



FINAL TEST SERIES for NEET-2024

MM : 720

Test-4

Time : 3 Hrs. 20 Mins.

Topics covered :

Physics : Thermodynamics, Kinetic Theory, Oscillations, Waves

Chemistry : Organic Chemistry-(Some Basic Principles and Techniques), Hydrocarbons

Botany : Photosynthesis in Higher Plants, Respiration in Plants

Zoology : Excretory Products and Their Elimination, Locomotion and Movement, Neural Control and Coordination

Instructions :

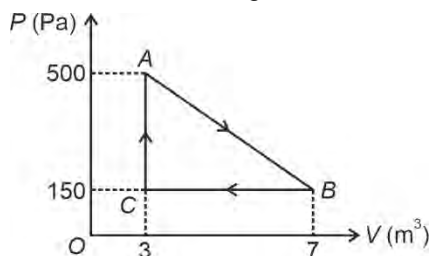
- There are two sections in each subject, i.e. Section-A & Section-B. You have to attempt all 35 questions from Section-A & only 10 questions from Section-B out of 15.
- Each question carries 4 marks. For every wrong response 1 mark shall be deducted from the total score. Unanswered / unattempted questions 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

1. A thermodynamic system is taken through a cyclic process. The total work done in the process is as shown in figure, is



- (1) 1300 J

(2) 700 J

(3) 600 J

(4) 500 J
- The temperature at which the translational kinetic energy of oxygen molecules becomes triple than its value at 127°C is

(1) 400 K

(2) 927 K

(3) 927°C

(4) 381°C

3. Consider the following statements

Statement I: If work is done by the system in a thermodynamic process, its volume may increase.

Statement II: The thermodynamic process, in which internal energy of the system remains constant may be isothermal.

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

- (1) Statement I is false but statement II is true
- (2) Statement I is true but statement II is false
- (3) Both statements I and II are true
- (4) Both statements I and II are false

4. The temperature of an ideal gas is increased from 100 K to 400 K. If root mean square speed of a gas at 100 K is v , then root mean square speed of the gas at 400 K will be

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

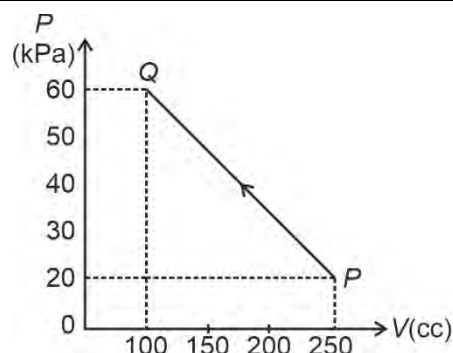
5. A source supplies heat to a system at the rate of 1200 W. If the system performs work at a rate of 300 W, then the rate at which internal energy of the system increases is

- (1) Zero
- (2) 1500 W
- (3) 900 W
- (4) 1200 W

6. The number of air molecules per cm^3 are increased from 4×10^{20} to 16×10^{20} . The ratio of collision frequency of air molecules before and after the increase in number respectively is

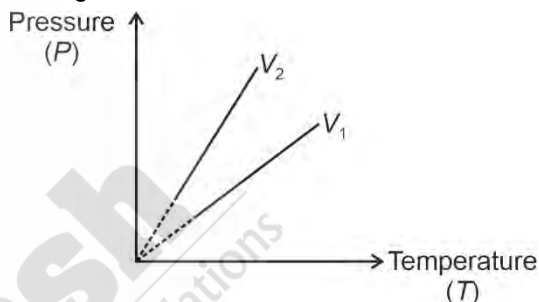
- (1) 0.25
- (2) 0.50
- (3) 4
- (4) 0.75

7. The pressure of a gas changes linearly with volume from P to Q as shown in figure. If no heat is supplied to or extracted from the gas, then change in the internal energy of the gas will be



- (1) 4.5 J
- (2) 6 J
- (3) 8 J
- (4) 3 J

8. A plot between pressure and temperature of an ideal gas at two different volumes is shown.



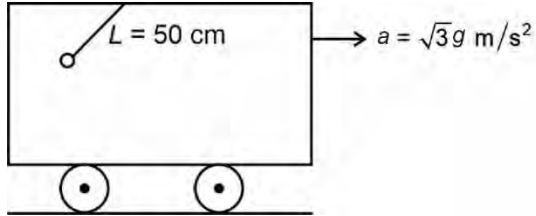
Which of the following conclusion can be drawn based upon above graph?

- (1) $V_1 > V_2$
- (2) $V_1 < V_2$
- (3) $V_1 = V_2$
- (4) Insufficient data to draw any conclusion

9. A particle is executing simple harmonic motion. The ratio of potential energy and kinetic energy of the particle when its displacement is one third of its amplitude will be

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

Space for Rough Work

10. A particle executes simple harmonic motion between $x = -A$ to $x = +A$. If time taken by particle to go from $x = 0$ to $\frac{A}{2}$ is 3 s then time taken by particle in going from $x = \frac{A}{2}$ to A is
- (1) 1.5 s (2) 3 s
(3) 6 s (4) 4.5 s
11. When a particle executes simple harmonic motion, the nature of graph of acceleration as a function of velocity will be
- (1) Straight line (2) Circular
(3) Elliptical (4) Sinusoidal
12. A simple harmonic motion is represented by equation $y = 8 (\sin 5\pi t + \sqrt{3} \cos 5\pi t)$ cm where t is time in seconds. The amplitude and time period of the simple harmonic motion is
- (1) 16 cm, 0.2 s (2) 2 cm, 0.4 s
(3) 16 cm, 0.4 s (4) 32 cm, 0.4 s
13. A steel wire with mass per unit length 5×10^{-3} kg m⁻¹ is under tension of 50 N. The speed of transverse wave in the wire will be
- (1) 10 m/s (2) 100 m/s
(3) 20 m/s (4) 50 m/s
14. A transverse travelling wave is described by the equation $y(x, t) = 0.04 \sin(20x - 5t)$ m. The velocity of the wave is (assume all quantities are in SI unit)
- (1) 4 m/s (2) 0.25 m/s
(3) 8 m/s (4) 0.5 m/s
15. The velocity of sound in a gas, in which two wavelengths 5.06 m and 5.14 m produce 60 beats in 15 s, will be
- (1) 1300.42 m/s (2) 1515 m/s
(3) 717.7 m/s (4) 314 m/s
16. Two identical strings A and B made of same material are having tension T_A and T_B in them. If their fundamental frequencies are 200 Hz and 150 Hz respectively, then the ratio T_A/T_B is
- (1) $\frac{2}{3}$ (2) $\frac{3}{2}$
(3) $\frac{16}{9}$ (4) $\frac{9}{16}$
17. If a simple harmonic motion is represented by $\frac{d^2x}{dt^2} + 4x = 0$ then the time period of resulting simple harmonic motion is
- (1) $\frac{\pi}{2}$ s (2) 2π s
(3) $\frac{\pi}{3}$ s (4) π s
18. A monoatomic gas undergoes a polytropic process which is given by the expression $PV^\beta = \text{constant}$. The molar specific heat capacity of the gas will be (where R represents the universal gas constant)
- (1) R (2) $2R$
(3) $3R$ (4) $\frac{2}{R}$
19. 8 moles of an ideal gas are present at 25°C. If the pressure of the gas is increased by 100% and volume is reduced by 50% then the final temperature of the gas will be
- (1) 25 K (2) 25°C
(3) 219°C (4) 50°C
20. A simple pendulum 50 cm long is suspended from the roof of a cart accelerating in the horizontal direction with constant acceleration $\sqrt{3}g$ m/s² as shown in figure. The period of small oscillations of the pendulum about its equilibrium position nearly is ($g = \pi^2$ m/s²)
- 
- (1) 1.0 s (2) $\sqrt{3}$ s
(3) 3.57 s (4) 2.78 s

Space for Rough Work

21. Three waves of equal frequencies having amplitudes $10\ \mu\text{m}$, $4\ \mu\text{m}$ and $7\ \mu\text{m}$ arrive at a given point with successive phase difference of $\frac{\pi}{2}$. The amplitude of the resulting wave in μm is given by

