



MitoPrep Test Series 1

Date - 04 December 2025

Duration – 3 Hours

Marks – 720

Physics :- Mathematical Tools, Units & Measurement

Chemistry :- Some Basic Concepts of Chemistry, Redox Reactions

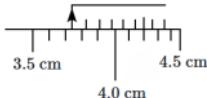
Biology :- Cell: The Unit of Life

Instruction

1. The test is of 3 hours duration.
2. The test booklet consists of 200 questions. The maximum mark is 720.
3. There are four Sections in the Question Paper, Sections I, II, III, and IV consisting of Section I (Physics), Section II (Chemistry), Section III (Botany) and Section IV (Zoology) have 50 Questions in each Subject and each subject is divided into two Sections,
4. Section A consists of 35 questions (all questions compulsory) and Section B consists of 15 Questions (Any 10 questions are compulsory).
5. There is only one correct response for each question.
6. Each correct answer will give 4 marks while 1 Mark will be deducted for a wrong MCQ response.
7. No student is allowed to carry any textual material, printed, or written, bits of paper, pager, mobile phone, any electronic device, etc. Inside the examination room/hall.
8. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator on duty in the Room/Hall. However, the Candidates are allowed to take away this Test Booklet with them

Physics

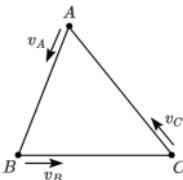
1. The figure shows the vernier scale of a calliper. If the least count of the instrument is 0.1 mm, what is the correct reading?



1. 3.7 cm
 2. 3.72 cm
 3. 3.64 cm
 4. 3.76 cm
2. If E and G respectively, denote energy and gravitational constant, then $\frac{E}{G}$ has the dimensions of:

1. $[ML^0T^0]$
2. $[M^2L^{-2}T^{-1}]$
3. $[M^2L^{-1}T^0]$
4. $[ML^{-1}T^{-1}]$

3. Three particles move along the three sides of a triangle, ABC , starting from the three vertices simultaneously. Each covers one side of the triangle and reaches the next vertex; all the particles reaching their destinations at the same time. Suppose that the particles move at constant velocities: $\vec{v}_A, \vec{v}_B, \vec{v}_C$ (see figure).



Then:

1. $\vec{v}_A + \vec{v}_B = \vec{v}_C$
2. $\vec{v}_A - \vec{v}_B = \vec{v}_C$
3. $\vec{v}_A - \vec{v}_B = \frac{\vec{v}_C}{2}$
4. $\vec{v}_A + \vec{v}_B + \vec{v}_C = 0$

4. If vectors $\vec{A} = \cos \omega t \hat{i} + \sin \omega t \hat{j}$ and $\vec{B} = \cos\left(\frac{\omega t}{2}\right) \hat{i} + \sin\left(\frac{\omega t}{2}\right) \hat{j}$ are functions of time.

Then, at what value of t are they orthogonal to one another?

1. $t = \frac{\pi}{4\omega}$
2. $t = \frac{\pi}{2\omega}$
3. $t = \frac{\pi}{\omega}$
4. $t = 0$

5. Vectors \vec{A}, \vec{B} and \vec{C} are such that $\vec{A} \cdot \vec{B} = 0$ and $\vec{A} \cdot \vec{C} = 0$. Then the vector parallel to \vec{A} is:

- | | |
|-----------------------------|----------------------------|
| 1. $\vec{A} \times \vec{B}$ | 2. $\vec{B} + \vec{C}$ |
| 3. $\vec{B} \times \vec{C}$ | 4. \vec{B} and \vec{C} |

6. The quantity "Action" (S) is defined by the equation: $S = \int_0^t (K - U) dt$

where K is the kinetic energy, U is the potential energy and the integral is over the time, t during the motion. The proper unit of action will be:

1. kg-m/s
2. kg-m²
3. kg-m²-s
4. kg-m²/s

7. The dimensions of momentum per unit time is the same as that of:

- | | |
|------------------------|-------------------------|
| 1. Torque / Mass | 2. Energy / Length |
| 3. Acceleration / Mass | 4. Power / Acceleration |

8. Express the result of the calculation to 3 significant figures:

$$2 \times 0.536 + 0.0050 + 2.100$$

- | | |
|----------|---------|
| 1. 3.177 | 2. 3.18 |
| 3. 3.19 | 4. 3.2 |

9. The angle between the force, $F = 6\hat{i} + 2\hat{j}$ and the displacement, $d = 2\hat{i} + 6\hat{j}$ is:

1. $\sin^{-1}(0.3)$
2. $\sin^{-1}(0.6)$
3. $\cos^{-1}(0.3)$
4. $\cos^{-1}(0.6)$

10. The work done by gravity exerting an acceleration of -10 m/s^2 for a 10 kg block down 5 m from its original position with no initial velocity is:

$$(F_{\text{gravitational}} = \text{mass} \times \text{acceleration} \text{ and } w = \int_a^b F(x)dx)$$

1. 250 J
2. 500 J
3. 100 J
4. 1000 J

11. Match the units mentioned in **List-I** with the units in **List-II**.

	List-I	List-II
(a)	H/s	(i) s^2
(b)	$\text{H} \times \text{A}$	(ii) Wb
(c)	$\text{H} \times \text{F}$	(iii) s
(d)	$\Omega \times \text{F}$	(iv) Ω

