

PHYSICS - SECTION A

1 Given below are two statements:

Assertion (A):	When a spring is cut into two equal parts, the spring constant of each part of the spring is doubled.
Reason (R):	Spring constant is inversely proportional to the length of the spring.

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

2 Two sound waves move in the same direction in the same medium. The pressure amplitudes of the waves are equal but the wavelength of the first wave is double the second. Let the average power transmitted across cross-section by the first wave be P_1 and that by the second wave be P_2 . Then:

1.	$P_1 = P_2$	2.	$P_1 = 4P_2$
3.	$P_2 = 2P_1$	4.	$P_2 = 4P_1$

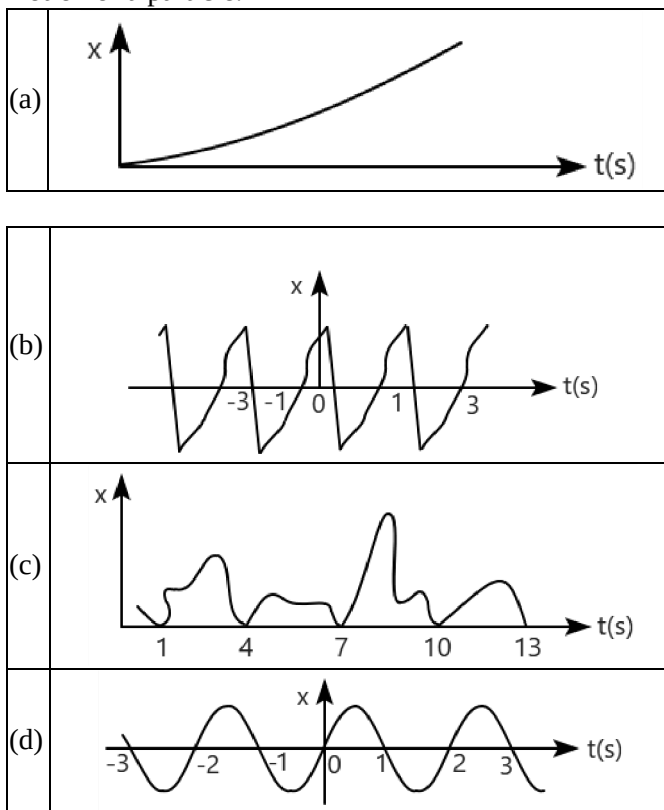
3 On average, a human heart is found to beat 72 times per minute. The frequency of heartbeat will be:

1.	0.833 s^{-1}	2.	1.2 s^{-1}
3.	12 s^{-1}	4.	72 s^{-1}

4 The displacement x of a particle varies with time t as $x = A \sin\left(\frac{2\pi t}{T} + \frac{\pi}{3}\right)$. The time taken by the particle to reach from $x = \frac{A}{2}$ to $x = -\frac{A}{2}$ will be:

1.	$\frac{T}{2}$	2.	$\frac{T}{3}$
3.	$\frac{T}{12}$	4.	$\frac{T}{6}$

5 The figure depicts four $(x - t)$ plots for the linear motion of a particle.



Which of the following is true?

1.	(a) is periodic but (c) is not periodic.
2.	(b) is periodic but (d) is not periodic.
3.	(b) and (d) are periodic.
4.	only (c) is periodic.

6 A particle displaced by wave has its motion represented by equation, $\frac{\sin(\omega t)}{\sqrt{2}} + \frac{\cos(\omega t)}{\sqrt{2}}$. The amplitude of the motion is:

1.	$\frac{1}{\sqrt{2}}$ unit	2.	$\sqrt{2}$ unit
3.	1 unit	4.	2 unit

7 Force acting on a body free to move on the X-axis is given by, $F = -kx^n$ where k is a positive constant. For which value of n motion of the body is not oscillatory?

1.	3	2.	7
3.	2	4.	5

- 8** The kinetic energy K for a particle executing simple harmonic motion is given by, $K = K_0 \sin^2 \omega t$. The maximum value of potential energy is:

1.	K_0	2.	zero
3.	$\frac{K_0}{2}$	4.	$\frac{K_0}{4}$

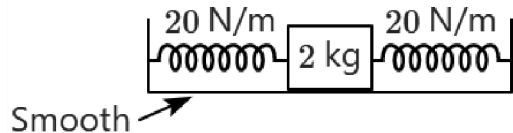
- 9** A tuning fork of frequency 480 Hz is used to vibrate a sonometer wire having natural frequency 410 Hz. The wire will vibrate with a frequency:

1.	410 Hz	2.	480 Hz
3.	820 Hz	4.	960 Hz

- 10** Which of the following equations represents a wave travelling along Y-axis?

- $x = A \sin(ky - \omega t)$
- $y = A \sin(kx - \omega t)$
- $y = A \sin ky \cos \omega t$
- $y = A \cos ky \sin \omega t$

- 11** A block of mass 2 kg is attached with two identical springs of force constant 20 N/m as shown in the figure. The time period of the oscillation of the block is:



- $2\pi \sqrt{\frac{1}{20}} \text{ s}$
- $\pi \sqrt{\frac{1}{20}} \text{ s}$
- $2\pi \sqrt{\frac{1}{10}} \text{ s}$
- $\pi \sqrt{\frac{1}{10}} \text{ s}$

- 12** A particle is fastened at the end of a string and is whirled in a vertical circle with the other end of the string being fixed. The motion of the particle is:

1.	periodic
2.	oscillatory
3.	simple harmonic
4.	angular simple harmonic

- 13** Two vibrating tuning forks producing progressive waves given by;

$$y_1 = 4 \sin(500\pi t - K_1 x), \quad y_2 = 2 \sin(506\pi t - K_2 x)$$

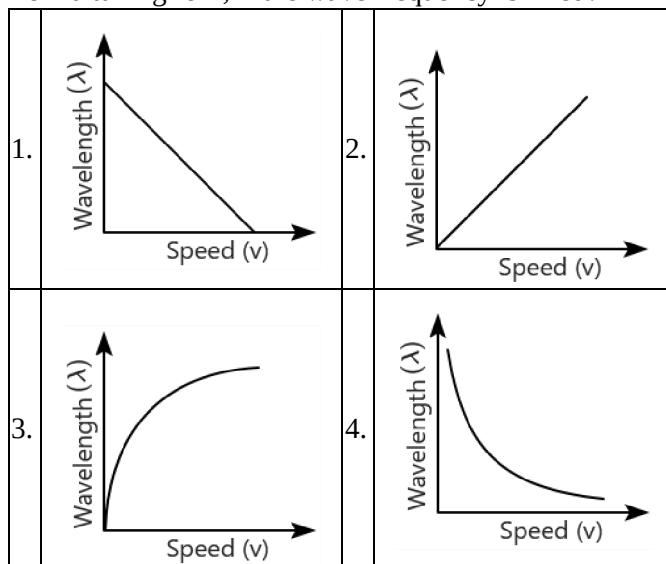
are held near the ear of a person. The person will hear:

- 9 beats/s
- 6 beats/s
- 3 beats/s
- 2 beats/s

- 14** An object of mass m is suspended at the end of a massless wire of length L and area of cross-section A . Young modulus of the material of the wire is Y . If the mass is pulled down slightly, its frequency of oscillation along the vertical direction is:

- $f = \frac{1}{2\pi} \sqrt{\frac{m A}{Y L}}$
- $f = \frac{1}{2\pi} \sqrt{\frac{Y L}{m A}}$
- $f = \frac{1}{2\pi} \sqrt{\frac{m L}{Y A}}$
- $f = \frac{1}{2\pi} \sqrt{\frac{Y A}{m L}}$

- 15** Which graph best represents the relationship between the wavelength and speed of waves emitted from a tuning fork, if the wave frequency is fixed?



16 Given below are two statements:

Assertion (A):	The graph of potential energy and kinetic energy of a particle in SHM with respect to position is a parabola.
Reason (R):	Potential energy and kinetic energy do not vary linearly with position.

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

17 A body of mass 20 g is executing SHM with amplitude 5 cm. When it passes through the equilibrium position its speed is 20 cm/s. What would be the distance from equilibrium when its speed becomes 10 cm/s?

1. $\frac{5\sqrt{3}}{4}$ cm
2. $\frac{5\sqrt{3}}{2}$ cm
3. $\frac{25\sqrt{7}}{2}$ cm
4. $5\sqrt{3}$ cm

18 The transverse wave propagating through a medium is given by $y = A \cos 2\pi \left[ft - \frac{x}{\lambda} \right]$. If the maximum particle velocity of the medium is two times the velocity of the wave through the medium, then:

1. $\lambda = 3.14A$	2. $\lambda = 6.28A$
3. $6.28\lambda = A$	4. $3.14\lambda = A$

19 A body oscillates simple harmonically with a period of 2 s starting from the origin (mean position). After what time, will its potential energy be 50% of the total energy?

1. $\frac{1}{6}$ s	2. $\frac{1}{4}$ s
3. $\frac{1}{3}$ s	4. $\frac{1}{12}$ s

20 The time period of a particle in simple harmonic motion is equal to the time between consecutive appearances of the particle at a particular point in its motion. This point is:

1.	the mean position
2.	an extreme position
3.	between the mean position and the positive extreme
4.	between the mean position and the negative extreme

21 Given below are two statements:

Assertion (A):	Sound waves cannot propagate through a vacuum but light waves can.
Reason (R):	Sound waves cannot be polarised but light waves can be.