(1) 7 (2) 6
(3) 5 (4) 4

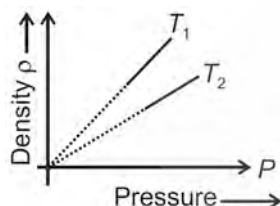
22. When a particle performs simple harmonic motion then its

(1) Velocity continuously changes and acceleration remains constant
(2) Velocity and acceleration changes continuously
(3) Velocity remains constant and acceleration continuously changes
(4) Velocity and acceleration does not change

23. The graph between the square of fundamental frequency and tension in wire is

(1) Straight line (2) Parabola
(3) Ellipse (4) Hyperbola

24. The density (ρ) versus pressure (P) graph for a given mass of an ideal gas at two different temperatures T_1 and T_2 is shown below. The correct relation between T_1 and T_2 may be



(1) $T_1 > T_2$
(2) $T_1 < T_2$
(3) $T_1 = T_2$
(4) Insufficient information to establish relation

25. Speed of sound wave in a fluid is

(1) Directly proportional to square of bulk modulus of medium
(2) Inversely proportional to square of density of medium

(3) Directly proportional to square root of product of bulk modulus and density of medium
(4) Inversely proportional to square root of density of medium

26. One mole of an ideal gas undergoes a process

which is described by the relation $P = \frac{P_0}{1 + \left[\frac{V_0}{V}\right]^2}$,

here P_0 and V_0 are constants. Change in temperature of the gas when volume is changed from $V = V_0$ to $V = 2V_0$ is (where symbols have their usual meaning)

(1) $\frac{-2P_0V_0}{5R}$ (2) $\frac{11P_0V_0}{10R}$
(3) $\frac{-5P_0V_0}{4R}$ (4) P_0V_0

27. The equation of a travelling wave on a string moving in positive x -direction is given by the $y = A\sin(\omega t - kx)$. It is reflected from a rigid boundary at $x = 0$. The equation of reflected wave is $y_r =$

(1) $-A\sin(\omega t - kx)$ (2) $-A\sin(\omega t + kx)$
(3) $A\sin(\omega t - kx)$ (4) $A\cos(\omega t + kx)$

28. A simple harmonic motion of a particle is represented by an equation

$y = A\sin\omega t + A\sin(\omega t + 120^\circ) + A\sin(\omega t - 60^\circ)$.

The maximum displacement of the particle from mean position will be

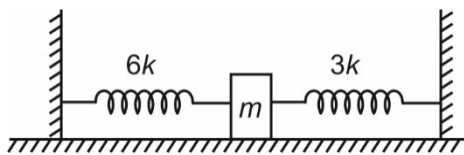
(1) A (2) $2A$
(3) $3A$ (4) $\sqrt{3}A$

29. The relation between internal energy U , pressure P and volume V of a gas in an adiabatic process is $U = a + bPV$ where a and b are positive constants. (All the symbols have their usual meaning). The value of ratio of molar specific heats (γ) is

(1) $\frac{a}{b}$ (2) $\frac{b+1}{b}$
(3) $\frac{a+1}{a}$ (4) $\frac{b}{a}$

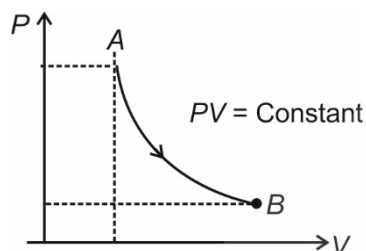
Space for Rough Work

30. A block of mass m is connected with two springs as shown in the figure. Time period of small oscillation of block is

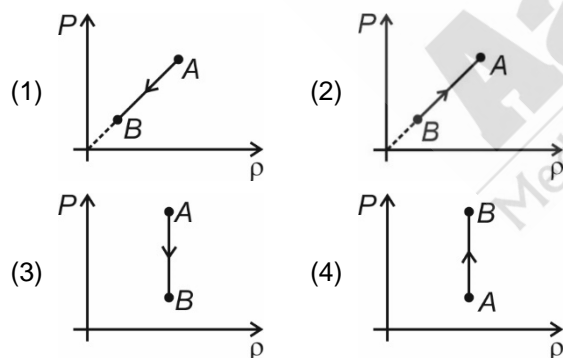


- (1) $2\pi\sqrt{\frac{m}{k}}$
 (2) $2\pi\sqrt{\frac{m}{2k}}$
 (3) $2\pi\sqrt{\frac{m}{9k}}$
 (4) $2\pi\sqrt{\frac{9m}{k}}$

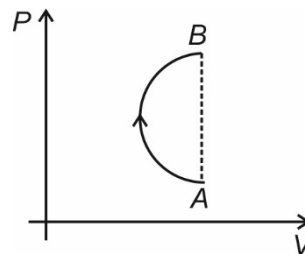
31. Consider P - V diagram for fixed mass of an ideal gas as shown below.



Which of the following represents the most appropriate variation of pressure with density?



32. Consider the process of an ideal gas as shown in figure. The work done by the system is



- (1) First positive then negative
 (2) Always positive
 (3) Always negative
 (4) First negative then positive
33. Which of the following equation may not represent stationary waves?

(All the symbols have their usual meaning)

- (1) $y = 2A\sin(kx)\cos(\omega t)$
 (2) $y = 2A\cos(\omega t)\cos(kx)$
 (3) $y = A\sin(\omega t)$
 (4) $y = 2A\cos(kx)\sin\omega t$

34. Consider a mixture of 5 moles of helium gas and 10 moles of oxygen gas (molecules are taken to be rigid as an ideal gas.) Its C_P/C_V value will be

- (1) $\frac{13}{19}$ (2) $\frac{19}{13}$
 (3) $\frac{15}{13}$ (4) $\frac{17}{13}$

35. Which of the following relation for an ideal gas is incorrect? (K_B = Boltzmann's constant and N_A is Avagadro's number)

(All other symbols have their usual meaning)

- (1) $C_P - C_V = R$ (2) $K_B = \frac{R}{N_A}$
 (3) $C_V = \frac{R}{\gamma - 1}$ (4) $C_P = \frac{R\gamma}{\gamma + 1}$

Space for Rough Work

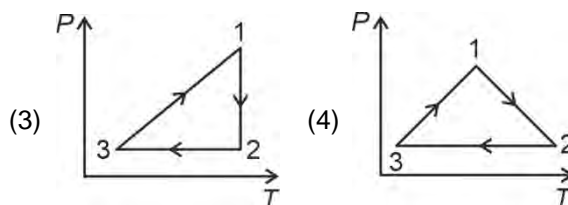
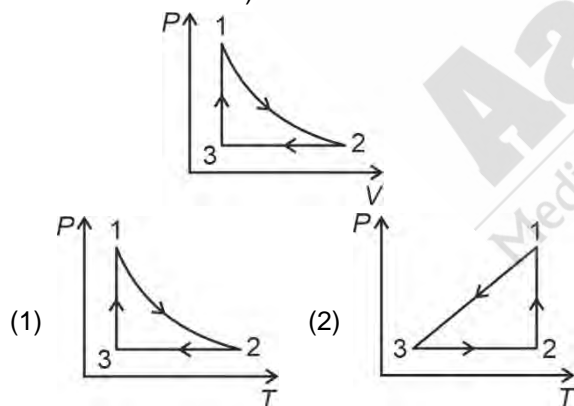
SECTION - B

36. Some thermodynamic processes are shown in column I and their properties in column II. Match correct entries in Column I with Column II.

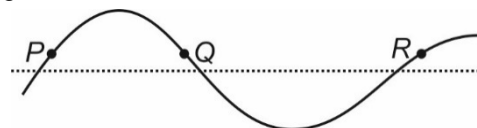
Column I	Column II
a. Isobaric process	(p) No heat interaction
b. Isochoric process	(q) Temperature is constant
c. Isothermal process	(r) Volume is constant
d. Adiabatic process	(s) Pressure is constant

Choose the correct answer from the options given below.