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

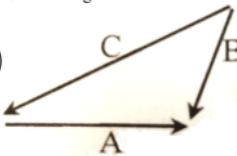
12. The estimate of absolute error in the measurement of time using a clock is 10^{-2} s . The time difference, $t = t_1 - t_2$, between two events is determined by using the clock. The error in t is:

1. 10^{-2} s
2. $2 \times 10^{-2} \text{ s}$
3. $\frac{1}{2} \times 10^{-2} \text{ s}$
4. zero

13. The dimensions of $(\mu_0 \varepsilon_0)^{-1/2}$ are:

1. $[L^{-1}T]$
2. $[LT^{-1}]$
3. $[L^{1/2}T^{1/2}]$
4. $[L^{1/2}T^{-1/2}]$

14. For the figure -



1. $A+B=C$
2. $B+C=A$
3. $C+A=B$
4. $A+B+C=0$

15. Time intervals measured by a clock give the following readings:

1.25 s, 1.24 s, 1.27 s, 1.21 s, 1.28 s.

What is the percentage relative error of the observations?

1. 2%
2. 4%
3. 16%
4. 1.6%

16. Three vectors \vec{A} , \vec{B} and \vec{C} each having magnitude of 200 units, are inclined to the x -axis at angles 45° , 135° and 315° respectively. They are added to get a resultant vector \vec{R} . The magnitude of \vec{R} is:

1. $200\sqrt{2}$ units	2. 200 units
3. 300 units	4. zero

17. The potential energy of a particle moving along the x -direction varies as $V = \frac{Ax^2}{\sqrt{x} + B}$. The dimensions of

$\frac{A^2}{B}$ are:

1. $[M^{3/2}L^{1/2}T^{-3}]$	2. $[M^{1/2}LT^{-3}]$
3. $[M^2L^{1/2}T^{-4}]$	4. $[ML^2T^{-4}]$

18. If $\vec{F} = 2\hat{i} + \hat{j} - \hat{k}$ and $\vec{r} = 3\hat{i} + 2\hat{j} - 2\hat{k}$, then the scalar and vector products of \vec{F} and \vec{r} have the magnitudes, respectively, as:

1. 5, $\sqrt{3}$
2. 4, $\sqrt{5}$
3. 10, $\sqrt{2}$
4. 10, 2

- 19.** If the unit of mass is 1 kg, the unit of length is 1 m and the unit of time is 1 min, then in this system the unit of pressure will be:

1. $\frac{1}{36} \text{ Nm}^{-2}$	2. $\frac{1}{60} \text{ Nm}^{-2}$
3. $\frac{1}{3600} \text{ Nm}^{-2}$	4. $\frac{1}{600} \text{ Nm}^{-2}$

- 20.** The velocity v of a particle at a time t is given by $v = at + \frac{b}{t+c}$. The dimensions of a , b and c are respectively:

1. $[LT^{-2}]$, $[L]$, $[T]$
2. $[L^2]$, $[T]$, $[LT^2]$
3. $[LT^2]$, $[LT]$, $[L]$
4. $[L]$, $[LT]$, $[T^2]$

- 21.** The dimension of which of the quantities is the same as that of electrical inductance?

1. Resistance
Capacitance
2. Resistance \times Capacitance
Capacitance
Resistance
4. $(\text{Resistance})^2 \times \text{Capacitance}$

- 22.** Given that $\vec{C} = \vec{A} \times \vec{B}$, then magnitude of $\vec{A} \cdot (\vec{A} \times \vec{B})$ will be:

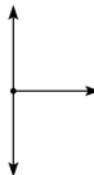
1. $ \vec{A} \vec{C} $	2. $ \vec{B} \vec{C} $
3. $ \vec{C} $	4. 0

- 23.** Match the following quantities in **List-I** with their dimensions in **List-II**.

List-I	List-II
(a) acceleration	(i) $[M^0 L^0 T^0]$
(b) torque	(ii) $[ML^{-1} T^{-2}]$
(c) absorptive power	(iii) $[LT^{-2}]$
(d) pressure	(iv) $[ML^2 T^{-2}]$

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

- 24.** The following diagram represents three vectors of equal magnitudes in a plane.



What arrow best represents the direction of the sum of these three vectors?

1. \rightarrow
2. \leftarrow
3. \uparrow
4. \downarrow

- 25.** A particle moves from a point $(-2\hat{i} + 5\hat{j})$ to $(4\hat{j} + 3\hat{k})$ when a force of $(4\hat{i} + 3\hat{j})$ N is applied. How much work has been done by the force?

1. 8 J	2. 11 J
3. 5 J	4. 2 J

- 26.** Which one of the following is not a vector quantity?

1. Velocity
2. Weight
3. Electric charge
4. Electric field

27. A student measured the diameter of a small steel ball using a screw gauge of least count 0.001 cm. The main scale reading is 5 mm and zero of circular scale division coincides with 25 divisions above the reference level. If the screw gauge has a zero error of -0.004 cm, the correct diameter of the ball is:

1. 0.521 cm	2. 0.525 cm
3. 0.053 cm	4. 0.529 cm

28. If $\vec{P} \times \vec{Q} = \vec{Q} \times \vec{P}$, the angle between \vec{P} and \vec{Q} is θ ($0^\circ < \theta < 360^\circ$), then the value of θ will be:

1. 30°
2. 60°
3. 90°
4. 180°

29. Column-I shows some vector equations that match **Column-II** (in which the values of the angles between \vec{A} and \vec{B} are given).