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

22 The time taken by a particle performing SHM to pass from the point A to B where its velocities are same is 2 s. After another 2 s, it returns to point B. The time period of oscillation is:

1.	2 s	2.	8 s
3.	6 s	4.	4 s

23 Two simple pendulums of length 1 m and 1.44 m are at their mean position with their velocities in the same direction at some instant. After how many oscillations of bigger pendulum they will again be in the same phase?

1.	5	2.	6
3.	7	4.	8

24 The phase difference between velocity and displacement in a simple harmonic motion is:

1. π
2. $\frac{\pi}{2}$
3. $\frac{\pi}{4}$
4. zero

25 The displacement of an object attached to a spring and executing simple harmonic motion is given by $x = 4 \cos \pi t$ meters. The time at which the maximum magnitude of acceleration occurs first after the start is:

1. 0.5 s
2. 1 s
3. 2 s
4. 1.5 s

26 A wall clock uses a vertical spring-mass system to measure the time. Each time the mass reaches an extreme position, the clock advances by a second. The clock gives correct time at the equator. If the clock is taken to the poles it will:

1. run slow	2. run fast
3. stop working	4. give correct time

27 Displacement as a function of time is given as $y = 2\sin\omega t + 2\cos\omega t$. The amplitude of the function is:

1. $2\sqrt{2}$	2. 2
3. 4	4. 8

28 A particle performs SHM with frequency f . The frequency of its velocity and acceleration are respectively:

1. f, f
2. $\frac{f}{2}, f$
3. $2f, f$
4. $f, 2f$

29 The wave shown is traveling to the right. Which of the waves below, traveling to the left, will momentarily cancel this wave?

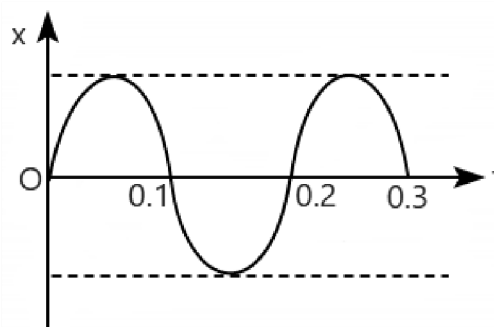


1.	2.
3.	4.

30 If the time period of a 2 m long simple pendulum is 2 s, the acceleration due to gravity at the place where the pendulum is executing simple harmonic motion is:

1. $\pi^2 \text{ m/s}^2$
2. $2\pi^2 \text{ m/s}^2$
3. 9.8 m/s^2
4. 16 m/s^2

31 The displacement (x) of an SHM varies with time (t) as shown in the figure. The frequency of variation of potential energy is:



1. 5 Hz	2. 10 Hz
3. 40 Hz	4. 20 Hz

32 Which of the following quantities are always zero in a simple harmonic motion?

a. $\vec{F} \times \vec{a}$
b. $\vec{v} \times \vec{r}$
c. $\vec{a} \times \vec{r}$
d. $\vec{F} \times \vec{r}$

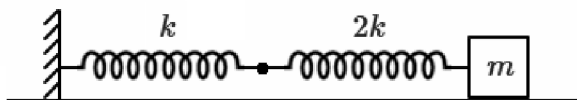
Choose the correct option:

1. (a) and (b)
2. (a), (b) and (c)
3. (b), (c) and (d)
4. all of these

33 A simple pendulum has some time period T . What will be the percentage change in its time period if its amplitude is decreased by 5%?

1. 6%
2. 3%
3. 1.5%
4. it will remain unchanged

- 34** Two springs are joined end-to-end and connected to a block of mass m . The angular frequency (ω) of oscillation is:



1. $\sqrt{\frac{2k}{3m}}$
2. $\sqrt{\frac{3k}{2m}}$
3. $\sqrt{\frac{3k}{m}}$
4. $\sqrt{\frac{k}{3m}}$

- 35** If the angular frequency of the given motion $y = \sin(\omega t) + \cos(\omega t)$ is $k\omega$, then value of k is:

1. $1/2$
2. 1
3. 2
4. none of these

PHYSICS - SECTION B

- 36** The first overtone of a closed organ pipe of length l_1 matches the fundamental frequency of an open pipe of length l_2 . Then,

1. $l_1 = 2l_2$
2. $l_2 = 2l_1$
3. $2l_1 = 3l_2$
4. $2l_2 = 3l_1$

- 37** The two lowest notes on the piano are A_0 (27.5 Hz) and $A\#_0$ (29.1 Hz). If you play the notes simultaneously, the resulting sound seems to turn off and on and off and on. How much time exists between the successive "on"s?

1.	0.6 s	2.	1.6 s
3.	28.3 s	4.	56.6 s

- 38** $y(x, t) = \frac{0.01}{[(4x+2t)^2+5]}$ represents a moving wave pulse, where x and y are in meter and t is in seconds. Then which of these statement(s) is incorrect?

1.	pulse is moving in $(-x)$ direction.
2.	wave speed is 0.5 m/s.
3.	maximum particle displacement is 1 cm.
4.	it is a symmetric pulse.

- 39** A transverse sinusoidal wave of amplitude a , wavelength λ and frequency f is traveling on a stretched string. The maximum speed of any point on the string is $\frac{v}{10}$, where v is the speed of propagation of the wave. If $a = 10^3$ m and $v = 10$ ms⁻¹, then λ and f are given by:
1. $\lambda = \pi \times 10^{-2}$ m
 2. $\lambda = 10^{-3}$ m
 3. $f = 10^{-3} / (2\pi)$ Hz
 4. $f = 10^4$ Hz

- 40** A string fixed at both ends is under tension T . It has a length L , and mass m . The fundamental frequency of the vibration is:

1.	$\frac{1}{2L} \sqrt{\frac{T}{m}}$	2.	$\frac{1}{4L} \sqrt{\frac{T}{m}}$
3.	$\frac{1}{2} \sqrt{\frac{TL}{2m}}$	4.	$\frac{1}{2} \sqrt{\frac{T}{mL}}$

- 41** Two strings A and B , made of same material, are stretched by same tension. The radius of string A is double of the radius of B . A transverse wave travels on A with speed v_A and on B with speed v_B . The ratio $\frac{v_A}{v_B} = ?$

1.	$\frac{1}{2}$	2.	2
3.	$\frac{1}{4}$	4.	4

- 42** The equation of vibration of a taut string, fixed at both ends, is given by:
 $y = (3 \text{ mm}) \cos\left(\frac{\pi x}{10 \text{ cm}}\right) \sin(800\pi \text{ s}^{-1} t)$ The positions of the nodes are:

1.	$x = 0 \text{ cm}, 10 \text{ cm}, 20 \text{ cm}, \dots$
2.	$x = 0 \text{ cm}, 20 \text{ cm}, 40 \text{ cm}, \dots$
3.	$x = 5 \text{ cm}, 10 \text{ cm}, 15 \text{ cm}, \dots$
4.	$x = 5 \text{ cm}, 15 \text{ cm}, 25 \text{ cm}, \dots$

43 The fundamental frequency of a vibrating organ pipe is 200 Hz.

- | | |
|----|-----------------------------------|
| a. | the first overtone is 400 Hz. |
| b. | the first overtone may be 400 Hz. |
| c. | the first overtone may be 600 Hz. |
| d. | 600 Hz is an overtone. |

Choose the correct option:

- | | |
|----|------------------|
| 1. | (a), (b) and (c) |
| 2. | (b), (c) and (d) |
| 3. | (a) and (b) |
| 4. | all of these |

44 Given below are two statements:

Assertion (A):	The flash of lightning is seen before the sound of thunder is heard.
Reason (R):	Speed of sound is greater than speed of light.

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

45 In a sinusoidal wave, the time required for a particular point to move from maximum displacement to zero displacement is 0.170 s. The frequency of the wave is:

- | | | | |
|----|---------|----|---------|
| 1. | 1.47 Hz | 2. | 0.36 Hz |
| 3. | 0.73 Hz | 4. | 2.94 Hz |

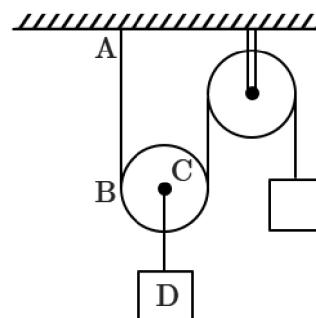
46 A sonometer wire supports a 5 kg load and vibrates in fundamental mode with a tuning fork of frequency 420 Hz. The length of the wire between the bridges is now doubled. In order to maintain fundamental mode with same frequency, the load should be changed to:

- | | | | |
|----|------|----|-------|
| 1. | 1 kg | 2. | 2 kg |
| 3. | 8 kg | 4. | 20 kg |

47 The first overtone of a closed pipe has a frequency f_c . A frequency that is $2f_c$ can be excited from an open pipe of the same length but vibrating in its:

- | | | | |
|----|--------------------------|----|---------------------------|
| 1. | 2 nd harmonic | 2. | 3 rd harmonic |
| 3. | 6 th harmonic | 4. | 12 th harmonic |

48 In the figure are shown two strings made of same material and have the same cross-section. The pulleys are light. The wave speed of a transverse wave in the string AB is v_1 and in CD it is v_2 . Then $\frac{v_1}{v_2}$ is:



- | | | | |
|----|------------|----|----------------------|
| 1. | 1 | 2. | 2 |
| 3. | $\sqrt{2}$ | 4. | $\frac{1}{\sqrt{2}}$ |

49 Two SHMs have equations:

$$x_1 = a \sin(\omega t + \phi_1) \text{ and } x_2 = a \sin(\omega t + \phi_2).$$