- (1) a(s), b(r), c(p), d(q) (2) a(s), b(r), c(q), d(p)
 (3) a(r), b(s), c(q), d(p) (4) a(s), b(q), c(r), d(p)
37. A gas mixture consists of 4 moles of oxygen and 6 moles of helium at temperature T . Assuming the gases to be ideal and the oxygen bond to be rigid, the total internal energy of the mixture is
 (1) $15RT$ (2) $25RT$
 (3) $19RT$ (4) $17RT$
38. Which of the following is an equivalent cyclic process corresponding to the thermodynamic cycle given in the figure? Assume the process $1 \rightarrow 2$ to be isothermal. (Graphs are schematic and are not to scale)



39. The diagram shown below represents the instantaneous position of a string as a transverse progressive wave travels along it from left to right.



Which of the following options correctly shows the direction of the velocity of the particles P , Q and R of the string?

	P	Q	R
(1)	\downarrow	\uparrow	\downarrow
(2)	\uparrow	\downarrow	\uparrow
(3)	\uparrow	\uparrow	\downarrow
(4)	\uparrow	\downarrow	\downarrow

40. The displacement of an object attached to a spring and executing simple harmonic motion is given by $x = 4\cos(4\pi t)$ m. The time at which the maximum speed of object first occurs during its motion is

(1) $\frac{1}{2}$ s	(2) $\frac{1}{4}$ s
(3) $\frac{1}{6}$ s	(4) $\frac{1}{8}$ s

41. A body undergoes simple harmonic motion with a time period of 8 s. If the body starts the motion from mean position then the minimum time after which kinetic energy will become 50% of total energy is

(1) 1 s
(2) 2 s
(3) 3 s
(4) 4 s

Space for Rough Work

42. A string 4 m long and fixed at its both ends is driven by 180 Hz vibrator. The string vibrates in its fourth harmonic mode. The speed of the wave and its fundamental frequency is

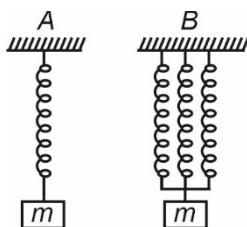
(1) 360 m/s, 60 Hz (2) 360 m/s, 45 Hz
(3) 180 m/s, 60 Hz (4) 180 m/s, 45 Hz

43. A uniform string of length 40 m is suspended from a rigid support. A short wave pulse is introduced at its lowest end. It starts moving up the string. The time taken by the wave to reach the support is

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

(1) $4\pi \text{ s}$ (2) $2\pi \text{ s}$
(3) 4 s (4) 2 s

44. The springs in figure A and B are of same material and identical in shape but length of spring in A is three times the length of each spring in B. The ratio of period $\frac{T_A}{T_B}$, is



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

45. Consider the following two statements

Statement-A: The average translational kinetic energy at a given temperature increases as degree of freedom increases.

Statement-B: The ratio of molar specific heat at constant pressure to that at constant volume always increases as the atomicity increases.

The correct statement is

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

46. A certain process is established by relation, $PV^x = \text{Constant}$. If the heat (Q) given to a monoatomic gas under this process leads to a change in internal energy of a gas which is equal to $\frac{Q}{4}$ then the value of x is

(1) $\frac{7}{9}$ (2) 2
(3) $\frac{3}{5}$ (4) $\frac{6}{7}$

47. For a particle executing SHM with a frequency 80 Hz, the frequency of oscillation of its kinetic energy is

(1) 20 Hz (2) 120 Hz
(3) 40 Hz (4) 160 Hz

48. In an isothermal expansion at temperature T , the work done in expanding a gas from volume $2V$ to $5V$ is W . The work done in expanding the same gas from volume $10V$ to $25V$ at same temperature T will be

(1) $5W$ (2) $10W$
(3) $3W$ (4) W

49. The volume of an ideal diatomic gas is doubled isothermally. The internal energy

(1) Becomes double
(2) Increases four times
(3) Is halved
(4) Remains unchanged

50. A closed organ pipe (closed at one end) is excited to support the third overtone. It is found that air in the pipe has

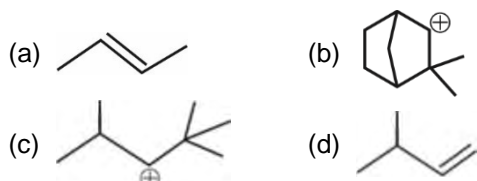
(1) Three displacement nodes and three displacement antinodes
(2) Three displacement nodes and four displacement antinodes
(3) Four displacement nodes and three displacement antinodes
(4) Four displacement nodes and four displacement antinodes

Space for Rough Work

CHEMISTRY

SECTION - A

51. Hyperconjugation is possible in case of



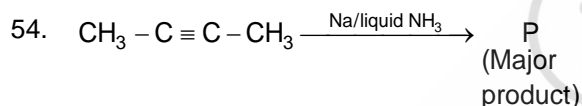
- (1) (a) and (d) only (2) (b) and (c) only
(3) (a), (c) and (d) only (4) (a), (b), (c) and (d)

52. Highest boiling point is observed for

- (1) 2-Methylbutane
(2) n-Pentane
(3) n-Hexane
(4) 2, 2 - Dimethylpropane

53. The most stable free radical among the following is

- (1) $(\text{CH}_3)_3\dot{\text{C}}$ (2) $(\text{CH}_3)_2\dot{\text{C}}\text{H}$
(3) $\text{C}_6\text{H}_5\dot{\text{C}}\text{H}_2$ (4) $(\text{C}_6\text{H}_5)_2\dot{\text{C}}\text{H}$



The major product P is

- (1) But-1-ene (2) Butane
(3) Cis-but-2-ene (4) Trans-but-2-ene

55. Rate of hydrogenation of which of the following alkene will be minimum?

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

56. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).

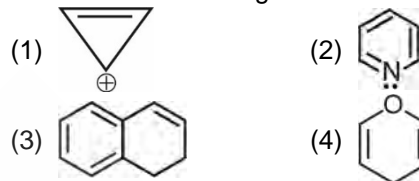
Assertion (A): Methoxypropane and ethoxyethane are metamers of each other.

Reason (R): Different alkyl chains are present on either side of functional group in the molecule.

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

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

57. Which of the following is not aromatic in nature?



58. Decreasing order of -I effect of the given groups is

- i. $-\text{CN}$ ii. $-\text{NO}_2$
iii. $-\text{NH}_2$ iv. $-\text{F}$
(1) iii > ii > i > iv (2) ii > iii > iv > i
(3) iii > ii > iv > i (4) ii > i > iv > iii

59. Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A): Reaction of HI with propene in the presence of peroxide results in the formation of iodine molecules.

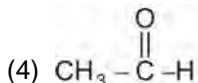
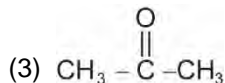
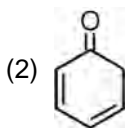
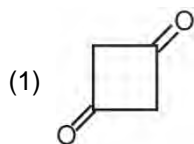
Reason (R): HI shows anti Markovnikov addition with propene.

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

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

Space for Rough Work

60. In which of the following compounds, tautomerism is favourable and enol form is the most stable?



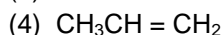
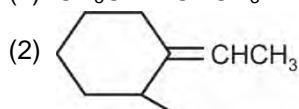
61. The technique which is used to separate different fractions of crude oil in petroleum industry is

- (1) Crystallisation
(2) Thin layer chromatography
(3) Sublimation
(4) Fractional distillation

62. In Carius method of estimation of halogen, 2.0 g of an organic compound gave 1.88 g of AgBr. Percentage of bromine in compound is (molar mass of AgBr = 188 g)

- (1) 20% (2) 40%
(3) 50% (4) 80%

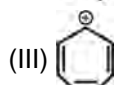
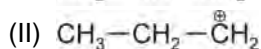
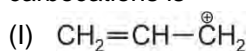
63. Which of the following compound does not exhibit geometrical isomerism?