Column-I	Column-II
(A) $ \vec{A} + \vec{B} = \vec{A} - \vec{B} $	(P) 45°
(B) $ \vec{A} \times \vec{B} = \vec{A} \cdot \vec{B}$	(Q) 30°
(C) $\vec{A} \cdot \vec{B} = \frac{AB}{2}$	(R) 90°
(D) $ \vec{A} \times \vec{B} = \frac{AB}{2}$	(S) 60°

Codes:

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

30. If the magnitude of the sum of two vectors is equal to the magnitude of the difference between the two vectors, the angle between these vectors is?

1. 90°
2. 45°
3. 180°
4. 0°

31. The magnitude of the vector

$$\hat{i} + \hat{i} \times \hat{j} + (\hat{i} \times \hat{j}) \times \hat{i} + ((\hat{i} \times \hat{j}) \times \hat{i}) \times \hat{j};$$

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

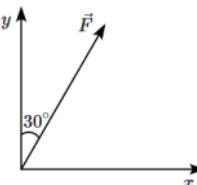
32. A plane is revolving around the earth with a speed of 100 km/hr at a constant height from the surface of the earth. The change in the velocity as it travels half-circle is:

1. 200 km/hr
2. 150 km/hr
3. $100\sqrt{2}$ km/hr
4. 0

33. Two vectors \vec{A} and \vec{B} are acting at an angle θ on an object. If the magnitude of their vector product is $\sqrt{3}$ times their scalar product, the angle θ between them is:

1. 30°
2. 45°
3. 60°
4. 90°

34. A force vector \vec{F} lies in the xy -plane and makes an angle of 30° with the positive y -axis, as shown in the figure. If the y -component of the force is given as $2\sqrt{3}$ N, what is the corresponding x -component of the force?



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

35. The quantities which have the same dimensions as those of solid angle are:

1. stress and angle
2. strain and arc
3. angular speed and stress
4. strain and angle

36. Given below are two statements:

Assertion (A):	The ratio $\frac{\vec{a} \times \vec{b}}{\vec{a} \cdot \vec{b}} = \tan \theta$, where θ is the angle between the vectors \vec{a}, \vec{b} .
Reason (R):	The $\vec{a} \times \vec{b}$ has the magnitude: $ab \sin \theta$, and $\vec{a} \cdot \vec{b}$ has the magnitude: $ab \cos \theta$, where θ is the angle between the vectors \vec{a}, \vec{b} .

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.

37. Two forces of magnitude A and $\frac{A}{2}$ act perpendicular to each other. The magnitude of the resultant force is equal to:

- | | | | |
|----|----------------|----|-----------------------|
| 1. | $\frac{A}{2}$ | 2. | $\frac{\sqrt{5}A}{2}$ |
| 3. | $\frac{3A}{2}$ | 4. | $\frac{5A}{2}$ |

38. Two different quantities having the same dimension are:

- | | |
|--------------------|---------------------|
| 1. momentum, power | 2. power, pressure |
| 3. work, torque | 4. pressure, torque |

39. Suppose the velocity of water waves is equal to $\lambda^K a^L \rho^M$, where λ is wavelength, a is acceleration due to gravity and ρ is the density of water. Then, the values of K, L, M are:

1. $\frac{1}{2}, 0, \frac{1}{2}$
2. $\frac{1}{2}, \frac{1}{2}, 0$
3. $\frac{1}{2}, -\frac{1}{2}, 0$
4. $\frac{1}{2}, 0, 1$

40. In an experiment, four quantities a, b, c and d are measured with percentage error 1%, 2%, 3% and 4% respectively. Quantity P is calculated as follows:

$$P = \frac{a^3 b^2}{cd}$$

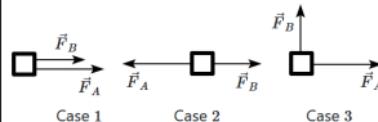
Percentage error in P is:

1. 10%
2. 7%
3. 4%
4. 14%

41. If the error in the measurement of mass is 0.8% and in volume it is 0.4%, then the error in the measurement of density is:

1. 1.2%
2. 0.4%
3. 0.8%
4. 1%

42. The magnitudes of forces \vec{F}_A and \vec{F}_B are 400 N and 300 N, respectively, as shown in the diagram. What is the magnitude of the net force in each of the three given cases?



Case 1 Case 2 Case 3

- | |
|---|
| 1. In Case 1, the net force is 100 N; Case 2, 700 N; and Case 3, 500 N. |
| 2. In Case 1, the net force is 700 N; Case 2, 100 N; and Case 3, 500 N. |
| 3. In Case 1, the net force is 350 N; Case 2, 50 N; and Case 3, 450 N. |
| 4. In Case 1, the net force is 350 N; Case 2, 50 N, and Case 3, 550 N. |

43. If the magnitude of the sum of two vectors is equal to the magnitude of the difference of the two vectors, then the angle between these vectors is:

1. 0°
2. 45°
3. 90°
4. 180°

44. A screw gauge has the least count of 0.01 mm and there are 50 divisions in its circular scale. The pitch of the screw gauge is:

1. 0.25 mm	2. 0.5 mm
3. 1.0 mm	4. 0.01 mm

45. The diameter of a spherical bob, when measured with vernier callipers yielded the values: 3.33 cm, 3.32 cm, 3.34 cm, 3.33 cm and 3.32 cm. The mean diameter to appropriate significant figures is:

- 1. 3.328 cm
- 2. 3.3 cm
- 3. 3.33 cm
- 4. 3.32 cm

Chemistry

46. 0.8 mole of a mixture of CO and CO₂ requires exactly 40 gram of NaOH in a solution for complete conversion of all the CO₂ into Na₂CO₃. How many moles more of NaOH would it require for conversion into Na₂CO₃, if mixture (0.8 mole) is completely oxidised to CO₂?