If the amplitude of the resultant SHM is equal to amplitude of superimposing SHM(s), the phase difference between them is:

- | | | | |
|----|-----------------|----|------------------|
| 1. | $\frac{\pi}{6}$ | 2. | $\frac{2\pi}{3}$ |
| 3. | $\frac{\pi}{4}$ | 4. | $\frac{\pi}{3}$ |

50 Increasing the wave amplitude of a standing wave will:

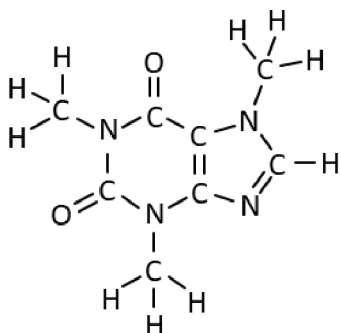
- | | |
|----|---|
| 1. | increase the number of nodes. |
| 2. | increase the number of antinodes. |
| 3. | increase the displacement of the cord at a node. |
| 4. | increase the displacement of the cord at an antinode. |

CHEMISTRY - SECTION A

51 0.16 g of an organic substance was heated in a carius tube and the sulphuric acid formed was precipitated as- BaSO_4 with BaCl_2 . The weight of the dry BaSO_4 was 0.35 g. The % of sulphur in the compound is:

1.	36.11	2.	30.04
3.	25.12	4.	42.12

52 The total number of lone pair of electrons in the given molecule is:

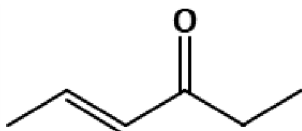


- :
1. 8
2. 6
3. 5
4. 7

53 The total number of unsaturated cyclic structure possible for a compound with the molecular formula C_4H_6 is:

1. 3
2. 4
3. 5
4. 6

54 The IUPAC name for the following compound is:



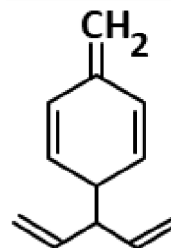
1.	4-Hexen-3-one	2.	3-Hexenone
3.	2-Hexene-4-one	4.	Hex-3-on-4-ene

55 Give the stability order of the following radicals:

(I)	$\text{CH}_3 - \dot{\text{C}}\text{H}_2$
(II)	$\text{CH}_3 - \dot{\text{C}}\text{H} - \text{CH}_3$
(III)	$\text{CH}_2 = \text{CH} - \dot{\text{C}}\text{H} - \text{CH}_3$
(IV)	$\text{CH}_3 - \dot{\text{C}}\text{H} - \text{C}_6\text{H}_5$

1. $\text{III} > \text{IV} > \text{II} > \text{I}$
2. $\text{IV} > \text{III} > \text{II} > \text{I}$
3. $\text{I} > \text{II} > \text{III} > \text{IV}$
4. $\text{IV} > \text{II} > \text{III} > \text{I}$

56 The number of moles of hydrogen will be required for the complete hydrogenation of one mole of the following compound is:

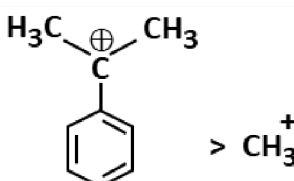
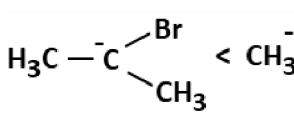
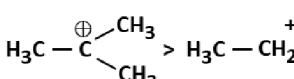
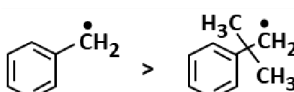
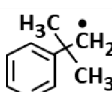


1. 6
2. 7
3. 5
4. 3

57 The total number of possible structural isomers with the molecular formula $\text{C}_5\text{H}_{10}\text{O}$ having either aldehyde or ketone functional group are:

1. 6
2. 4
3. 5
4. 7

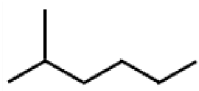
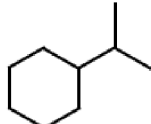
58 Match List-I with List-II and select the correct answer using the codes given below:

List I (Stability)	List II (Reason)
(A)  > CH ₃ ⁺	(1) Inductive effect
(B)  < CH ₃ ⁻	(2) Resonance
(C)  > H ₃ C-CH ₂ ⁺	(3) Hyper-conjugation and resonance
(D)  > 	(4) Hyper-conjugation and inductive effect

Codes:

1. A - 2; B - 3; C - 4; D - 1
2. A - 3; B - 1; C - 4; D - 2
3. A - 4; B - 3; C - 1; D - 2
4. A - 3; B - 4; C - 2; D - 1

59 Among the following, the compound which contains the fewest tertiary carbons is

1.	(CH ₃) ₃ C(CH ₂) ₂ CH ₃
2.	4-isobutylheptane
3.	
4.	

60 The electrophile species among the following is/are:

1. CO₂
2. NO₂⁺
3. AlCl₃
4. All of the above.

61 The increasing order of nucleophilicity of the following nucleophiles is:

(a)	CH ₃ CO ₂ [⊖]
(b)	H ₂ O
(c)	CH ₃ SO ₃ [⊖]
(d)	OH [⊖]

1. (b) < (c) < (a) < (d)	2. (b) < (c) < (d) < (a)
3. (a) < (d) < (c) < (b)	4. (d) < (a) < (c) < (b)

62 120 gram of an organic compound on combustion analysis gives 330 gram of carbon dioxide and 270 gram of water. % by mass of C and H in an organic compound is:

1. 50% C and 50% H
2. 60% C and 40% H
3. 80% C and 20% H
4. 75% C and 25% H

63 When n-hexane is heated with anhydrous AlCl₃ and HCl gas, the major products(s) obtained is/are:

1. Mixture of 2-methylpentane and 3-methylpentane.
2. 2-chlorohexane.
3. 3-chlorohexane .
4. Hex-3-ene.

64

Assertion (A):	It is impractical to separate Conformers.
Reason (R):	Conformers have a negligibly small difference in their potential energy.

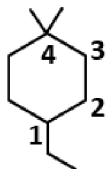
1.	Both (A) and (R) are true and (R) is the correct explanation of (A).
2.	Both (A) and (R) are true but (R) is not the correct explanation of (A).
3.	(A) is true but (R) is false.
4.	Both (A) and (R) are false.

65 Which of the following sodium compound(s) is/are formed when an organic compound containing both nitrogen and sulphur is fused with sodium?

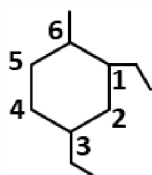
1. Cyanide and sulphide.
2. Thiocyanate.
3. Sulphite and cyanide.
4. Nitrate and sulphide.

66 The correct IUPAC numbering among the following is:

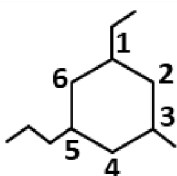
1.



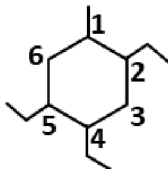
2.



3.

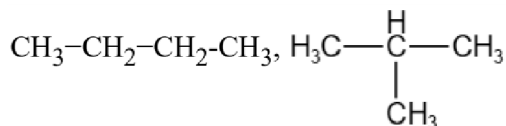


4.



67 Which of the following pairs represent isomers?

1. $\text{CH}_3\text{-CH}_3$, $\text{CH}_3\text{-CH}_2\text{-CH}_3$
2. $\text{H}_2\text{C=CH-OH}$, $\text{CH}_3\text{-O-CH}_3$
- 3.



4. All of the above.

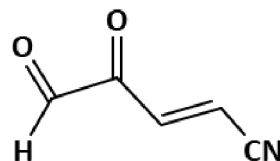
68 Incorrect statement/s among the following about alkynes is:

1. The first three members are gases.
2. All alkynes are odourless.
3. All alkynes are colorless.
4. They are lighter than water and immiscible with water.

69 Most stable compound among the following is:

1.		2.	
3.		4.	

70 The hybridization of carbon atoms in the following compound from left to right is:



1. sp^2 , sp^3 , sp^2 , sp^2 , sp
2. sp^2 , sp^2 , sp^2 , sp^2 , sp
3. sp^3 , sp^2 , sp^2 , sp^2 , sp^2
4. sp^3 , sp^2 , sp^2 , sp^2 , sp

71 The incorrect statement(s) among the following is/are:

a.	The spots of colorless compounds in TLC can be detected by putting the plate under infrared light.
b.	Carbohydrate is detected by spraying the plate with ninhydrin solution.
c.	Chromatography paper contains water trapped in it, which acts as the stationary phase.

1. Only a
2. Both a and b
3. Both b and c
4. Only c

72 Correct statement/s about organic isomers is /are -

a.	They have the same molecular formula.
b.	Their physical properties are very similar.
c.	They have a different structural formula.

1. a and b only.
2. a, b and c.
3. b and c only.
4. a and c only.

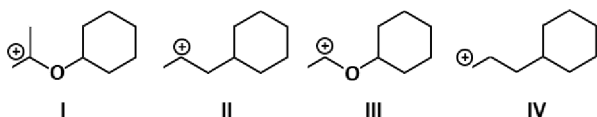
73 Which one of the following statements is not true for carbocation?

1. Carbocation is electrophile.
2. Carbocation is diamagnetic in character.
3. It is formed by homolytic bond fission.
4. It reacts with nucleophiles.