64. The total number of cyclic isomers for a hydrocarbon with molecular formula C_4H_6 is

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

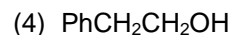
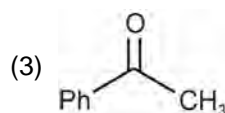
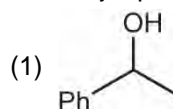
65. The correct order of stability of the following carbocations is



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

66. $\text{Ph}-\text{C}\equiv\text{C}-\text{H} \xrightarrow[\text{dil. H}_2\text{SO}_4]{\text{Hg}^{2+}} \text{A (Major)}$

The major product A is



67. $\text{H}-\text{C}\equiv\text{C}-\text{CH}_3 \xrightarrow{\text{HBr (excess)}} \text{A} \xrightarrow[\Delta]{\text{H}_2\text{O}} \text{B}$

The compound B is

- (1) A diol (2) An aldehyde
(3) A ketone (4) An alkyl halide

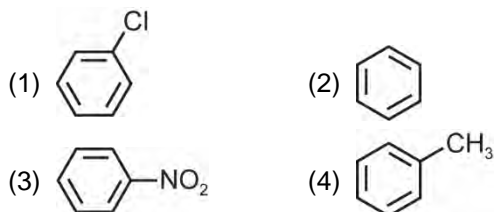
68. Match the following columns and choose the **correct** option.

	Column I (Reaction)		Column II (Mechanism)
(a)	Dehydration of alcohol	(i)	Electrophilic substitution
(b)	Halogenation of alkane	(ii)	Electrophilic addition
(c)	Reaction of halogen with alkene	(iii)	Free radical substitution
(d)	Sulphonation of benzene	(iv)	Elimination through carbocation intermediate

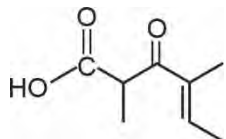
- (1) (a)(iv), (b)(i), (c)(ii), (d)(iii)
(2) (a)(iii), (b)(iv), (c)(i), (d)(ii)
(3) (a)(iii), (b)(ii), (c)(iv), (d)(i)
(4) (a)(iv), (b)(iii), (c)(ii), (d)(i)

Space for Rough Work

69. Which of the following is least reactive towards electrophilic attack?



70. The IUPAC name of the given compound is



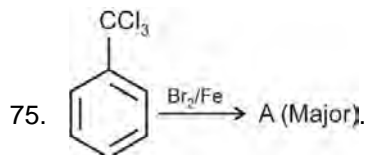
- (1) 2, 4, 6-Trimethyl-3-Oxopent-4-enoic acid
 (2) 1-Hydroxy-2, 4-dimethylhex-1, 3-dione
 (3) 3-Oxo-2, 4-dimethylhex-4-enoic acid
 (4) 2, 4-Dimethyl-3-oxohex-4-enoic acid
71. The product P in the following reaction is
- $$\text{C}_2\text{H}_6 + \text{O}_2 \xrightarrow[\Delta]{(\text{CH}_3\text{COO})_2\text{Mn}} \text{P}$$
- (1) $\text{CH}_3\text{CH}_2\text{OH}$ (2) CH_3CHO
 (3) C_2H_4 (4) CH_3COOH
72. The total number of conformation possible for ethane by rotation around C–C bond is
- (1) 2 (2) ∞
 (3) 4 (4) 9
73. $\text{CH}_3\text{MgBr} \xrightarrow{\text{C}_2\text{H}_5\text{OH}} (\text{A})$.
 The product (A) is
- (1) CH_4 (2) C_2H_6
 (3) $\text{CH}_3 - \text{O} - \text{C}_2\text{H}_5$ (4) C_3H_8
74. Given below are two statements:

Statement I: Aqueous sodium acetate undergoes Kolbe's electrolysis to form ethane gas at anode while H_2 and CO_2 are evolved at cathode.

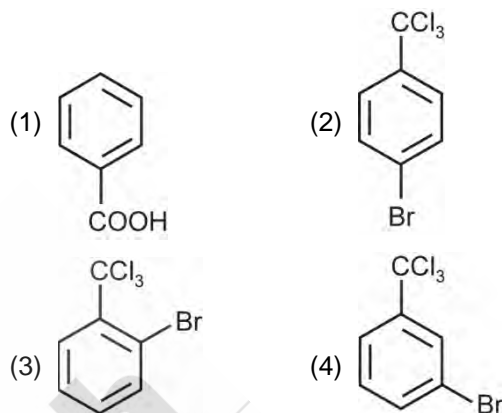
Statement II: The alkane obtained during Kolbe's electrolysis contains even number of carbon atoms.

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

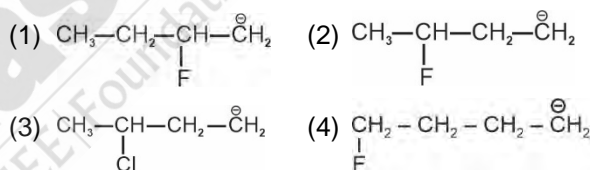
- (1) Statement I is true but statement II is false
 (2) Statement I is false but statement II is true
 (3) Both statements I and II are true
 (4) Both statements I and II are false



The major product A is

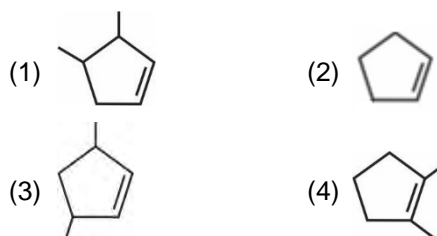


76. Which of the given carbanions is expected to be most stable?



77. Which of the following compounds produces

$\text{H}-\text{C}(=\text{O})-\text{CH}_2-\text{CH}_2-\text{C}(=\text{O})-\text{H}$ upon ozonolysis?

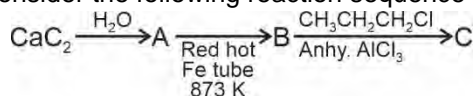


Space for Rough Work

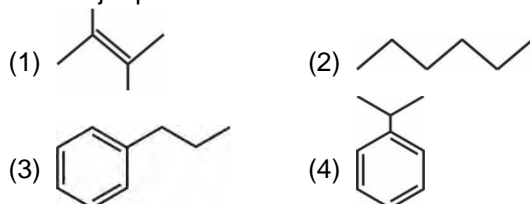
78. In which of the following molecules all atoms are coplanar?



79. Consider the following reaction sequence



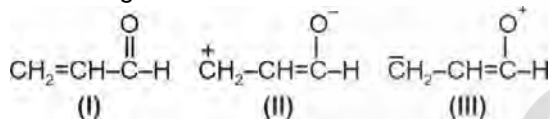
The major product C is



80. All of the following statements are correct for electrophiles, except

- (1) Electrophiles attack at high electron density site
 (2) Electrophiles are electron seeking
 (3) Electrophiles are Lewis bases
 (4) :CCl_2 is an electrophile

81. Correct order of relative stability of the given resonating structures is

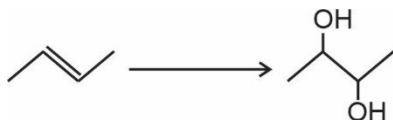


- (1) I > II > III (2) II > I > III
 (3) III > II > I (4) III > I > II

82. Which among the following is blood red in color?

- (1) $\text{Fe}_4[\text{Fe}(\text{CN})_6]_3 \cdot x\text{H}_2\text{O}$ (2) $[\text{Fe}(\text{CN})_5\text{NOS}]^{4-}$
 (3) $[\text{Fe}(\text{SCN})]^{2+}$ (4) $[\text{Fe}(\text{CN})_6]^{4-}$

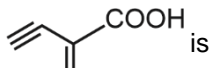
83. The most suitable reagent for the following conversion is



- (1) dil. KMnO_4 , 273 K
 (2) KMnO_4/H^+ + heat
 (3) O_3 , $\text{Zn}/\text{H}_2\text{O}$
 (4) $\text{Hg}^{2+}/\text{H}^+$, 333 K

84. Number of vinylic hydrogen atoms in $\text{CH}_3-\text{CH}=\text{CH}_2$ is

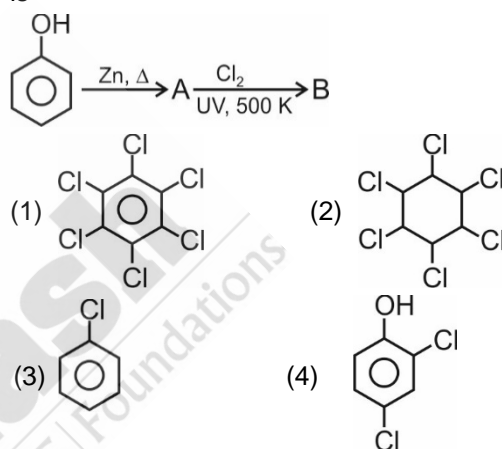
- (1) 3 (2) 2
 (3) 4 (4) 1

85. The sum of σ and π bonds in  is

- (1) 12 (2) 15
 (3) 18 (4) 14

SECTION-B

86. The product B in the following reaction sequence is



87. Given below are two statements:

Statement I: Silica gel and alumina are used as adsorbent for adsorption chromatography.

