorption maxima of photosystem II is 680 nm.
118. Answer (1)
The nodule of soyabean export the fixed nitrogen as ureides.
119. Answer (4)
The continued oxidation of acetyl CoA via the TCA cycle requires the regeneration of OAA.
120. Answer (3)
Reaction center of PS-I has chlorophyll a and absorbs the light at 700 nm.
121. Answer (3)
In mitochondrial ETC, ubiquinone is reduced to form ubiquinol by complexes I and II.
122. Answer (2)
During C_4 pathway, OAA is formed in mesophyll cell.
123. Answer (4)
Substrate level phosphorylation does not occur during Calvin cycle.

124. Answer (1)
Yeast poison themselves to death when the concentration of alcohol reaches about 13 percent.
125. Answer (2)
Micronutrients are also known as trace elements.
126. Answer (1)
Citrate synthase is required for Krebs cycle and is found in mitochondrial matrix.
127. Answer (1)
RuBisCO enzyme during carboxylation produces 3-phosphoglyceric acid.
128. Answer (3)
Maltose molecule is composed of 2 hexose sugars and each hexose sugar requires six Calvin cycles for its formation.
129. Answer (2)
For each ATP produced, $4H^+$ passes through F_0 from the intermembrane space to the matrix down the electrochemical proton gradient.
130. Answer (3)
Non-cyclic photophosphorylation takes place under optimum light, aerobic conditions and in the presence of carbon dioxide.
Cyclic photophosphorylation operates under low light intensity, anaerobic conditions or when CO_2 availability is poor.
From PS I, electrons move downhill to reduce $NADP^+$.
131. Answer (1)
Photorespiration is absent in C_4 plants.
132. Answer (4)
Bundle sheath cells of C_4 plants have agranal chloroplasts so that light reaction and thus O_2 production do not take place here.
133. Answer (1)
Pyruvate is formed in cytosol.
Acetyl CoA is formed in mitochondrial matrix.
 $NADH + H^+$ is formed in both mitochondrial matrix and cytosol.
134. Answer (3)
NADP reductase is located on the stromal side of thylakoid membrane.
135. Answer (4)
T.W. Engelmann has used *Cladophora* and aerobic bacteria.
136. Answer (4)
 F_1 is the site of ATP synthesis.
137. Answer (1)

$$\text{Pyruvic acid} + \text{CoA} + \text{NAD}^+ \xrightarrow[\text{Pyruvate dehydrogenase}]{\text{Mg}^{2+}} \text{Acetyl CoA} + \text{CO}_2 + \text{NADH} + \text{H}^+$$
138. Answer (2)
R.Q. value for organic acid is more than unity because more CO_2 is evolved than O_2 consumed.
139. Answer (4)
Deficiency of N, P and K is seen first in older parts.
Lack or low level of N, K, S, Mo causes an inhibition of cell division.
Micronutrients are also used as component of fertilisers.
140. Answer (2)
Sucrose and glucose totally have 18C which further need 18 CO_2 to be fixed. Each CO_2 needs 3 ATP and 2 NADPH for fixation.
141. Answer (1)
Complex II does not pump any proton.
142. Answer (3)
Photolysis of H_2O is associated with PS-II, thus providing e^- to PS-II.
143. Answer (2)
Ammonification of organic nitrogen releases ammonia.
144. Answer (3)
Complete oxidation of $NADH + H^+$ and $FADH_2$ form 3 and 2 ATP molecules respectively.
145. Answer (3)
Chromatographic separation of the leaf pigments show various colours. For instance, chlorophyll a shows bright or blue green and chlorophyll b shows yellow-green.
146. Answer (2)
Absorption spectrum represents the graphic curve showing the amount of energy of different wavelengths of light absorbed by pigments.

147. Answer (4)

Frankia, *Rhodospirillum* and *Beijerinckia* → Nitrogen fixation

Nitrosomonas → Nitrification

148. Answer (1)

Leg-haemoglobin binds to O₂, making anaerobic condition.

149. Answer (2)

Complex I contains FMN and Fe-S.

150. Answer (3)

Development of root nodules in soyabean include following steps:

- (i) *Rhizobium* bacteria come in contact with a susceptible root hair, divide near it.
- (ii) Curling of root hair.
- (iii) Formation of infection thread.
- (iv) Modification of *Rhizobium*.
- (v) Division of inner cortical and pericycle cells.

ZOOLOGY

SECTION - A

151. Answer (3)

Semicircular canal and the otolith together form vestibular apparatus, located above the cochlea.

152. Answer (1)

G-actins polymerise in the presence of Mg²⁺ to form F-actin.

153. Answer (2)

When a neuron is not conducting any impulse, *i.e.*, resting, the axonal membrane is comparatively more permeable to K⁺ ions and nearly impermeable to Na⁺.

154. Answer (2)

Frogs possess mesonephric kidneys.

155. Answer (3)

Myofilaments, sarcomere, myofibrils, sarcoplasm and sarcolemma are part of a muscle fibre which is covered by endomysium.

156. Answer (1)

The inner area of the cerebral hemisphere is called the white matter because of the presence of tracts *i.e.* bundles of myelinated nerve fibres in this area.

157. Answer (4)

Osmoreceptors of the body are activated by changes in blood volume, body fluid volume and ionic concentration. An excessive loss of fluid from the body can activate these receptors that trigger the release of ADH from posterior pituitary.

158. Answer (3)

The length of A-band remains unchanged during muscle contraction.