74 The possible number of distinct terminal alkynes are possible for a compound having molecular formula C_5H_8 is:

1. 1
2. 2
3. 3
4. 4

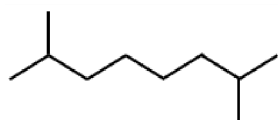
75 The correct order of stability of the following carbocations is:



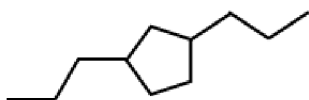
1. $II > IV > I > III$
2. $I > II > III > IV$
3. $II > I > IV > III$
4. $I > III > II > IV$

76 The hydrocarbon that cannot be prepared effectively by the Wurtz reaction is:

1.



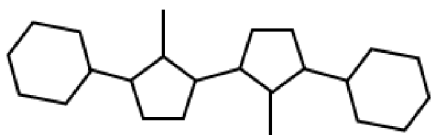
2.



3.

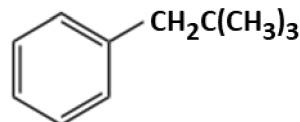


4.

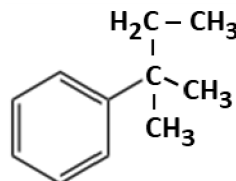


77 Neopentyl chloride reacts with benzene in the presence of a Lewis acid ($AlCl_3$) to form:

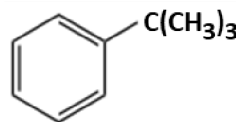
1.



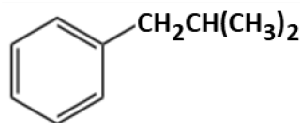
2.



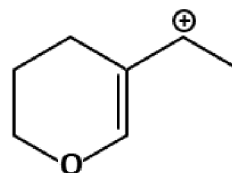
3.



4.



78 The total number of resonance structures (including the given structure) that can be drawn for the following carbocation is:



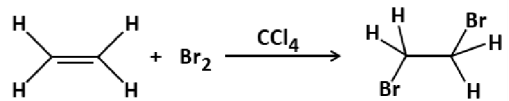
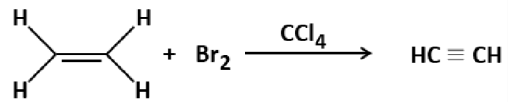
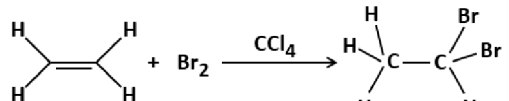
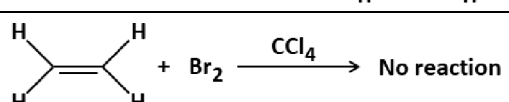
1. 0

2. 1

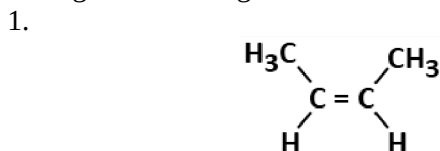
3. 3

4. 4

79 Which of the following reactions is correct?

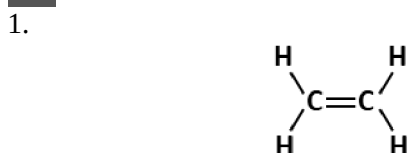
1.	
2.	
3.	
4.	

80 The hydrocarbons having the lowest dipole moment among the following is:

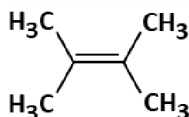


2. $\text{CH}_3 - \text{C} \equiv \text{C} - \text{CH}_3$
3. $\text{CH}_3\text{CH}_2\text{CH} = \text{CH}_2$
4. $\text{CH}_2 = \text{CH} - \text{C} \equiv \text{CH}$

81 Which of the following alkenes is the most stable?



2. $\text{CH}_3 - \text{CH} = \text{CH}_2$
3. $\text{H}_3\text{C} - \text{CH} = \text{CH} - \text{CH}_3$
4.

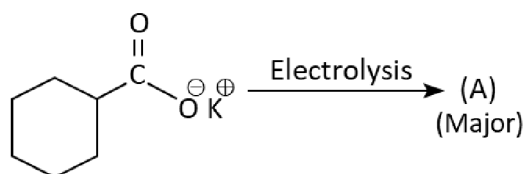


82 A few mixtures and their methods of separation are given in columns I and II respectively. Match the columns and mark the appropriate choice.

	Column I		Column II
(A)	Chloroform + aniline	(p)	Steam distillation
(B)	o-Nitrophenol + p-Nitrophenol	(q)	Distillation
(C)	Benzoic acid + Benzaldehyde	(r)	Fractional distillation
(D)	Fractions of crude oil	(s)	Sublimation

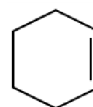
1. A-(r); B-(q); C-(p); D-(s)
2. A-(q); B-(r); C-(p); D-(s)
3. A-(q); B-(p); C-(s); D-(r)
4. A-(p); B-(r); C-(q); D-(s)

83

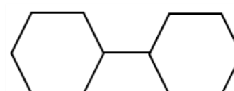


The major product (A) in the above reaction is:

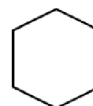
1.



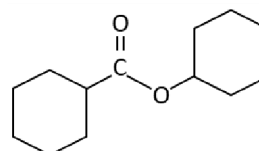
2.



3.



4.



84

	List-I (Chemicals)		List-II (Use/Preparation/Constitute)
A.	Alcoholic potassium hydroxide	(i)	Potassium salt of a carboxylic acid.
B.	Pd/BaSO ₄	(ii)	Obtained by addition reaction.
C.	BHC (Benzene hexachloride)	(iii)	Used for β -elimination.
D.	Kolbe's electrolytic method	(iv)	Lindlar's catalyst.

Choose the most appropriate match:

1. A-(ii), B-(i), C-(iv), D-(iii)
2. A-(iii), B-(iv), C-(ii), D-(i)
3. A-(iii), B-(i), C-(iv), D-(ii)
4. A-(ii), B-(iv), C-(i), D-(iii)

85 Among the following, the compound which is wrongly named is:

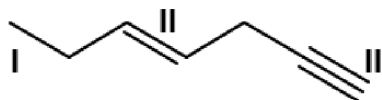
1.	$\begin{array}{c} \text{H}_2 \quad \text{H}_2 \quad \text{H} \\ \quad \quad \\ \text{H}_3\text{C}-\text{C}-\text{C}-\text{C}-\text{COOH} \\ \\ \text{Cl} \end{array}$	2-Chloropentanoic acid
2.	$\begin{array}{c} \text{H} \\ \\ \text{H}_3\text{C}-\text{C} \equiv \text{C}-\text{C}-\text{COOH} \\ \\ \text{CH}_3 \end{array}$	2-Methylpent-2-en-5-oic acid
3.	$\text{CH}_3\text{CH}_2\text{CH}=\text{CHCOCH}_3$	Hex-3-en-2-one
4.	$\begin{array}{c} \text{H} \quad \text{H}_2 \quad \text{H}_2 \\ \quad \quad \\ \text{H}_3\text{C}-\text{C}-\text{C}-\text{C}-\text{CHO} \\ \\ \text{CH}_3 \end{array}$	4-Methylpentanal

CHEMISTRY - SECTION B

86 The aromatic compound among the following is:

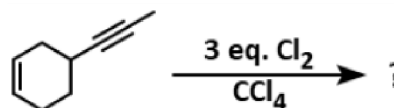
1.		2.	
3.		4.	

87 The correct decreasing order of bond length in the given compound is:



1. I > III > II
2. II > I > III
3. I > II > III
4. III > II > I

88 The major product of the following reaction is:

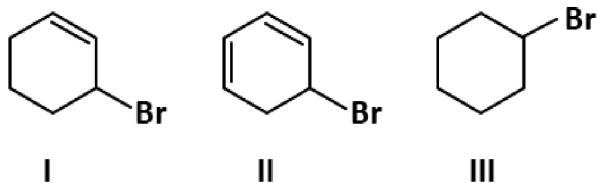


1.		2.	
3.		4.	

89 The compound obtained by addition of water to an alkyne having more than two carbons, in the presence of HgSO_4 and dilute H_2SO_4 at 333K, is:

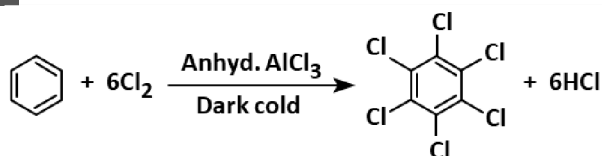
1.	A vicinal diol	2.	An aldehyde
3.	An alcohol	4.	A ketone

90 Arrange the following in decreasing order of stability of their transition state during elimination by a strong base.



1. II > I > III
2. II > III > I
3. I > III > II
4. I > II > III

91 The given reaction is an example of:



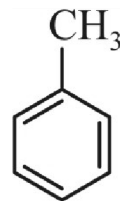
1. Addition reaction.
2. Nucleophilic substitution reaction.
3. Electrophilic substitution reaction.
4. Electrophilic addition reaction.

92 Arrange the following hydrogen halides in order of their increasing reactivity with propene:

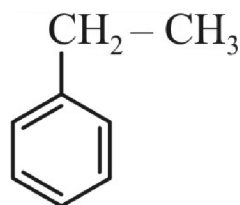
1. HCl > HBr > HI
2. HBr > HI > HCl
3. HI > HBr > HCl
4. HCl > HI > HBr

93 Which compound is most reactive towards electrophilic substitution reaction?

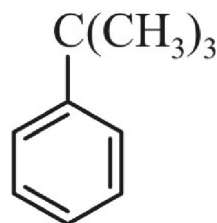
1.