- 1. 0.2
- 2. 0.6
- 3. 1
- 4. 1.5

47. Which of the following is a redox reaction?

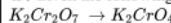
- 1. NaCl + KNO₃ → NaNO₃ + KCl
- 2. CaC₂O₄ + 2HCl → CaCl₂ + H₂C₂O₄
- 3. Ca(OH)₂ + 2NH₄Cl → CaCl₂ + 2NH₃ + 2H₂O
- 4. 2K[Ag(CN)₂] + Zn → 2Ag + K₂[Zn(CN)₄]

48. Identify the correct statements regarding the given reaction:

$\text{P}_4 + 3 \text{OH}^- + 3\text{H}_2\text{O} \rightarrow \text{PH}_3 + 3\text{H}_2\text{PO}_4^-$
a. Phosphorus undergoes reduction only.
b. Phosphorus undergoes oxidation only.
c. Phosphorus undergoes oxidation as well as reduction.
d. Hydrogen undergoes neither oxidation nor reduction.

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

49. Given the following reaction:



The change in the oxidation state of chromium in the above conversion is:

- 1. 0
- 2. 6
- 3. 4
- 4. 3

50. What is the volume of 0.6 M NaOH required to neutralize 30 cm³ of 0.4 M HCl?

- 1. 30 cm³
- 2. 20 cm³
- 3. 50 cm³
- 4. 45 cm³

51. The following reaction is given for reference:



The number of moles of KI required to produce 0.4 moles of K₂HgI₄ is:

- 1. 0.4
- 2. 0.8
- 3. 3.2
- 4. 1.6

52. Given below are two statements:

Statement I: KMnO₄ acts as a self-indicator.

Statement II: K₂Cr₂O₇ is not used as a self-indicator.

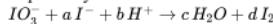
Choose the correct option:

- 1. **Statement I** is correct but **Statement II** is incorrect.
- 2. **Statement I** and **Statement II** both are correct.
- 3. **Statement I** and **Statement II** both are incorrect.
- 4. **Statement I** is incorrect but **Statement II** is correct.

53. The total number of electrons present in 1.0 g of C₂H₄ is:

- 1. 6×10^{23}
- 2. 3.44×10^{23}
- 3. 0.5×10^{11}
- 4. None of the above

54. If the chemical reaction given below is assumed to be balanced, what will be the values of a, b, c, and d, respectively?

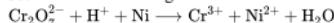


1. 5, 6, 3, 3
2. 5, 3, 6, 3
3. 3, 5, 3, 6
4. 5, 6, 5, 5

55. A gaseous mixture contains $\text{CO}_2(\text{g})$ and $\text{N}_2\text{O}(\text{g})$ in 2 : 5 ratio by mass. The ratio of the number of molecules of $\text{CO}_2(\text{g})$ and $\text{N}_2\text{O}(\text{g})$ is:

1.	5 : 2	2.	2 : 5
3.	1 : 2	4.	5 : 4

56. Given the following redox reaction :



The correct coefficients of the reactants for the balanced reaction are:

	$\text{Cr}_2\text{O}_7^{2-}$	Ni	H^+
1.	1	3	14
2.	2	3	14
3.	1	1	16
4.	3	3	12

57. The molarity of one liter solution of 22.2 gm CaCl_2 is:

1.	0.4 M	2.	0.2 M
3.	0.8 M	4.	0.6 M

58. The NaNO_3 weighed out to make 50 mL of an aqueous solution containing 70.0 mg Na^+ per ml is: (Rounded off to the nearest integer) [Given: Atomic weight in g mol^{-1} – Na: 23; N: 14; O: 16]

1. 13 g
2. 26 g
3. 18 g
4. 22 g

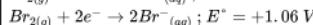
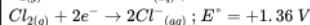
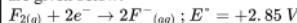
59. The oxidation number of potassium in K_2O , K_2O_2 and KO_2 , respectively, is:

1. +2, +1 and $+\frac{1}{2}$
2. +1, +1 and +1
3. +1, +4 and +2
4. +1, +2 and +4

60. A gaseous hydrocarbon upon combustion gives 0.72 g of water and 3.08 g. of CO_2 . The empirical formula of the hydrocarbon is:

1. C_6H_5	2. C_7H_8
3. C_2H_4	4. C_3H_4

61. Standard reduction potentials of the half-reactions are given below:



The strongest oxidizing and reducing agents, respectively, are:

1. Br_2 and Cl^-
2. Cl_2 and Br^-
3. Cl_2 and I_2
4. F_2 and I^-

62. Match the prefixes present in column I with their multiples in column II and mark the appropriate choice:

Column I (Prefixes)	Column II (Multiples)
(A) pico	(i) 10^9
(B) femto	(ii) 10^{-3}
(C) milli	(iii) 10^{-12}
(D) giga	(iv) 10^{-15}

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

63. To produce 20 moles of ammonia via Haber's process, how many moles of hydrogen molecules are required?

1.	40 mol	2.	10 mol
3.	20 mol	4.	30 mol

64. 2.5 litre mixture of CO and CO₂ is passed through red hot charcoal in a tube. The new volume becomes 3.5 litre. All measurements are made at same temperature and pressure. Percentage composition of original mixture by volume will be:

1. CO = 50%, CO₂ = 50%
2. CO = 60%, CO₂ = 40%
3. CO = 40%, CO₂ = 60%
4. CO = 20%, CO₂ = 80%

65. Three hydrochloric acid solutions, X, Y, and Z, with molarities of 0.07 M, 0.12 M, and 0.15 M, respectively, are mixed to prepare 100 mL of a 0.1 M solution. What volumes of X, Y, and Z should be used?