Statement II: Paper chromatography is a type of partition chromatography.

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

- (1) Statement I is true but statement II is false
 (2) Statement I is false but statement II is true
 (3) Both statements I and II are true
 (4) Both statements I and II are false

Space for Rough Work

88. In the hydrocarbon, $\overset{5}{\text{CH}_3} - \overset{4}{\text{CH}} = \overset{3}{\text{CH}} - \overset{2}{\text{C}} \equiv \overset{1}{\text{CH}}$, the hybridisation state of carbon 2, 3 and 5 are respectively

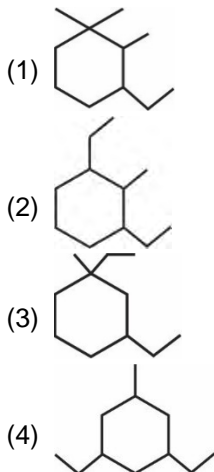
(1) sp, sp^2, sp^3 (2) sp^3, sp^2, sp^2
 (3) sp^2, sp^3, sp^2 (4) sp, sp, sp^3

89. n-Hexane $\xrightarrow[10-20 \text{ atm}]{\text{V}_2\text{O}_5, 773 \text{ K}}$ P(major)

The major product P is

(1) Cyclohexane (2) Phenol
 (3) Neopentane (4) Benzene

90. The correct structure of compound with IUPAC name of 1, 3-diethyl-2-methylcyclohexane is



91. Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R.

Assertion (A): Nitrogen cannot be estimated by Kjeldahl's method in case of pyridine.

Reason (R): Nitrogen in pyridine is present as heteroatom and does not change in ammonium sulphate during Kjeldahl's method.

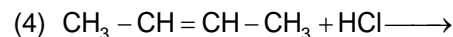
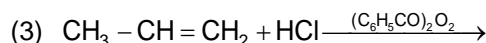
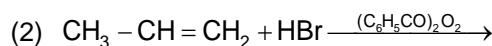
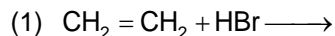
In the light of the above statements, choose the correct answer from the options given below:

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

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

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

92. Markovnikov's rule is applicable to which of the following reaction?



93. The major product obtained when 2-methylpropene is treated with dilute H_2SO_4 will be

(1) 2-Methylpropan-2-ol (2) 2-Methylpropane

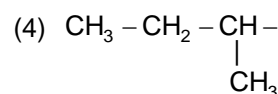
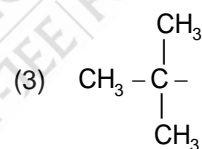
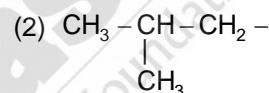
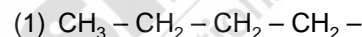
(3) Butanol (4) Butan-2-ol

94. In sulphur estimation 0.4 g of an organic compound gave 0.699 g of BaSO_4 . The % of sulphur in the compound is (Molar mass of $\text{BaSO}_4 = 233 \text{ u}$)

(1) 16% (2) 32%

(3) 24% (4) 64%

95. Among the following tert-butyl group is

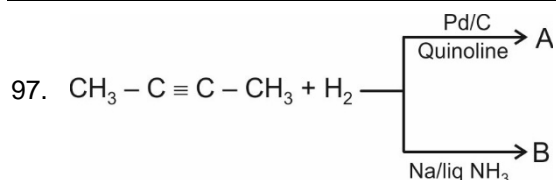


96. Which among the following hydrocarbons give only one product upon monochlorination (excluding stereoisomers)?

(1) Isobutane (2) Neopentane

(3) Methylcyclohexane (4) 3-methylpentane

Space for Rough Work



Choose the incorrect statement regarding the above reaction sequence.

- (1) Both A and B are geometrical isomers of each other
- (2) A has higher boiling point than B
- (3) Dipole moment of B is zero
- (4) A has higher melting point than that of B

98. On treating sodium fusion extract with sodium nitroprusside, appearance of violet colour indicates the presence of

- (1) S (2) Cl
- (3) Br (4) I

99. The colour of ammonium phosphomolybdate is

- (1) Black (2) Yellow
- (3) Green (4) Scarlet red

100. Among the following, +R group for electrophilic aromatic substitution reaction is

- (1) $-\text{OH}$ (2) $-\text{COOH}$
- (3) $-\text{CHO}$ (4) $-\text{COOR}$

BOTANY

SECTION - A

101. Read the following statements and choose the correct option.

Assertion (A): As electrons move through the photosystems, protons are transported across the thylakoid membrane.

Reason (R): The primary acceptor of electron of PS II is located towards the inner side of the thylakoid membrane, transfers its electron to an electron carrier.

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

102. Match Column I with Column II and select the correct option.

Column I (Enzyme)	Column II (Reactions)
a. Aldolase	(i) Catalyses the first step of glycolysis
b. Enolase	(ii) Catalyses the breakdown of a disaccharide

c. Hexokinase (iii) Converts 2-phosphoglycerate into phosphoenolpyruvate

d. Invertase (iv) Catalyses the splitting of the product of rate limiting step of glycolysis

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

103. Which of the following substances is/are never used as respiratory substrates?

- (1) Carbohydrates (2) Pure proteins
- (3) Fructose (4) Sucrose

104. $\text{RQ} = 1$ is true for

- (1) $\text{C}_5\text{H}_{98}\text{O}_6$ (2) $\text{C}_4\text{H}_6\text{O}_5$
- (3) $\text{C}_6\text{H}_{12}\text{O}_6$ (4) $\text{C}_2\text{H}_2\text{O}_4$

105. Which of the following acts as the final electron acceptor in the mitochondrial ETS?

- (1) FMN
- (2) Cytochrome b
- (3) Oxygen
- (4) Cytochrome c

Space for Rough Work

106. Pyruvic acid decarboxylase participates in the process of
 (1) Glycolysis
 (2) Alcoholic fermentation
 (3) Lactic acid fermentation
 (4) Oxidative phosphorylation
107. The key product of glycolysis is
 (1) Pyruvic acid (2) Glucose
 (3) Acetyl CoA (4) Lactic acid
108. Which of the following is the site of Krebs cycle?
 (1) Stroma of chloroplast
 (2) Intermembrane space of mitochondria
 (3) Mitochondrial matrix
 (4) Thylakoid membrane
109. Which of the following enzymes is common to both Krebs cycle and ETS?
 (1) NADH dehydrogenase
 (2) Malate dehydrogenase
 (3) Succinate dehydrogenase
 (4) α -ketoglutarate dehydrogenase
110. Amino acids undergoes _____ to enter into respiratory pathway.
 Select the **correct** option to fill the blank.
 (1) Deamination (2) Decarboxylation
 (3) Aminoacylation (4) Amination
111. Choose **incorrect** statement w.r.t. temperature as a factor affecting photosynthesis.
 (1) Dark reaction is temperature controlled
 (2) Light reaction is affected by temperature at a much lesser extent
 (3) At very low temperature, C_4 plant show higher rate of photosynthesis
 (4) Optimum temperature for C_3 plants is lower than that of C_4 plants
112. In chemiosmosis
 (1) There is no requirement of a proton pump
 (2) There is a measurable increase in the pH of the thylakoid lumen
 (3) Creation of H^+ gradient across the thylakoid membrane occurs
 (4) The gradient is broken down due to movement of electron across the membrane
113. Which of the following conversion steps occur during Krebs cycle in which decarboxylation takes place?
 a. $PGA \longrightarrow$ Acetaldehyde
 b. Pyruvic acid \longrightarrow Acetyl CoA
 c. Oxalosuccinic acid \longrightarrow α -Ketoglutaric acid
 d. α -Ketoglutaric acid \longrightarrow Succinyl CoA
 (1) b, c and d only (2) b and c only
 (3) c and d only (4) a, b, c and d
114. Respiration in plants is different from respiration in animals as
 (1) The plants do not breathe
 (2) The plants have special organs for breathing
 (3) Every plant part takes care of its own gas-exchange needs
 (4) The plants respire at rates faster than animals
115. Glycolysis occurs
 a. In all anaerobes
 b. In mitochondrial matrix of eukaryotes and in cytoplasm of prokaryotes
 c. With help of oxygen
 Select the **correct** one(s).
 (1) a only (2) a and b only
 (3) b and c only (4) All a, b and c
116. Select the **correct** one w.r.t. payoff phase of glycolysis.
 (1) Fructose-6-phosphate is converted into fructose 1, 6-bisphosphate
 (2) Substrate level phosphorylation takes place
 (3) Activation of glucose takes place
 (4) Glucose is phosphorylated to glucose-6-phosphate by ATP in the presence of enzyme hexokinase
117. Read the following statements and state **true (T)** or **false (F)**.
 A. In plants, the glucose used as respiratory substrate in glycolysis is derived from sucrose.
 B. Phosphofructokinase is known as the pacemaker enzyme of EMP pathway.