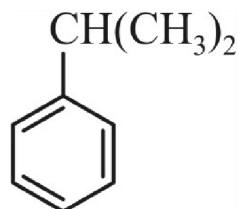
2.



3.



4.



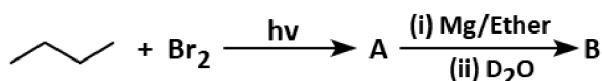
94 In an electrophilic substitution reaction of nitrobenzene, the presence of nitro group:

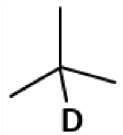
- (a) Deactivates the ring by inductive effect.
- (b) Activates the ring by inductive effect.
- (c) Decreases the charge density at ortho and para position of the ring relative meta position by resonance.
- (d) Increases the charge density at meta position relative to the ortho and para positions of the ring by resonance.

Choose the correct option:

1. (a, b)
2. (b, c)
3. (c, d)
4. (a, c)

95 The end product (B) in the given reaction is:



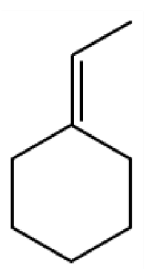
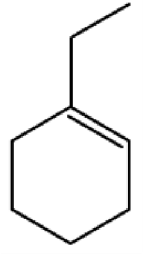
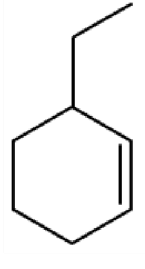
1.	$\text{H}_3\text{C}-\overset{\text{H}_2}{\underset{\text{H}_2}{\text{C}}}-\text{CH}_2\text{D}$
2.	$\text{H}_3\text{C}-\overset{\text{H}_2}{\text{C}}-\text{CH}_2\text{D}$
3.	
4.	$\text{H}_3\text{C}-\overset{\text{H}_2}{\text{C}}-\underset{\text{D}}{\text{CH}}-\text{CH}_3$

96

Statement I:	Addition of Cl_2 in the presence of CCl_4 with alkene will give geminal dichloride.
Statement II:	The addition of two moles of HCl with alkyne will give vicinal dichloride.

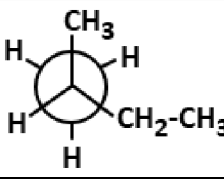
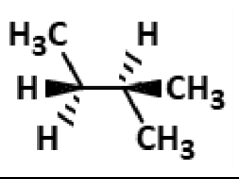
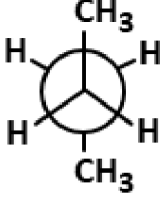
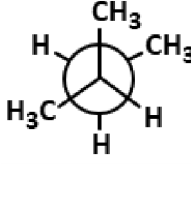
1.	Statement I is true and statement II is false.
2.	Statement I is false and statement II is true.
3.	Both statements I and II are true.
4.	Both statements I and II are false

97 Arrange the following compounds in decreasing number of α -hydrogen:

		
(i)	(ii)	(iii)

- (i) > (ii) > (iii)
- (ii) > (i) > (iii)
- (ii) > (iii) > (i)
- (iii) > (ii) > (i)

98 Among the following, the structure which does NOT represent 2-methyl butane is:

1. 	2. 
3. 	4. 

99

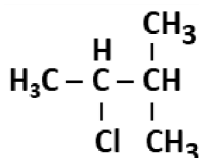
Assertion (A):	Inductive effect is a permanent effect.
Reason (R):	Inductive effect weakens steadily with increasing distance from the substituent.

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

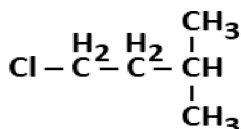
1.	Both (A) and (R) are true and (R) is the correct explanation of (A).
2.	Both (A) and (R) are true but (R) is not the correct explanation of (A).
3.	(A) is true but (R) is false.
4.	Both (A) and (R) are false.

100 An alkene "A" on reaction with O_3 and $Zn - H_2O$ gives propanone and ethanal in equimolar ratio. The addition of HCl to alkene "A" gives "B" as the major product. The structure of product "B" is:

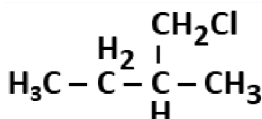
1.



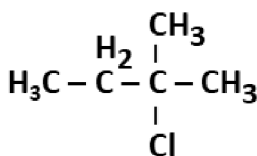
2.



3.



4.



BIOLOGY I - SECTION A

101 What is incorrect regarding the double helix model of DNA given by Watson and Crick?

1.	At each step of ascent the strand turns	36°
2.	The pitch	3.4 nm
3.	The rise per base pair	0.34 nm
4.	Diameter	10 nm

102 Non-membranous nucleoplasmic structures in the nucleus, are the sites for active synthesis of:

1.	protein	2.	mRNA
3.	rRNA	4.	tRNA

103 Which of the following is similar, in the DNA of an elephant and the mango tree?

1.	Size of DNA	2.	Type of nucleotide
3.	Sequence of nucleotide	4.	Total bases

104 Which one of the following, most accurately describes the structure of a human haemoglobin molecule, that can bind four oxygen molecules to form oxyhaemoglobin?

1. It has a primary, tertiary and quaternary structure only.
2. It has a primary, secondary and tertiary structure only.
3. It has a primary and secondary structure only.
4. It has a primary, secondary, tertiary and quaternary structure.

105 Identify the incorrect statement regarding glycogen:

1. It is a homopolymer of alpha glucose molecules
2. It is the preferred storage carbohydrate in animals
3. The left hand of the molecule is called, the reducing end
4. It has $\alpha [1 \rightarrow 6]$ branching

106 Which of the following statement(s) is/are not correct regarding lysosomes?

A.	The hydrolytic enzymes of lysosomes are active under alkaline pH
B.	Lysosomes are membrane-bound structures
C.	Lysosomes are formed by the process of packaging in the endoplasmic reticulum
D.	Lysosomes have numerous hydrolytic enzymes

Choose the correct answer from the options given below:

1.	A only	2.	B, D Only
3.	A, D Only	4.	A, C Only

107 The enzyme commission number of an enzyme 'X' is 2.3.1.4. 'X' belongs to a class of enzymes that catalyses:

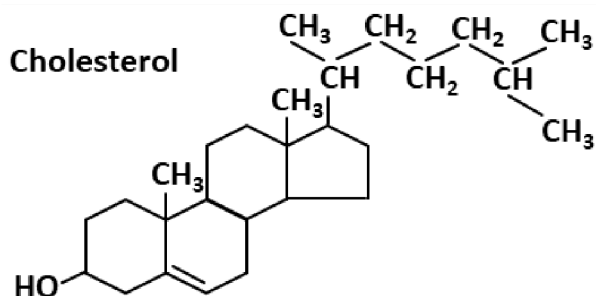
1. $\text{NAD}^+ + 2\text{H}^+ + 2\text{e}^- \longrightarrow \text{NADH} + \text{H}^+$
2. $\text{S} - \text{G} + \text{S}^1 \longrightarrow \text{S} + \text{S}^1 - \text{G}$
3. $\text{X} - \text{C} - \text{C} - \text{Y} \longrightarrow \text{X} - \text{Y} + \text{C} = \text{C}$
4. $\text{A} - \text{B} + \text{H}_2\text{O} \longrightarrow \text{A} - \text{OH} + \text{B} - \text{H}$

108 Which statements are correct regarding centriole?

I:	Centrioles are typically made up of nine sets of short microtubule triplets, arranged in a cylinder.
II:	The main function of centrioles is to produce cilia during interphase and the aster and the spindle during cell division.
III:	Centrioles start duplicating when DNA replicates.

1.	Only I and II	2.	Only I and III
3.	Only II and III	4.	I, II and III

109 The molecule shown in the given diagram:



- I. is a lipid.
 II. is biosynthesized from acetyl coA.
 III. is a precursor of steroid hormones in animals.
1. Only I and II are correct
 2. Only I and III are correct
 3. Only II and III are correct
 4. I, II and III are correct

110 The cell wall of an Okra plant is made up of cellulose. The variant of this, present in plants that act as a store-house of energy is:

1. Glycogen	2. Glucosamine
3. Chitin	4. Starch

111 Which of the following functions is carried out by the cytoskeleton in a cell?

1. Transportation	2. Nuclear division
3. Protein synthesis	4. Motility

112 Select the incorrect statement from the following, regarding cell wall functions:

1. Protection from mechanical injury
2. Cell-to-cell interaction
3. Maintains shape of cell
4. Provides selective permeability

113 Given below are two statements:

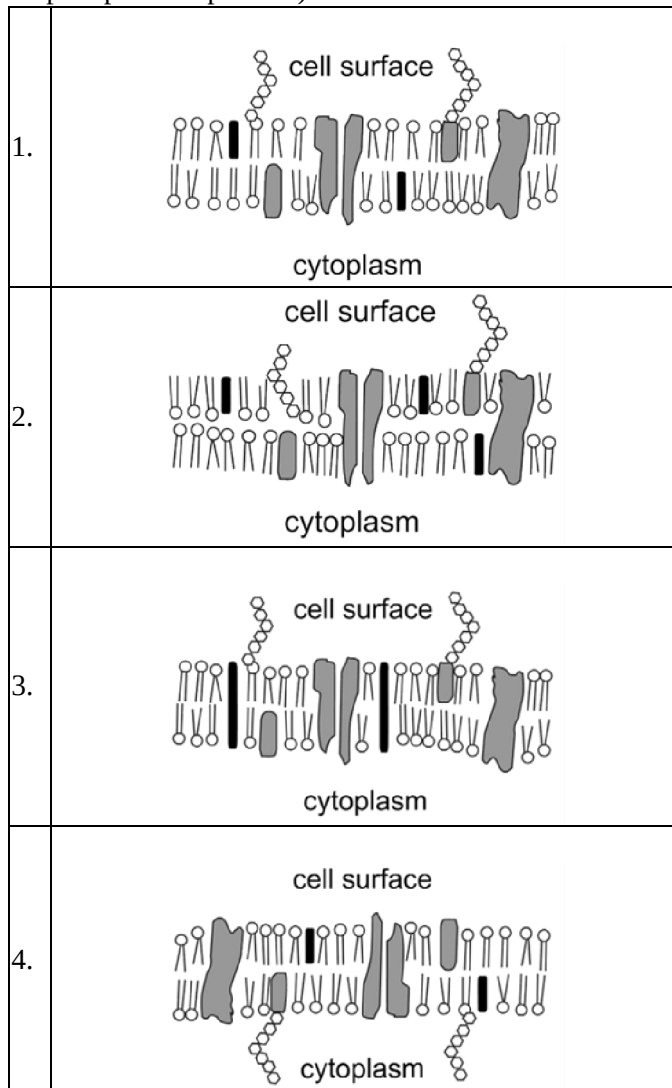
Assertion (A):	It is important that the organisms should have cells.
Reason (R):	A cell keeps its chemical composition steady within its boundary.