1. 50 mL, 25 mL, 25 mL
2. 20 mL, 60 mL, 20 mL
3. 40 mL, 30 mL, 30 mL
4. 55 mL, 20 mL, 25 mL

66. The sum of the coefficients of the reactants in the following reaction is :

- $$\dots \text{CS}_2 + \dots \text{Cl}_2 \rightarrow \text{CCl}_4 + \dots \text{S}_2 \text{Cl}_2$$
1. 5
 2. 3
 3. 6
 4. 4

67. Which of the following reactions is an example of a redox reaction?

1. XeF₄ + O₂ F₂ → XeF₆ + O₂
2. XeF₂ + PF₅ → [XeF]⁺PF₆⁻
3. XeF₆ + H₂O → XeOF₄ + 2HF
4. XeF₆ + 2H₂O → XeO₂ F₂ + 4HF

68. What is the mass of the precipitate formed when 50 mL of 16.9% solution of AgNO₃ is mixed with 50 mL of 5.8% NaCl solution? (Ag = 107.8, N = 14, O = 16, Na = 23, Cl = 35.5)

1. 28 g
2. 3.5 g
3. 7 g
4. 14 g

69.

Assertion (A): Mole fraction is a unitless quantity.

Reason (R): Mole fraction is the ratio of the number of moles of a particular component to the total number of moles of the solution.

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.

70. 3 gm H₂ reacts with 20 gm O₂ to form H₂O. The maximum mass of H₂O formed is:

1. 27 gm
2. 22.5 gm
3. 18 gm
4. 9.0 gm

71. The correct structure of tribromo octoxide is:

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

72. Rearrange the following (I to IV) in the order of increasing masses:

- (I) 0.5 mole of O₃
- (II) 0.5 gm atom of oxygen
- (III) 3.011×10^{23} molecules of O₂
- (IV) 5.6 liter of CO₂ at STP

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

73. Identify the incorrect statement from the following:

- | |
|---|
| Lithium is the strongest reducing agent among the alkali metals. |
| Alkali metals react with water to form their hydroxides. |
| The oxidation number of K in KO ₂ is +4. |
| Ionisation enthalpy of alkali metals decreases from top to bottom in the group. |

74. Which of the following reactions is an example of a redox reaction?

- 1. XeF₆ + H₂O → XeOF₄ + 2HF
- 2. XeF₆ + 2H₂O → XeO₂F₂ + 4HF
- 3. XeF₄ + O₂F₂ → XeF₆ + O₂
- 4. XeF₂ + PF₆⁻ → [XeF]⁺¹ + PF₆⁻

75. During the reaction of 32.65 g of zinc with HCl, what is the volume of hydrogen gas liberated at STP? (atomic mass of Zn=65.3u)

- 1. 20 L
- 2. 15.23 L
- 3. 11.2 L
- 4. 25.5 L

76. The correct statement(s) about the given reaction is -



- 1. XeO₆⁴⁻ oxidises F⁻
- 2. The oxidation number of F increases from -1 to zero
- 3. XeO₆⁴⁻ is a stronger oxidizing agent than F⁻
- 4. All of the above

77. The process associated with the following conversion is:



- 1. Oxidation
- 2. Reduction
- 3. Oxidation as well as reduction
- 4. Neither oxidation nor reduction

78. One mole of carbon atom weights 12 g, the number of atoms in it is equal to:

- (Mass of carbon – 12 is 1.9926×10^{-23} g)
- 1. 1.2×10^{23}
 - 2. 6.022×10^{22}
 - 3. 12×10^{22}
 - 4. 6.022×10^{23}

79. How many moles of magnesium phosphate, Mg₂(PO₄)₃, contain 0.25 moles of oxygen atoms?

1. 0.02	2. 3.125×10^{-2}
3. 1.25×10^{-2}	4. 2.5×10^{-2}

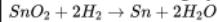
80. Which of the following can show disproportionation reaction?

- 1. MnO₄⁻
- 2. ClO₄⁻
- 3. MnO₄²⁻
- 4. F₂

81. What is the oxidation number of phosphorus (P) in the compound Ca(H₂PO₂)₂?

1. -1	2. 0
3. +1	4. +3

82. Given is the following equation:



What volume of hydrogen, measured at 1 atm and 273 K, is required to react with 2.00 g of SnO₂?

(Given: Molar mass of SnO₂ = 150.71 g/mol

- 1. 0.00133 L
- 2. 0.00265 L
- 3. 0.297 L
- 4. 0.595 L

83. When 7.3 g of magnesium bicarbonate (Mg(HCO₃)₂) is decomposed by heating, how much carbon dioxide gas (in mL) is released at STP?