Space for Rough Work

C. Respiratory substrate is fat in protoplasmic respiration.

A B C

(1) T F F

(2) T F T

(3) T T F

(4) F T T

118. Coenzyme A is required in

- (a) Glycolysis
- (b) Lactic acid fermentation
- (c) Krebs cycle
- (d) Link reaction

The **correct** one(s) is/are

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

119. What will be the net gain of ATP if one molecule of PGAL is respired aerobically?

- (1) 20 ATP (2) 40 ATP
- (3) 10 ATP (4) 50 ATP

120. Find the number of carbons in following molecules and choose the **correct** option.

- (a) α -ketoglutaric acid
- (b) Acetyl-Coenzyme A
- (c) Dihydroxy acetone phosphate
- (d) Citric acid

(a) (b) (c) (d)

(1) 4 3 2 6

(2) 5 2 3 6

(3) 5 3 2 4

(4) 4 2 3 4

121. Stroma lamellae shows the presence of

- (1) PS II
- (2) PS I
- (3) NADP reductase
- (4) Oxygen evolving complex

122. Which of the following can be the possible location for cyclic photo-phosphorylation?

- (1) Inner membrane of chloroplast
- (2) Lumen of thylakoid

(3) Stoma lamellae

(4) Stroma

123. Select the component which is **not** associated with Z-scheme of light reaction of photosynthesis.

- (1) PS I (2) PS II
- (3) Cytochrome B₆f (4) RuBisCO

124. Which of the following transfers the electron between PS II and cytochrome B₆f?

- (1) Plastocyanin (2) Ferredoxin
- (3) FNR (4) Plastoquinone

125. External source of electrons for PS II is

- (1) Carbon dioxide (2) Oxygen
- (3) Water (4) Plastocyanin

126. Absorption spectrum of which of the following pigments coincides with the action spectrum of photosynthesis?

- (1) Chlorophyll *b* (2) Chlorophyll *a*
- (3) Anthocyanin (4) Fucoxanthin

127. Which of the following pigments imparts yellow-green colour in the chromatogram?

- (1) Chlorophyll *b* (2) Xanthophyll
- (3) Carotenoids (4) Chlorophyll *a*

128. Which of the following events is **not** associated with photochemical phase of photosynthesis?

- (1) Light absorption
- (2) Water splitting
- (3) Oxygen release
- (4) Formation of ADP and NADP⁺

129. Which of the following isotopes was used by Melvin Calvin to discover that the first CO₂ fixation product in C₃ plants is a 3-carbon organic acid?

- (1) ¹⁴C (2) ¹¹C
- (3) ¹³C (4) ¹²C

130. Which of the following plants does **not** show 'Kranz' anatomy in its leaves?

- (1) Maize
- (2) *Sorghum*
- (3) Sugarcane
- (4) Tomato

Space for Rough Work

131. C_4 plants are able to tolerate saline conditions due to
- (1) Spatial separation of two CO_2 fixation steps
 - (2) Presence of abundant organic acids in them
 - (3) Presence of granal chloroplasts in mesophyll cells
 - (4) Presence of low temperature sensitive enzyme PEP synthetase
132. Photorespiration is a wasteful process because
- (1) CO_2 and O_2 both compete for binding with the enzyme RuBisCO
 - (2) There is no synthesis of ATP or NADPH and there is release of fixed CO_2 with the utilisation of ATP
 - (3) O_2 is used in both chloroplast and peroxisome
 - (4) It can occur only in the presence of light
133. All of the following are characteristics of C_4 plant, **except**
- (1) Photosynthesis can occur when stomata are closed
 - (2) Presence of RuBisCO enzyme in bundle sheath cells
 - (3) Concentric arrangement of cells in leaf for better water utilisation
 - (4) Process of carbon fixation is quite slower
134. Read the statements given below.
- A. Photosynthesis is anabolic, endergonic and redox process.
- B. Photosynthesis occurs in all prokaryotes.
- Choose the **correct** option.
- (1) Statements A and B both are correct
 - (2) Only statement A is correct
 - (3) Only statement B is correct
 - (4) Statements A and B both are incorrect
135. Which of the following is **true** about C_3 plants?
- (1) They do not show photorespiration
 - (2) They are more efficient to fix the CO_2 as compared to C_4 plants
 - (3) They show CO_2 fertilization effect
 - (4) They show Kranz anatomy in their leaves

SECTION - B

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

Column I**Column II**

- | | |
|-----------------------|---|
| a. Joseph Priestley | (i) Green part of the plants could release oxygen |
| b. Jan Ingenhousz | (ii) Hydrogen from a suitable oxidisable compound reduces CO_2 to carbohydrates |
| c. Cornelius van Niel | (iii) Aided in the description of first action spectrum |
| d. T.W. Engelmann | (iv) Revealed the essential role of air in the growth of green plants |

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

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

Assertion (A): The TCA cycle requires the continued regeneration of NAD^+ and FAD^+ for its occurrence.

Reason (R): There are three points in the TCA cycle where both NAD^+ and FAD^+ is reduced to $NADH + H^+$ and $FADH_2$ respectively.

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

138. Moll's half leaf experiment is used to demonstrate the necessity of (A) for photosynthesis. Select the **correct** option to fill (A).

- | | |
|------------|-----------------|
| (1) Light | (2) CO_2 |
| (3) H_2O | (4) Chlorophyll |