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

114 If guanine makes 20% of the DNA molecules, what will be the percentage of adenine, thymine and cytosine in it?

1. [A]: 20 ; [T] : 25 ; [C] : 35
2. [A]: 30 ; [T] : 30 ; [C] : 20
3. [A]: 20 ; [T] : 30 ; [C] : 30
4. [A]: 30 ; [T] : 20 ; [C] : 30

115 In the following diagrams, each shows a section of the cell surface membrane to illustrate the fluid mosaic model. Which diagram is the most accurate? (The black shape represents cholesterol, and the gray shape represents protein.)



116 Primary proteins are also known as polypeptides, because:

1. they are linear chains.
2. they are polymers of peptide monomers.
3. successive amino acids are joined by peptide bonds.
4. they can assume many conformations.

117 Regarding enzyme catalysis, all of the following will be true except:

- | | |
|----|---|
| 1. | The rate of reaction initially increases with an increase in substrate concentration |
| 2. | It speeds up the rate of reaction by decreasing the requirement for activation energy |
| 3. | If the associated co-factor is removed, the enzyme activity is enhanced |
| 4. | Enzymes have an optimum temperature and pH at which they act most efficiently |

118 Prosthetic groups differ from co-enzymes, in which:

- | | |
|----|---|
| 1. | they require metal ions for their activity. |
| 2. | they (prosthetic groups) are tightly bound to apoenzymes. |
| 3. | their association with apoenzymes is transient. |
| 4. | they can serve as co-factors in a number of enzyme-catalyzed reactions. |

119 A. Release of products of the reaction

- B. Binding of substrate to the active site of the enzyme
C. Formation of enzyme-substrate complex
D. Alteration in the shape of the enzyme

E. Enzyme free to bind another molecule of substrate
Given above are the steps involved in the catalytic cycle of enzyme action. Choose the correct answer from the options given below:

1. B > C > D > A > E
2. B > D > C > A > E
3. B > D > A > E > C
4. B > E > D > C > A

120 Match the structures given in column I, with their names in column II and select the correct option:

	Column I		Column II
a.	$\begin{array}{c} \text{COOH} \\ \\ \text{H} - \text{C} - \text{NH}_2 \\ \\ \text{H} \end{array}$	(i)	Alanine
b.	$\begin{array}{c} \text{CH}_2 - \text{OH} \\ \\ \text{CH} - \text{OH} \\ \\ \text{CH}_2 - \text{OH} \end{array}$	(ii)	Serine
c.	$\begin{array}{c} \text{COOH} \\ \\ \text{H} - \text{C} - \text{NH}_2 \\ \\ \text{CH}_3 \end{array}$	(iii)	Glycine
d.	$\begin{array}{c} \text{COOH} \\ \\ \text{H} - \text{C} - \text{NH}_2 \\ \\ \text{CH}_2 - \text{OH} \end{array}$	(iv)	Glycerol

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

121 Which of the following structures performs the function of mitochondria in a bacteria?

1. Nucleoid	2. Ribosomes
3. Cell wall	4. Mesosomes

122 Identify the option, where all the columns are not matched correctly:

1. Abrin	Secondary metabolite	Drug
2. GLUT-4	Protein	Transport carrier
3. Lecithin	Phospholipid	Cell membrane
4. Thymidylic Acid	Nucleotide	DNA

123 Identify the incorrect statement:

1.	In an animal cell, the steroidal hormones are synthesized in SER.
2.	The sarcoplasmic reticulum is a type of rough endoplasmic reticulum.
3.	The cis and trans faces of Golgi are entirely different but interconnected.
4.	Lysosomes contain acid hydrolases.

124 What is common between Eukaryotic & Prokaryotic flagella?

1. Both have the same structure
2. Both are used for locomotion
3. Both are composed of the same proteins
4. Both are extensions of the cell membrane

125 Which of the following would not be true for a typical plant cell?

1. A cell wall composed of cellulose, hemicelluloses, and pectin.
2. A large vacuole that regulates turgor pressure.
3. The absence of flagella or centrioles, except in the gametes.
4. A freely permeable cell membrane.

126 Select the mismatch:

Column I	Column II
1. Gas vacuoles	Green bacteria Cells
2. Large central vacuoles	Animal cells
3. Protists	Eukaryotes
4. Methanogens	Prokaryotes

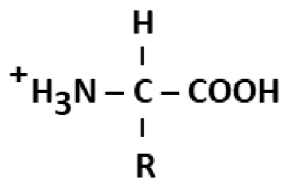
127 Which of the following combinations are correct in response to plastids?

- A. Amyloplasts store carbohydrates
- B. Leucoplasts gives a red colour to the plant
- C. Xanthophyll gives yellow and orange colours to parts of the plant
- D. Carotenoid pigments are responsible for tapping light energy
- E. Chlorophyll gives a red color

Choose the correct answer from the options given below:

1. A & B only	2. A, C, D only
3. A, B, C, D only	4. A & D only

128 Identify the correct statement regarding the structure of a molecule shown in the given diagram:



- I. It is an alpha amino acid
II. The configuration shown is called zwitterion
1. Only I
 2. Only II
 3. Both I and II
 4. Neither I nor II

129 In an average composition of a cell, the maximum % of total cellular mass [after water and protein] is constituted by:

1. Carbohydrates
2. Lipid
3. Nucleic acids
4. Ions

130 A cell is considered as a fundamental, structural and functional unit of all living organisms. This is because

- | | |
|----|---|
| 1. | Metabolic reactions occur only inside the cell. |
| 2. | Anything less than a complete structure of a cell does not ensure independent living. |
| 3. | Cytoplasm is the main arena of activities, which is present inside the cell. |
| 4. | There is no independent existence of unicelled prokaryotes as they have only a single cell. |

131 Given below are two statements:

Assertion (A):	Lipids are a part of acid-soluble pool.
Reason (R):	Lipids are macromolecular polymers and are insoluble in water.

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

132 The organic compound 'X' that is 5 - 7% of the total cellular mass in living organisms, constitutes monomeric units that are joined together with the help of:

1.	Phosphodiester bonds	2.	Peptide bonds
3.	Glycosidic bonds	4.	Hydrogen bonds

133

Assertion(A):	The acid-insoluble fraction contains lipids and proteins.
Reason(R):	The molecular weight of proteins and lipids is in the range of ten thousand daltons and above.

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

- | | |
|----|--|
| 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, (R) is false. |
| 4. | (A) is false, (R) is true. |

134 Given below are two statements:

Statement I	Membrane-bound organelles of the endomembrane system coordinate cellular functions.
Statement II	Mitochondria and chloroplasts are not considered a part of the endomembrane system.

In the light of the 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. | Both Statement - I and Statement - II are correct. |
| 4. | Both Statement - I and Statement - II are incorrect. |

135

Which of the following is true for nucleolus?

1. Larger nucleoli are present in dividing cells.
2. It is a membrane-bound structure.
3. It takes part in spindle formation.
4. It is a site for active ribosomal RNA synthesis.

BIOLOGY I - SECTION B

136 Which of the following does not take place during diakinesis of Meiosis I?

1. Disappearance of nucleolus
2. Decondensation of chromosomes
3. Nuclear envelope breaks down
4. Assembly of meiotic spindle

137 Match the stage of Prophase I of Meiosis I given in Column I with the corresponding event in Column II and select the correct match from the codes given below:

	COLUMN I		COLUMN II
A	Zygotene	P	Crossing over
B	Pachytene	Q	Synapsis
C	Diplotene	R	Terminalization of chiasmata
D	Diakinesis	S	Appearance of chiasmata

Codes:

	A	B	C	D
1.	Q	P	S	R
2.	P	Q	S	R
3.	P	Q	R	S
4.	Q	P	R	S

138 Under the microscope, we cannot see chromosome in which of the following phases of cell division?

1. Leptotene
2. Anaphase
3. Diakinesis
4. Late telophase

139 Find the odd one out for G_1 phase, from the following:

1. Most of the cell organelles duplicate here
2. Involves protein synthesis
3. Centriole duplicates in cytoplasm
4. RNA formation occurs

140 The beginning of diplotene is recognized by:

1. appearance of recombination nodules
2. crossing over
3. dissolution of synaptonemal complex
4. appearance of chiasmata

141 Identify the correct statement with regard to G_1 phase (Gap 1) of interphase:

1.	The reorganisation of all cell components takes place.
2.	The cell is metabolically active and grows but does not replicate its DNA
3.	Nuclear division takes place
4.	DNA synthesis or replication takes place.