- 1. 1000 mL
- 2. 1120 mL
- 3. 2230 mL
- 4. 3240 mL

84. A set of species capable of showing disproportionation reactions is:

- | |
|--|
| 1. ClO_2 , ClO_3^- , ClO_4^- , Cl_2 |
| 2. Cl_2 , ClO_2^- , ClO_3^- , S_8 |
| 3. ClO_4^- , ClO^- , ClO_2^- , F_2 |
| 4. ClO_3^- , ClO_4^- , H_2O_2 , ClO^- |

85. The highest oxidation number of nitrogen among the following compounds is:

- | | |
|---------------------------|---------------------------|
| 1. N_2H_4 | 2. NH_3 |
| 3. N_3H | 4. NH_2OH |

86. Which of the following processes is happening at the anode (from the options given below)?

1. $\text{F}_2 + 2e^- \rightarrow 2\text{F}^-$
2. $\text{H}^+ + \frac{1}{2}\text{O}_2 + 2e^- \rightarrow \text{H}_2\text{O}$
3. $2\text{Cr}^{3+} + 7\text{H}_2\text{O} \rightarrow \text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6e^-$
4. None of the above

87. An element A (at. wt. = 75) and B (at. wt. = 25) combine to form a compound that contains 75% A by weight. The formula of the compound will be:

- | | |
|-------------------------|-------------------------|
| 1. A_2B | 2. A_3B |
| 3. AB_3 | 4. AB |

88. Given the following reaction involving manganese (Mn):
$$3\text{MnO}_4^{2-} + 4\text{H}^+ \rightarrow 2\text{MnO}_4^- + \text{MnO}_2 + 2\text{H}_2\text{O}$$
Which oxidation states of manganese are not observed in the above reaction?

- A. +6
- B. +2
- C. +4
- D. +7
- E. +3

Mark the most appropriate answer from the options given below:

1. D and E only
2. B and D only
3. A and B only
4. B and E only

89. Which species are oxidized and reduced in the given reaction?



1. Oxidised : Fe,C ; Reduced : Mn
2. Oxidised : Fe; Reduced : Mn
3. Reduced : Fe,Mn ; Oxidised : C
4. Reduced : C; Oxidised : Mn,Fe

90. The oxidation states of two S-atoms in $\text{Na}_2\text{S}_2\text{O}_3$ are:

1. +2 and +4
2. +3 and -2
3. +4 and -2
4. +6 and -2

Biology

91. Both plastids and mitochondria:

I:	are enclosed by single membrane
II:	have ribosomes
III:	have DNA

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

92. All of the following organelles are a part of the endomembrane system of a eukaryotic cell except:

1. Endoplasmic reticulum
2. Golgi complex
3. Lysosomes
4. Mitochondria

93. What is the typical width of the perinuclear space between the two membranes of the nuclear envelope?

1. 5 to 10 nm	2. 10 to 50 nm
3. 50 to 100 nm	4. 100 to 200 nm

94. Match the following cellular processes with their corresponding terms:

Column I (Process)	Column II (Term)
A. Passive transport	1. Energy-dependent movement of molecules
B. Active transport	2. Diffusion of water across a selectively permeable membrane
C. Osmosis	3. Movement of molecules along the concentration gradient
D. Endocytosis	4. Process of engulfing external materials into the cell

Options:

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

95. Cell wall formation in bacteria is facilitated by:

1. Ribosomes	2. Mesosomes
3. Golgi Apparatus	4. Centrosomes

96. How many of the given pairs are correctly matched?

I:	Smooth endoplasmic reticulum: Lipid synthesis
II:	Cilia and flagella: 9 + 0 arrangement of microtubules
III:	Centriole: 9 + 2 arrangement of microtubules

1. 0
2. 1
3. 2
4. 3

97. Consider the given two statements:

Statement I:	The Golgi apparatus is involved in the packaging of materials for secretion or intracellular targeting.
Statement II:	The cis face of the Golgi apparatus is responsible for releasing modified materials into the cytoplasm.

1. **Statement I** is correct; **Statement II** is correct
2. **Statement I** is correct; **Statement II** is incorrect
3. **Statement I** is incorrect; **Statement II** is correct
4. **Statement I** is incorrect; **Statement II** is incorrect

98. Out of the four basic shapes:

1. Spherical bacteria are called as Coccus and Rod shaped bacteria are called as Bacillus
2. Spherical bacteria are called as Bacillus and Rod shaped bacteria are called as Coccus
3. Spherical bacteria are called as Spirillum and Rod shaped bacteria are called as Vibrios
4. Comma shaped bacteria are called as Vibrios and Spherical bacteria are called as Spirillum

99. Identify the incorrect statement:

1. Plastids are found in all plant cells and in euglenoids.
2. Plastids are easily observed under the microscope as they are large.
3. Majority of the chloroplasts of all green plants are found in the bundle sheath cells of the leaves.
4. Plastids are double membrane bound.

100. Identify the incorrect statement regarding nucleolus:

1. Their content is continuous with nucleoplasm
2. It is site for active rRNA synthesis
3. Their number is always one per nucleus
4. Larger nucleoli are present in cells actively carrying out protein synthesis

101. Consider the given two statements:

Statement I:	Bacterial flagella are composed of three parts: filament, hook, and basal body.
Statement II:	All bacteria possess flagella.

1. Both **Statements I** and **II** are True.
2. Both **Statements I** and **II** are False.
3. **Statement I** is True but **Statement II** is False.
4. **Statement I** is False but **Statement II** is True.