Space for Rough Work

139. Alignment of chloroplasts along the walls of the mesophyll cells will ensure that the plant
- Will be unable to allow easy diffusion of gases
 - Will be able to protect themselves under low light intensities
 - Get the optimum quantity of the incident light
 - Will show very low rate of photosynthesis
140. What will be the net gain of ATP if one molecule of glucose undergoes glycolysis?
- 2 ATP
 - 4 ATP
 - 6 ATP
 - 10 ATP
141. State true (T) or false (F) to the following statements and mark the **correct** option.
- RuBisCO has a much greater affinity for O_2 than CO_2 when the $CO_2 : O_2$ is nearly equal.
 - Increase in intracellular CO_2 concentration can minimize the oxygenase activity of RuBisCO.
 - The binding of O_2 and CO_2 to RuBisCO is competitive.
- (a) – (F); (b) – (T); (c) – (T)
 - (a) – (F); (b) – (F); (c) – (T)
 - (a) – (T); (b) – (F); (c) – (T)
 - (a) – (T); (b) – (F); (c) – (F)
142. A. NADPH is called reducing power.
B. ATP synthase catalyses the formation of ATP.
C. NADPH is produced by facilitated diffusion of proton across the membrane via ETC.
- In the light of the above statements, choose the **correct** option.
- All A, B and C are correct
 - Only C is incorrect
 - A and B are incorrect
 - Only B is correct
143. All of the following are the assumptions made for making respiratory balance sheet, **except**
- There is a sequential, orderly pathway functioning with one substrate forming the next
 - None of the intermediates in pathway are utilized to synthesise any other compound
 - Only glucose is being respired
 - Any respiratory intermediate can be withdrawn from the pathway when needed
144. Choose the **incorrect** one for glycolysis.
- Both glucose and fructose are substrates of glycolysis
 - NADH is utilised during conversion of PGAL into 1, 3 bisphosphoglycerate
 - A molecule of water is removed during conversion of 2-phosphoglycerate to phosphoenolpyruvate
 - This process involves partial oxidation of glucose
145. The first step of TCA cycle
- Starts with condensation of product of link reaction with a four carbon compound and water
 - Yields a five carbon product
 - Is catalysed by citrate synthase
- The **correct** one(s) is/are
- a only
 - a & b only
 - b & c only
 - a & c only
146. How many $FADH_2$ molecules will be produced from 2 molecules of glucose in aerobic respiration?
- 8
 - 3
 - 4
 - 2
147. In ETS of chloroplast, cytochrome b_6f complex
- Transfers electrons between PS II and PS I
 - Is a primary electron acceptor
 - Transfers its electron to PS II
 - Accepts the electrons from PS I
148. During reduction step of Calvin cycle
- 2 molecules of ATP are consumed per CO_2 molecule fixed
 - Regeneration of CO_2 acceptor molecule occurs
 - Ribulose-1, 5 bisphosphate is formed
 - CO_2 is fixed by RuBisCO

Space for Rough Work

149. Most crucial step of Calvin cycle
- (1) Is carboxylation
 - (2) Is reduction
 - (3) Is the step in which RuBP is regenerated
 - (4) Involves sucrose production from 3 carbon molecule
150. Choose **incorrect** statement w.r.t. light as a factor affecting photosynthesis.
- (1) There is a linear relationship between incident light and CO₂ fixation rates at low light intensities
 - (2) Light saturation occurs at 10% of the full sunlight
 - (3) Low light intensity can damage the chlorophyll and results in the decline of rate of photosynthesis
 - (4) Light duration only affects the overall process of photosynthesis

ZOOLOGY

SECTION - A

151. The type of nitrogenous waste excreted by *Columba* is also excreted by
- (1) *Calotes*
 - (2) *Carcharodon*
 - (3) *Clarias*
 - (4) *Canis*
152. Even under the influence of vasopressin, maximum reabsorption of electrolytes takes place in 'X'. Choose the **correct** option w.r.t 'X'.
- (1) Absent in cortical nephrons
 - (2) Lined by brush bordered cuboidal epithelium
 - (3) Allows passage of small amounts of urea into the medullary interstitium
 - (4) Extends from cortex of the kidney to the inner parts of the medulla
153. The most toxic nitrogenous waste is named as 'P'. 'P' is excreted mainly by all of the following animals, **except**
- (1) Many bony fishes
 - (2) Aquatic amphibians
 - (3) Aquatic arthropods
 - (4) Many marine fishes
154. Read the given statements and select the **correct** option.
- Statement (A):** The PCTs of many nephrons open into a straight tube called loop of Henle, many of which converge and open into the renal pelvis through medullary pyramids in the calyces.
- Statement (B):** The renal tubule begins with a double walled cup-like structure called renal corpuscle which encloses glomerulus.
- (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
155. Choose the **correct** statement w.r.t. humans.
- (1) Presence of podocytes and Bowman's capsule is extremely important for water conservation in mammals.
 - (2) Passage of filtrate through the proximal tubules allow reabsorption of urea to maintain osmotic balance of medullary interstitium.
 - (3) The ascending limb of loop of Henle is impermeable to water.
 - (4) The non-selective process of osmoregulation performed by the kidneys is passive transport of H⁺ from tubular cells into filtrate that controls pH.

Space for Rough Work

156. Which of the following paired bones is a part of skull but not of face in humans?
- (1) Temporal (2) Maxilla
(3) Zygomatic (4) Palatine
157. The total number of vertebrosteral ribs in an adult human is
- (1) Equal to the total number of thoracic vertebrae in human
(2) More than the total number of carpals in both the forelimbs of human
(3) Less than the total number of cervical vertebrae in human
(4) Twice the total number of tarsals in one hindlimb of human
158. Choose the **incorrect** match w.r.t the structure of a sarcomere.
- (1) 'Z' line – Elastic fibre that bisects 'I' band
(2) 'A' band – Consists of both actin and myosin
(3) 'H' zone – Consists of only dark band
(4) 'M' line – Thick fibrous membrane that holds thin filaments
159. The similar feature between the type of muscles that assists in transportation of food through the digestive tract and the type of muscles that are primarily involved in the locomotory actions and changes of body postures is
- (1) Presence of striations
(2) Absence of multinucleated muscle fibres
(3) Presence of unbranched muscle fibres
(4) Position of nuclei
160. The type of movement that assists in movement of food through cytopharynx in *Paramoecium* also helps in
- (1) Swimming of human spermatozoa
(2) Passage of ova through genital tract in human females
(3) Maintenance of water current in *Sycon*
(4) Capturing of prey by *Hydra*
161. The part of human brain that controls cardiovascular reflexes is 'X'. Select the incorrect option w.r.t 'X'.
- (1) Part of brain stem as well as hind brain
(2) Also controls gastric secretions as well as urge for eating and drinking
(3) Connected to the spinal cord
(4) Possesses chemosensitive area
162. In neural tissue of humans, collections of RER and ribosomes are present in
- (A) Dendrites of neuron
(B) Axon of neuron
(C) Cyton of neuron
(D) Neuroglial cells
- Select the correct option.
- (1) (A) and (B) only (2) (B) and (C) only
(3) (A) and (C) only (4) (B) and (D) only
163. How many of the functions given below in the box are associated with the limbic system of human brain along with hypothalamus?
- Olfaction, Motivation, Excitement, Pleasure, Gastric secretion, Cardiovascular reflexes
- Choose the **correct** option.
- (1) Four (2) Five
(3) Three (4) Six

Space for Rough Work

164. Read the given statements and select the correct option.
- Statement (A):** The neural system in insects is composed of a network of neurons without brain as present in *Hydra*.
- Statement (B):** The neural system of all animals is composed of neurons which can detect, receive, produce and transmit different kinds of stimuli.
- (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
165. Visceral neural system and autonomic neural system are considered as the parts of
- (1) Central neural system
 - (2) Sympathetic neural system
 - (3) Peripheral neural system
 - (4) Somatic neural system
166. When a comparison of the volume of the filtrate formed per day with that of the urine released is done in a healthy human under normal conditions, it suggest that nearly _____ per cent of the filtrate has to be reabsorbed by the renal tubules.
- Choose the option that correctly fills the blank.
- (1) 70
 - (2) 60
 - (3) 99
 - (4) 89
167. Consider the given features w.r.t. human kidneys:
- (A) Originates from peritubular capillaries
 - (B) Absent in the majority of nephrons
 - (C) Runs parallel to loop of Henle
- The above given features are true for
- (1) Vasa recta
 - (2) Collecting duct
 - (3) Distal tubules
 - (4) Bowman's capsule
168. Choose the correct set of compounds that are eliminated from the human body through the secretions of sweat glands.
- (1) Cholesterol, degraded steroid hormones, vitamins and drugs
 - (2) NaCl, small amounts of urea and lactic acid
 - (3) Sterols, hydrocarbons and waxes
 - (4) Bilirubin, biliverdin and water
169. Renin converts angiotensinogen in blood to 'X' and further to 'Y'. 'Y' is responsible for all of the following, **except**
- (1) Vasoconstriction
 - (2) Activation of adrenal cortex to release mineralocorticoid
 - (3) Increase in glomerular blood flow
 - (4) Decrease in reabsorption of Na^+ and water from the distal parts of the tubule
170. During the complete muscle contraction, there is
- (1) Reduction in the length of 'A' band
 - (2) Shortening of muscle
 - (3) Increase in the length of 'H' zone
 - (4) No change in the length of 'I' band
171. Choose the **incorrect** match w.r.t joints in humans.
- (1) Pivot joint – Between 1st and 2nd cervical vertebrae
 - (2) Gliding joint – Between carpal and metacarpal of thumb
 - (3) Ball and socket joint – Between humerus and pectoral girdle
 - (4) Fibrous joint – Between occipital and sphenoid

Space for Rough Work

172. Identify and select the age-related disorder characterised by decreased bone mass and increased chances of fractures whose common cause is decreased levels of estrogen in women.