142 Splitting of centromere occurs in:

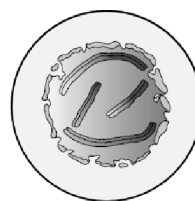
1. Mitotic anaphase and Anaphase II
2. Mitotic anaphase and Anaphase I
3. Mitotic metaphase and Metaphase II
4. Mitotic metaphase and Metaphase I

143 Given below are two statements:

Assertion (A):	It is essential for a cell to divide, to restore the nucleo-cytoplasmic ratio.
Reason (R):	Cell growth disturbs the nucleo-cytoplasmic ratio.

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

144 The following cell undergoing mitosis, is at:



1.	Early prophase	2.	Late prophase
3.	Transition to metaphase	4.	Early metaphase

145 Meiosis in sexually reproducing organisms creates new variations by shuffling the available genetic material and leads to the formation of a recombinant DNA which is created at:

1. Pachytene of Prophase I
2. Diplotene of Prophase I
3. Anaphase I of Meiosis I
4. Anaphase II of Meiosis II

146 The size of Pleuro Pneumonia Like Organism (PPLO) is:

1. $0.02 \mu\text{m}$
2. $1-2 \mu\text{m}$
3. $10-20 \mu\text{m}$
4. $0.1 \mu\text{m}$

147 Arrange the following events of meiosis in a correct sequence:

- I. Crossing over
- II. Synapsis
- III. Terminalisation of chiasmata
- IV. Disappearance of nucleolus

1.	II, I, IV, III	2.	II, I, III, IV
3.	I, II, III, IV	4.	II, III, IV, I

148 Which of the following statements about inclusion bodies is incorrect?

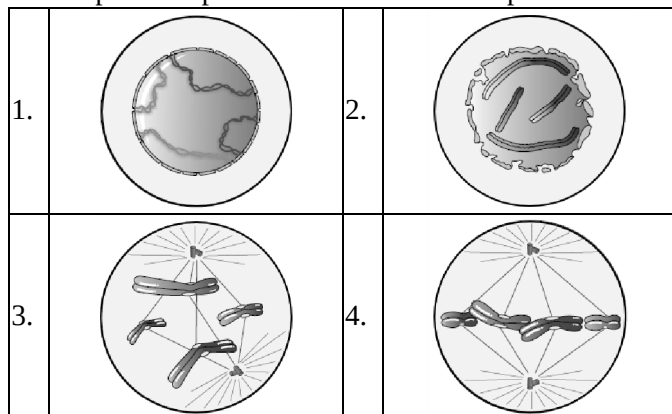
1. These are involved in the ingestion of food particles.
2. They lie freely in the cytoplasm.
3. These represent reserve material in cytoplasm.
4. They are not bound by any membrane.

149 During cytokinesis:

I.	A cleavage furrow forms in the center of the animal cell and extends to the periphery
II.	A cell plate is formed at the periphery in plant cells and deepens towards the center

1. Only I is correct
2. Only II is correct
3. Both I and II are correct
4. Both I and II are incorrect

150 Which stage of the mitotic division in a cell shown in the options depicts a 'transition' to metaphase?



BIOLOGY II - SECTION A

151 Mark the incorrect option about chromosomes from the following:

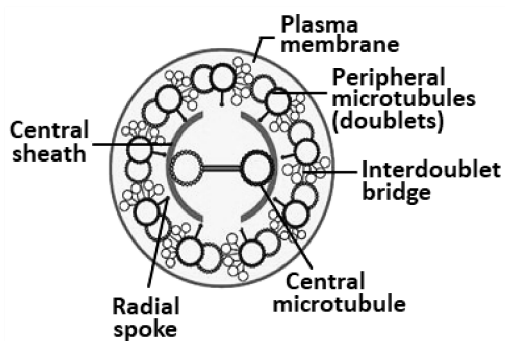
1. Contain DNA and histones but not RNA
2. Contain primary constriction
3. Are 23 pairs in diploid human cell
4. Are condensed forms of chromatin

152 Given below are two statements:

Assertion (A):	Analysis of compounds gives an idea of the kind of organic and inorganic constituents of living tissue.
Reason (R):	Ash analysis is performed to identify organic components of living tissue.

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

153 Identify the correct statement regarding the part of cell, the structure of which is shown in the given diagram:



1. It is not found in the plant cells
2. It serves to provide an attachment with a surface for a bacterial cell
3. The structure is made of a protein called flagellin
4. It can be used for movement by a eukaryotic cell

154 Consider the statements 'A' and 'B' and select the correct option:

Statement A:	Just like inorganic catalysts, enzymes work efficiently at high temperatures and high pressures
Statement B:	Thermal stability is an important quality of enzymes isolated from thermophilic organisms

- Both statements A and B are correct
- Only statement A is correct
- Only statement B is correct
- Both statements A and B are incorrect

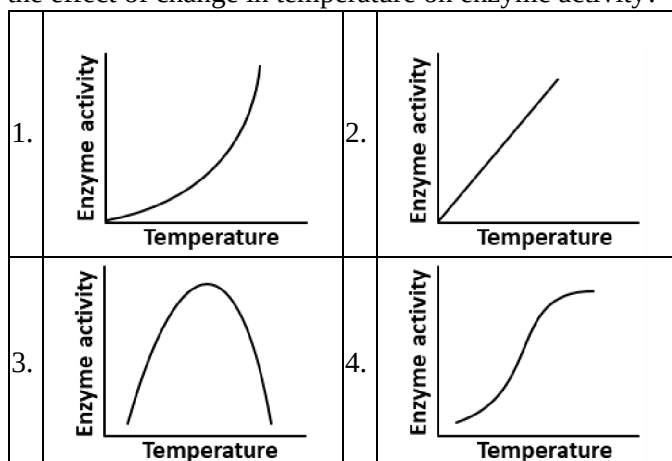
155 Read the statements given below carefully:

(a)	Lipids are generally water soluble.
(b)	Dietary proteins are the source of essential amino acids.
(c)	Paper made from plant pulp and cotton fibre is cellulosic in nature.
(d)	In a nucleic acid, the bond between the phosphate and hydroxyl group of sugar is an ester bond.

How many of the statements given above are correct?

1.	One	2.	Two
3.	Three	4.	Four

156 Which of the following graphs correctly represents the effect of change in temperature on enzyme activity?



157 Read the statements given below with respect to proteins and select the correct one:

1.	In proteins, only left-handed helices are observed.
2.	Adult human haemoglobin is an example of a tertiary structure.
3.	Primary structure of proteins gives the positional information of amino acids.
4.	The first amino acid in a polypeptide chain is called the C-terminal amino acid.

158 Read the given statements carefully and select the correct one:

- In DNA, the two strands of polynucleotides are parallel to each other.
- The backbone is formed by the sugar, phosphate, sugar chain.
- The nitrogen bases are projected more or less perpendicular to the backbone but face outside.
- T and C of one strand complementarily base pairs with G and A in the other strand, respectively.

159 Which of the following is wrong with respect to 'biomolecules'?

A.	Cellulose and starch can hold I_2 due to formation of helical secondary structures
B.	Proteins transport nutrient across cell membrane and fight infectious organisms
C.	At high temperature, enzymes get damaged while inorganic catalysts work efficiently
D.	In animal tissue, different drugs, pigments, essential oil, magnesium, O_2 compounds are noticed
E.	DNA and RNA have three chemically distinct components - heterocyclic, monosaccharides and phosphates.

Choose the correct answer from the options given below:

- D & E only
- A & D only
- A, B & D only
- B, E & C only

160 Which of the following is the largest constituent of the membrane of the erythrocyte in human beings and is also responsible for performing most of the functions of the membrane?

- Protein
- Lipid
- Glycolipid
- Glycoprotein

161 In the DNA double helix:

I:	At each step of ascent, the strand turns 34°.
II:	The rise per base pair would be 0.36 nm.

1.	Only I is correct
2.	Only II is correct
3.	Both I and II are correct
4.	Both I and II are incorrect

162 Given below are two statements:

Assertion (A):	Tertiary structure of a protein is absolutely necessary for its biological activities.
Reason (R):	The structure brings distant amino acid side chains closer, thereby forming active sites of enzymes.

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

163 Select the wrong statement:

1.	Bacterial cell wall is made up of peptidoglycan
2.	Pili and fimbriae are mainly involved in the motility of bacterial cells
3.	Cyanobacteria lack flagellated cells
4.	Mycoplasma is a wall-less microorganism

164 The outer membrane of the nucleus:

- I. is continuous with the Endoplasmic reticulum
II. does not bear ribosomes.