102. Consider the given two statements:

Statement I:	Rudolph Virchow proved that all life comes from pre-existing life.
Statement II:	Louis Pasteur proved that all cells arise from pre-existing cells

1. **Statement I** is True; **Statement II** is True
2. **Statement I** is True; **Statement II** is False
3. **Statement I** is False; **Statement II** is True
4. **Statement I** is False; **Statement II** is False

103. Ribosomes are the sites of protein synthesis in the cell. Where are ribosomes most likely to be found in a eukaryotic cell?

- | |
|--|
| 1. Attached to the endoplasmic reticulum (RER) |
| 2. Within the nucleus |
| 3. Attached to the inner nuclear membrane |
| 4. Inside the Golgi apparatus |

104. Consider the two statements:

Statement I:	Besides flagella, Pili and Fimbriae are also surface structures of the bacteria but do not play a role in motility.
Statement II:	Pili and fimbriae help attach the bacteria to rocks in streams and also to the host tissues.

- | |
|--|
| 1. Statement I is correct; Statement II is correct |
| 2. Statement I is correct; Statement II is incorrect |
| 3. Statement I is incorrect; Statement II is correct |
| 4. Statement I is incorrect; Statement II is incorrect |

105. Identify the incorrect statement regarding the cell wall of a plant cell:

- | |
|--|
| 1. Cell wall helps in cell-to-cell interaction and provides barrier to undesirable macromolecules. |
| 2. Cell wall consists of cellulose, hemicellulose, pectins and proteins. |
| 3. The primary wall is capable of growth. |
| 4. The secondary wall is formed on the outer (towards middle lamella) side of the cell. |

106. 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

107. Reserve material in prokaryotic cells:

- | |
|---|
| 1. are not stored at all. |
| 2. are stored in the cytoplasm in the form of inclusion bodies not bound by any membrane system. |
| 3. are stored in the cytoplasm in the form of inclusion bodies bound by a single membrane system. |
| 4. are stored in gas vacuoles found in blue green and purple and green photosynthetic bacteria. |

108. Who proposed the hypothesis that the bodies of animals and plants are composed of cells and products of cells, and also noted that the presence of a cell wall is a unique characteristic of plant cells?

- | | |
|-----------------------|--------------------|
| 1. Matthias Schleiden | 2. Rudolf Virchow |
| 3. Louis Pasteur | 4. Theodor Schwann |

109. Mesosomes in a bacterial cell:

- | | |
|-------------|--|
| I: | are formed by the extensions of plasma membrane into the cell. |
| II: | help in cell wall formation, DNA replication and distribution to daughter cells. |
| III: | contain pigments in cyanobacteria. |

- | |
|--------------------------------|
| 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. A 9 + 2 arrangement of microtubules is seen in:

- | | |
|------------------------|----------------------|
| I: Cilia | II: Flagella |
| III: Basal Body | IV: Centriole |

- | |
|--------------------|
| 1. Only I and II |
| 2. Only III and IV |
| 3. Only I and III |
| 4. Only II and IV |

111. What role does the stroma in chloroplasts play in cellular function?

- | |
|--|
| 1. It contains pigments responsible for trapping light energy. |
| 2. It houses enzymes required for the synthesis of carbohydrates and proteins. |
| 3. It serves as the primary site for ribosome assembly. |
| 4. It provides structural support to the chloroplast. |

112. Lysosomes are membrane-bound vesicular structures rich in:

1. Acid Hydrolases	2. Oxidases
3. Kinases	4. Polymerases

113. Match List I with List II:

List I	List II
A. Axoneme	I. Centriole
B. Cartwheel pattern	II. Cilia and flagella
C. Crista	III. Chromosome
D. Satellite	IV. Mitochondria

Choose the correct answer from the options given below:

1. A-IV, B-II, C-III, D-I
2. A-II ,B-IV, C-I, D-III
3. A-II, B-I, C-IV, D-III
4. A-IV,B-III, C-II, D-I

114. A single human somatic cell has approximately:

1. two metre long thread of DNA distributed among its forty six chromosomes.
2. two metre long thread of DNA distributed among its twenty three chromosomes.
3. one metre long thread of DNA distributed among its forty six chromosomes.
4. one metre long thread of DNA distributed among its twenty three chromosomes.

115. Vacuole in a plant cell

1. is membrane-bound and contains storage proteins and lipids
2. is membrane-bound and contains water and excretory substances
3. lacks membrane and contains air
4. lacks membrane and contains water and excretory substances

116. Consider the given two statements:

Statement I:	Ribosomes are non-membrane bound organelles found in both prokaryotic and eukaryotic cells, and they are the sites of protein synthesis.
Statement II:	Several ribosomes may attach to a single mRNA and form a chain called polyribosomes or polysome.

1. **Statement I** is correct; **Statement II** is correct
2. **Statement I** is correct; **Statement II** is incorrect
3. **Statement I** is incorrect; **Statement II** is correct
4. **Statement I** is incorrect; **Statement II** is incorrect

117. Consider the given two statements:

Statement I:	Prokaryotic ribosomes are 70S, while eukaryotic ribosomes are 80S.
Statement II:	The "S" in ribosome sizing stands for Svedberg unit, which is a measure of the rate of sedimentation in centrifugation rather than size.

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

118. Consider the given two statements:

Statement I:	The content of nucleolus is continuous with the rest of the nucleoplasm as it is not a membrane bound structure.
Statement II:	The outer nuclear membrane usually remains continuous with the endoplasmic reticulum but does not bear ribosomes on it.