159. Answer (4)

A canal called cerebral aqueduct passes through the midbrain.

160. Answer (2)

Dialysing fluid have the same composition as that of plasma except the nitrogenous waste.

161. Answer (2)

White skeletal muscle fibres are supplied by less blood capillaries as compared to red muscle fibres and possess less amount of myoglobin.

162. Answer (1)

The retina forms the inner coat of the eyeball which contains the photoreceptor cells.

163. Answer (4)

Osmolarity in cortex (300 mOsmL⁻¹) increases towards medullary interstitium (1200 mOsmL⁻¹) mainly due to NaCl and urea.

164. Answer (3)

Fibrous joints are present between skull bones as well as in between teeth and jaw sockets.

165. Answer (4)

Retina contains three layers of cells, from inside to outside – ganglion cells, bipolar cells and photoreceptor cells.

166. Answer (2)

The medulla of kidney is divided into a few conical masses projecting into the calyces.

167. Answer (2)

Saddle joint is a type of synovial joint between carpal and metacarpal of thumb in humans.

168. Answer (2)

Neurons are divided into three types

- (i) Multipolar – Found in cerebral cortex
- (ii) Bipolar – Found in retina of eye
- (iii) Unipolar – Found in embryonic stage

169. Answer (4)

The epithelial cells of Bowman's capsule called podocytes are arranged in an intricate manner so as to leave minute spaces called filtration slits.

170. Answer (3)

According to sliding filament theory, actin and myosin filaments do not shorten but actin filament slide over the myosin filaments during muscle contraction.

171. Answer (4)

At electrical synapses, the membranes of pre- and post-synaptic neurons are in very close proximity.

172. Answer (1)

Protonephridia or flame cells are excretory and osmoregulatory structures in platyhelminths.

173. Answer (3)

Tonus is the normal tone of a resting muscle.

174. Answer (4)

Coordination of muscles movement is function of cerebellum.

175. Answer (3)

The medulla oblongata contains centres which control respiration, cardiovascular reflexes and gastric secretions.

176. Answer (2)

The total number of tarsals in an adult man is 14.

177. Answer (4)

In the resting state, a subunit of troponin masks the active binding sites for myosin on the actin filaments.

178. Answer (1)

Clavicle is commonly known as collar bone. It has two curvatures and two ends *i.e.* medial and lateral. Medial end of clavicle articulates with sternum and its lateral end articulates with acromion process of scapula.

179. Answer (4)

Urea is absorbed by collecting tubule and transported back into medullary interstitium where it is secreted into ascending limb of loop of Henle to complete its cycle.

180. Answer (2)

Projections of renal pelvis are known as renal calyces in which medullary pyramids project.

181. Answer (3)

The efferent arteriole emerging from the glomerulus forms a fine capillary network around the renal tubule called the peritubular capillaries.

182. Answer (2)

The supply of O₂ is increased which necessitates an increase in rate of respiration, heart beat and increased blood flow *via* blood vessels.

183. Answer (4)

The CNS includes the brain and the spinal cord and is the site of information processing and control.

184. Answer (1)

Neurons are excitable cells because their membranes are in a polarised state.

185. Answer (2)

At the site of excitation, within a fraction of a second, rapid efflux of K⁺ ions restores the resting membrane potential and nerve fibre becomes once more responsible to further stimulation.

SECTION - B

186. Answer (2)

Catla is a bony fish which excretes ammonia as ammonium ions through gill surfaces. So, kidneys do not play any significant role in its elimination.

187. Answer (3)

The loop of Henle is too short in cortical nephrons and the loop of Henle is very long and runs deep into the medulla in juxtamedullary nephrons.

188. Answer (2)

Cardiac output = 6.25 litre/minute
= 6250 mL/minute

Roughly 1/5th of cardiac output reaches the kidneys per minute *i.e.*

$6250 \times 1/5 = 1250 \text{ mL/min}$

189. Answer (2)

The descending limb of loop of Henle is permeable to water and almost impermeable to electrolytes.

190. Answer (1)

In *Planaria* and *Amphioxus*, protonephridia or flame cells are present as excretory structures which are mainly concerned with osmoregulation.

191. Answer (1)

Both cardiac and skeletal muscles are striated but cardiac muscles are involuntary in their regulation.

192. Answer (3)

About 40-50 per cent of the body weight of a human adult is contributed by muscles.

193. Answer (4)

In a resting state, the central part of thick filament, not overlapped by thin filaments is called 'H' zone.

194. Answer (1)

Ethmoid is a flat bone present in anterior part of base of cranium.

195. Answer (3)

The bones of thoracic cavity which participate in the formation of rib cage in an adult man are

1.	Thoracic vertebrae	= 12
2.	Ribs	= 24
3.	Sternum	= 1
	Total	= 37

196. Answer (4)

Dendrites are always unmyelinated whereas axons may be myelinated or unmyelinated.

197. Answer (4)

Waves in perilymph and endolymph finally produce a ripple in basilar membrane. Due to movement of basilar membrane, hair cells bend pressing them against the tectorial membrane.

198. Answer (2)

Urinary bladder contains smooth muscles. The internal and external urethral sphincters relax during micturition. Signal for micturition is initiated by stretching of the urinary bladder.

199. Answer (2)

At the posterior pole of the eye lateral to blind spot, there is a yellowish pigmented spot called macula lutea with a central pit called the fovea.

200. Answer (4)

The layer of cells which covers the cerebral hemisphere is called cerebral cortex and is thrown into prominent folds.

□ □ □