- Only I is correct
- Only II is correct
- Both I and II are correct
- Both I and II are incorrect

165 All of the following are nucleosides, except:

1.	Adenosine	2.	Cytosine
3.	Guanosine	4.	Uridine

166 Which structure-function pair is mismatched?

- Smooth endoplasmic reticulum - synthesis of lipids
- Golgi apparatus - synthesis of glycoprotein
- Peroxisome - Cellular respiration
- Vacuole - water balance

167 Identify the incorrect statement regarding the structure of proteins:

1.	They are heteropolymers containing strings of amino acids.
2.	The first amino acid in the primary structure is the N-terminus amino acid
3.	Only left helices are observed in proteins
4.	Tertiary structure is absolutely essential for many biologic functions of the proteins

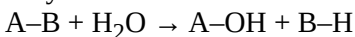
168 The six most common atoms in organic molecules are:

1.	Carbon, Hydrogen, Oxygen, Helium, Calcium and Sulphur
2.	Carbon, Hydrogen, Oxygen, Calcium, Magnesium and Sulphur
3.	Carbon, Oxygen, Nitrogen, Sulphur, Phosphorous and Magnesium
4.	Carbon, Hydrogen, Oxygen, Nitrogen, Phosphorous and Sulphur

169 Which of the following statements is not correct?

1.	Lysosomes are formed by the process of packaging in the endoplasmic reticulum.
2.	Lysosomes have numerous hydrolytic enzymes
3.	The hydrolytic enzyme of lysosomes are active under acidic pH
4.	Lysosomes are membrane bound structure.

170 The following reaction will be catalyzed by an enzyme classified as a/an:



1.	Oxidoreductase	2.	Hydrolase
3.	Lyase	4.	Transferase

171 Prokaryotic mesosomes do not help in:

- Cell wall formation
- DNA replication
- Respiration
- Photosynthesis

172 Identify the correct statement:

1.	α amino acids are substituted methanes
2.	Only triglycerides are lipids that are both macromolecules as well as polymers
3.	Cellulose forms secondary helical structures and can hold iodine molecules in the helical portion
4.	Every virus will have both DNA and RNA as its genetic material

173 Chromatophores and mesosomes are both membranous extensions into the cytoplasm but still they differ from each other as former helps in A and latter helps in B.

Fill the above blanks choosing the correct option.

	A	B
1.	Respiration	Photosynthesis
2.	Cell wall formation	DNA replication
3.	Photosynthesis	Respiration
4.	DNA replication	Secretion process

174 Apart from chromoplasts, carotenoid pigments are also seen in chloroplast. There they:

1. Are responsible for trapping light energy
2. Impart colour to plant parts only
3. Can initiate photosynthesis
4. Act as primary photosynthetic pigments.

175 Which of the following is not associated with the observations of Theodore Schwann?

1.	Cell membrane is the outermost layer of animal cells.
2.	Bodies of both plants and animals are composed of cells and their products
3.	A cell divides to form new cells
4.	Presence of cell wall is a unique feature of plant cells

176 Carrier proteins in the membrane, facilitate the transport of water molecules because these molecules:

1.	Are polar; hence cannot pass through the lipid bilayer.
2.	Are so large that they cannot cross the lipid bilayer
3.	Are not required in the cytoplasm but only in the membrane.
4.	May be lipid-soluble but requires tunnel proteins.

177 Which of the following statements are correct in the context of Golgi apparatus?

A.	It is the important site for the formation of glycoprotein and glycolipids
B.	It produces cellular energy in the form of ATP
C.	It modifies the protein synthesized by ribosomes on ER
D.	It facilitates the transport of ions
E.	It provides mechanical support

Choose the most appropriate answer from the options given below:

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

178 Read the statements given below and select the correct option:

(a)	In glycogen, the right end is the reducing one
(b)	Cellulose and starch form complex helices
(c)	Starch is the main structural component of papers made from plant pulp

1.	Statements (a) and (b) are correct while statement (c) is incorrect
2.	Statements (a) and (c) are correct while statement (b) is incorrect
3.	Statements (b) and (c) are incorrect while statement (a) is correct
4.	Statements (a) and (c) are incorrect while statement (b) is correct

179 Given below are two statements:

Assertion (A):	Cell wall gives shape to the plant cell, protect the cell and helps in cell to cell interactions.
Reason (R):	Cell wall is living rigid structure, an outer covering for the plasma membrane of fungi, animal and plants.

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

180

Which one of the following statements is incorrect?

1. Cellulose is a polysaccharide
2. Uracil is a pyrimidine
3. Glycine is a sulphur-containing amino acid
4. Sucrose is a disaccharide

181 Match List-I with List-II:

List - I		List - II
a. $F_1 - F_0$ particles	(i)	Site of dark reaction of photosynthesis
b. Stroma of chloroplast	(ii)	Site of glycosidation of lipids
c. Kinetochores	(iii)	ATP synthesis
d. Golgi bodies	(iv)	Site of attachment of spindle fibres

Choose the correct answer from the options given below

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

182 Following are the statements with reference to 'lipids'.

(a)	Lipids having only single bonds are called unsaturated fatty acids.
(b)	Lecithin is a phospholipid.
(c)	Trihydroxy propane is glycerol.
(d)	Palmitic acid has 20 carbon atoms including carboxyl carbon.
(e)	Arachidonic acid has 16 carbon atoms.

You have to choose the correct statements out of the five given above. Choose the correct answer from the options given below:

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

183 Select the correct match from among the following:

1. Collagen – Intracellular ground substance
2. Toxin – Codeine
3. Lectin – Ricin
4. Alkaloid – Morphine

184 Animal cells and plant cells are similar to each other in all of the following features, except?

1. Cytoplasm is the main arena of cellular activities
2. Presence of a non-membranous cell organelle which helps in cell division and formation of basal bodies
3. Presence of both 70S and 80S ribosomes
4. Presence of endomembrane system

185 Given below are two statements:

Assertion (A):	Mitochondria and chloroplasts have their own DNA.
Reason (R):	Endoplasmic reticulum and Golgi body are the cell organelles which have their own DNA.

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

BIOLOGY II - SECTION B

186 Doubling of the number of chromosomes can be achieved by disrupting mitotic cell division soon after:

1.	Anaphase	2.	Telophase
3.	Prophase	4.	Metaphase

187 A process that is common to metaphases of mitosis, meiosis I as well as meiosis II is:

1.	Alignment of chromosome at equatorial plate
2.	Attachment of spindle fibres from centrioles to both of the kinetochores of each chromosome
3.	Separation of sister chromatids
4.	Exchange of genetic material between non-sister chromatids

188 Between Telophase I and Prophase II:

1. The nuclear membrane disappears
2. DNA does not replicate
3. A tetrad of cells is formed
4. There is a long lasting resting stage

189 Arrange the following stages of chromosomal behaviour during Prophase-I of meiosis in the correct sequence.

- Appearance of recombination nodules
- Formation of synaptonemal complex
- Appearance of chiasmata
- Terminalisation of chiasmata
- Beginning of chromosomal compaction

Choose the correct answer from the options given below:

- E, B, D, A, C
- C, D, A, E, B
- E, B, A, C, D
- D, B, E, A, C

190 Given below are two statements:

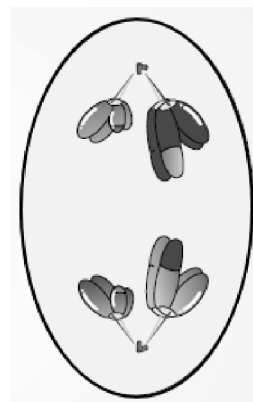
Assertion (A):	Concentration of ions is significantly higher in the vacuole than in the cytoplasm in a plant cell.
Reason (R):	In plants, the tonoplast facilitates the transport of a number of ions against the concentration of gradient into a vacuole

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

191 What happens during the metaphase stage of the cell cycle?

- Chromosomes are moved to the spindle equator.
- Centromere splits and chromatids separate.
- Pairing between homologous chromosomes takes place.
- Crossing over between homologous chromosomes takes place.

192



The above diagram represents:

- anaphase-I
- metaphase-I
- telophase-I
- prophase-I

193 Given below are two statements:

Assertion (A):	Meiosis does not occur in haploids cells.
Reason (R):	Haploid cells do not form gametes.

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

194 Select the incorrect statement with reference to mitosis.

- Splitting of centromere occurs at anaphase.
- All the chromosomes lie at the equator at metaphase.
- Spindle fibres attach to centromere of chromosomes.
- Chromosomes decondense at telophase

195 A feature unique to prokaryotes would be:

- A cell wall not made up of cellulose
- An extrachromosomal plasmid DNA
- A cell membrane of peptidoglycan
- Presence of inclusions

196 Given below are two statements:

Assertion (A):	During anaphase-1 of meiosis, non-homologous chromosomes separate.
Reason (R):	There is splitting of centromere during anaphase-1.

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

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Match the following column I with column II.

Column I	Column II
A. Synapsis aligns homologous chromosomes	(i) Anaphase II
B. Synthesis of RNA and protein	(ii) Zygotene
C. Action of enzyme recombinase	(iii) G ₂ - phase
D. Centromeres do not separate, but chromatids move towards opposite poles	(iv) Anaphase I
	(v) Pachytene

1. A-(ii) B-(i) C-(iii) D-(iv)
2. A-(ii) B-(iii) C-(v) D-(iv)
3. A-(i) B-(ii) C-(v) D-(iv)
4. A-(ii) B-(iii) C-(iv) D-(v)

198 Chromosomes duplicate during A and increase in number of chromosomes is observed first during B. Identify A & B correctly.

1	A – Interphase	B – Prophase
2	A – S – phase	B – Telophase
3	A – Synthetic phase	B – Gap 2 phase
4	A – Interphase	B – Anaphase

199 Consider the following phases of cell cycle:

A.	S	B.	G ₂
C.	G ₁	D.	M

Choose the correct sequence of phases of the cell cycle:

- | | |
|---------------|---------------|
| 1. C, A, B, D | 2. D, B, A, C |
| 3. A, C, B, D | 4. C, A, D, B |

200 Unidentical chromatids of a chromosome move to opposite poles during:

1. Anaphase II
2. Telophase
3. Mitotic anaphase
4. Anaphase I

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