- (1) Osteoporosis
- (2) Myasthenia gravis
- (3) Muscular dystrophy
- (4) Gout

173. All of the following are true w.r.t. nodes of Ranvier, **except**

- (1) Presence of axolemma
- (2) Absence of Nissl's granules
- (3) Presence of myelin sheath
- (4) Presence of axoplasm

174. **Assertion (A):** The cerebral cortex is referred to as the grey matter due to its greyish appearance.

Reason (R): Myelinated nerve fibres are concentrated in the cerebral cortex.

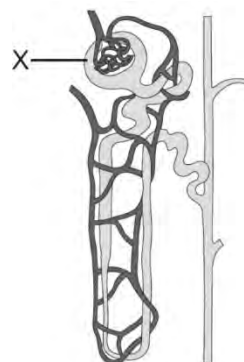
In the light of above statements, select the **correct** option.

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

175. The total number of ATP molecule(s) utilized during the active transport of 2 K^+ ions from ECF to axoplasm and of 3 Na^+ ions from axoplasm into ECF by specific transmembrane protein to maintain resting potential of a neuron is/are

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

176. In the given figure, the structure labelled as 'X' is lined by



- (1) Simple squamous epithelium
- (2) Simple cuboidal brush bordered epithelium
- (3) Simple cuboidal ciliated epithelium
- (4) Compound epithelium

177. The juxtaglomerular apparatus is formed by the cellular modifications of

- (1) DCT only
- (2) DCT and efferent arteriole
- (3) DCT and afferent arteriole
- (4) DCT, afferent and efferent arterioles

178. The amount of blood filtered by the kidneys in an adult man under normal physiological conditions per hour is approximately

- (1) 1100 – 1200 mL
- (2) 33000 – 36000 mL
- (3) 5500 – 6000 mL
- (4) 66000 – 72000 mL

179. Which of the following prevents diuresis?

- (1) ADH
- (2) Alcohol
- (3) ANF
- (4) Caffeine

180. Uremia is a condition of malfunctioning of kidneys that leads to accumulation of

- (1) Uric acid in blood
- (2) Urea in urinary bladder
- (3) Urea in blood
- (4) Uric acid in kidneys

Space for Rough Work

181. Which of the following feature(s) is/are represented by muscles?

- a. Excitability
- b. Contractility
- c. Extensibility
- d. Elasticity

Choose the **correct** option.

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

182. A single U-shaped bone that is included in skull and present at the base of the buccal cavity is called

- (1) Hyoid (2) Mandible
- (3) Maxilla (4) Occipital condyle

183. The bone has a very hard matrix due to X in it and cartilage has slightly pliable matrix due to Y . Choose the **correct** option.

	X	Y
(1)	Sodium salts	Calcium salts
(2)	Calcium salts	Chondroitin salts
(3)	Chondroitin salts	Calcium salts
(4)	Potassium salts	Calcium salts

184. Red muscle fibres contain all of the following, **except**

- (1) High myoglobin content
- (2) Plenty of mitochondria
- (3) Many nuclei
- (4) High amount of sarcoplasmic reticulum

185. Choose the **incorrect** statement w.r.t. 'F' actin.

- (1) It is filamentous and helically wound.
- (2) It is a polymerised protein.
- (3) It is made up of contractile LMM and HMM.
- (4) It is a contractile protein.

SECTION - B

186. How many of the following statement(s) is/are **correct**?

- (a) Unmyelinated nerve fibres in PNS are enclosed by Schwann cells that do not form a myelin sheath around the axon.
- (b) Action potential is also termed as nerve impulse.
- (c) The organ of Corti is responsible for hearing and balance of the body
- (d) The new action potential developed in post-synaptic neuron may be either excitatory or inhibitory.

Choose the **correct** option.

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

187. Select the **incorrect** statement w.r.t ribs of an adult human.

- (1) Each rib is a flat thin bone and all ribs are connected dorsally to the sternum.
- (2) True ribs have two articulation surfaces at their dorsal end
- (3) The three pairs of vertebrochondral ribs are attached to 7th rib by hyaline cartilage.
- (4) There are two pairs of floating ribs.

188. The process through which two or more organs interact and complement the functions of one another is called

- (1) Implementation (2) Control
- (3) Coordination (4) Synapse

189. Choose the cranial meninx which is in direct contact with the brain tissue.

- (1) Dura mater
- (2) Arachnoid
- (3) Pia mater
- (4) Arachnoid and pia mater

Space for Rough Work

190. The cerebrum wraps around a structure, which is a major coordinating centre for sensory and motor signalling. The structure is
 (1) Thalamus (2) Hypothalamus
 (3) Midbrain (4) Cerebellum
191. During muscle contraction
 (1) Chemical energy is changed into mechanical energy
 (2) Mechanical energy is changed into chemical energy
 (3) Temperature of muscle decreases
 (4) Hydrolysis of ATP does not occur
192. Choose the **correct** statement w.r.t. micturition reflex.
 (1) It is initiated by stretch receptors of ureters.
 (2) Sympathetic stimulation causes relaxation of internal urethral sphincter.
 (3) Parasympathetic stimulation causes relaxation of urinary bladder muscles.
 (4) CNS passes on motor messages to initiate relaxation of urethral sphincter during micturition.
193. Activity that does not require skeletal function for the movement is
 (1) Finding reproductive mate
 (2) Searching and building of shelter
 (3) Passage of food through intestine
 (4) Chewing of food
194. Elimination of urea in urine is mainly the result of a process known as
 (1) Tubular secretion
 (2) Ultrafiltration
 (3) Active absorption
 (4) Selective reabsorption
195. Arrange the events which occur during muscle contraction.
 a. Action potential causes the release of Ca^{2+} ions into the sarcoplasm.
 b. Activated myosin head binds to the exposed active sites on actin to form cross bridge.
 c. A neural signal at neuromuscular junction causes the release of acetylcholine which generates action potential.
 d. Increase in Ca^{2+} levels leads to the binding of calcium with $\text{T}_\text{P}\text{C}$ on actin filaments thereby unmasking active sites for myosin on actin.
 Choose the **correct** option.
 (1) $a \rightarrow c \rightarrow b \rightarrow d$
 (2) $a \rightarrow c \rightarrow d \rightarrow b$
 (3) $c \rightarrow a \rightarrow d \rightarrow b$
 (4) $c \rightarrow d \rightarrow a \rightarrow b$
196. Kidneys are reddish brown, bean shaped structures situated between the levels of
 (1) Last thoracic and last lumbar vertebra
 (2) Last thoracic and first lumbar vertebra
 (3) First thoracic to third lumbar vertebra
 (4) Last thoracic and third lumbar vertebra
197. How many of the following structures given in the box below are considered mainly as excretory structures in animals?
- Malpighian tubules, Coxal glands, Trachea, Antennal glands, Kidneys, Book lungs
- (1) Six
 (2) Four
 (3) Five
 (4) Three

Space for Rough Work

198. The chemical synapse in which the membranes of the pre- and post-synaptic neurons are separated by a fluid-filled space called synaptic cleft is/shows
- (1) Rare in our body
 - (2) Faster impulse conduction than the synapses in which the membranes of pre- and post-synaptic neurons are in very close proximity
 - (3) Characterised by the involvement of neurotransmitters in the impulse transmission
 - (4) Flow of electrical current directly from one neuron into the other
199. Type of neuron characterised by presence of a single dendrite and a single axon emerging from its cell body is called
- (1) Multipolar neuron
 - (2) Bipolar neuron
 - (3) Unipolar neuron
 - (4) Pseudounipolar neuron
200. Neural system differs from endocrine system in showing all of the following, **except**
- (1) Point-to-point coordination
 - (2) Homeostasis
 - (3) Fast but short lived coordination
 - (4) Presence of glial cells



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