1. **Statement I** is correct; **Statement II** is correct
2. **Statement I** is incorrect; **Statement II** is incorrect
3. **Statement I** is incorrect; **Statement II** is correct
4. **Statement I** is correct; **Statement II** is incorrect

119. Cells in the human body that secrete products like lipids and steroids are likely to have an abundance of:

1. Smooth endoplasmic reticulum
2. Rough endoplasmic reticulum
3. Lysosomes
4. Mitochondria

120. The primary wall of a young plant cell is capable of _____ as the cell matures, while the _____ wall forms on the inner side of the cell, providing additional rigidity.

1. shrinking, outer
2. breaking down, middle
3. growth, secondary
4. division, primary

121. Who first observed a live cell under a microscope?

- | | |
|-----------------|--------------------------|
| 1. Robert Hooke | 2. Anton von Leeuwenhoek |
| 3. Robert Brown | 4. Rudolf Virchow |

122. The content of nucleolus is continuous with nucleoplasm

- | |
|--|
| 1. Through microtubules |
| 2. Through nuclear pores |
| 3. Due to lack of membrane |
| 4. Due to presence of channels in membrane |

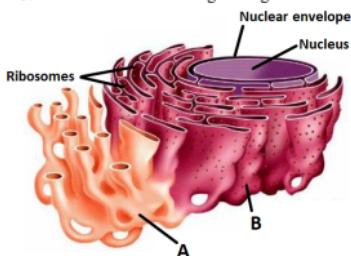
123. The correct description of prokaryotic ribosomes will be:

- | |
|--|
| They are about 15 nm by 20 nm in size and are made of two subunits - 50S and 30S units which when present together form 70S prokaryotic ribosomes. |
| They are about 15 nm by 20 nm in size and are made of two subunits - 40S and 30S units which when present together form 70S prokaryotic ribosomes. |
| They are about 20 nm by 25 nm in size and are made of two subunits - 60S and 40S units which when present together form 80S prokaryotic ribosomes. |
| They are about 25 nm by 50 nm in size and are made of two subunits - 50S and 20S units which when present together form 70S prokaryotic ribosomes. |

124. The fluid mosaic model for the plasma membrane was proposed by:

1. H. Davson and J. Danielli
2. Schleiden and Schwann
3. Singer and Nicolson
4. Robert Brown and Robert Hooke

125. What are A and B in the given figure?



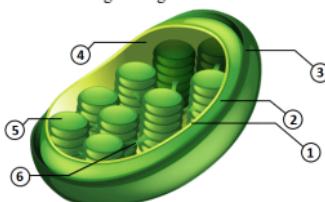
A	B
1. SER	RER
2. RER	SER
3. RER	Golgi apparatus
4. SER	Golgi apparatus

126. Consider the two statements:

Statement I:	Prokaryotic cells are usually smaller than eucaryotic cells.
Statement II:	Prokaryotic cells usually divide faster than eucaryotic cells.

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

127. Which number represents the site for carbon fixation in the given figure?



1.2	2.4
3.5	4.3

<p>128. Which type of plastid is responsible for storing oils and fats in plant cells?</p> <ol style="list-style-type: none"> 1. Chloroplasts 2. Chromoplasts 3. Leucoplasts 4. Elaioplasts 	<p>134. A chromosome where the centromere is situated close to the end forming one extremely short and one very long arm is called as</p> <table border="1" data-bbox="518 261 748 309"> <tr> <td>1. Metacentric</td><td>2. Submetacentric</td></tr> <tr> <td>3. Acrocentric</td><td>4. Telocentric.</td></tr> </table>	1. Metacentric	2. Submetacentric	3. Acrocentric	4. Telocentric.		
1. Metacentric	2. Submetacentric						
3. Acrocentric	4. Telocentric.						
<p>129. In <i>Amoeba</i>, contractile vacuoles:</p> <table border="1" data-bbox="108 355 505 492"> <tr> <td>1. contains water, sap, excretory product and other materials not useful for the cell.</td></tr> <tr> <td>2. store enzymes capable of digesting carbohydrates, proteins, lipids and nucleic acids.</td></tr> <tr> <td>3. are formed by engulfing the food particles.</td></tr> <tr> <td>4. are important for osmoregulation and excretion.</td></tr> </table>	1. contains water, sap, excretory product and other materials not useful for the cell.	2. store enzymes capable of digesting carbohydrates, proteins, lipids and nucleic acids.	3. are formed by engulfing the food particles.	4. are important for osmoregulation and excretion.	<p>135. What differentiates chromatin from chromosomes in eukaryotic cells?</p>		
1. contains water, sap, excretory product and other materials not useful for the cell.							
2. store enzymes capable of digesting carbohydrates, proteins, lipids and nucleic acids.							
3. are formed by engulfing the food particles.							
4. are important for osmoregulation and excretion.							
<p>130. In protists like <i>Amoeba</i>, what is the function of the contractile vacuole?</p> <table border="1" data-bbox="108 571 342 665"> <tr> <td>1. Protein synthesis</td></tr> <tr> <td>2. Osmoregulation and excretion</td></tr> <tr> <td>3. Lipid synthesis</td></tr> <tr> <td>4. DNA replication</td></tr> </table>	1. Protein synthesis	2. Osmoregulation and excretion	3. Lipid synthesis	4. DNA replication	<ol style="list-style-type: none"> 1. Chromatin is composed only of RNA, while chromosomes contain DNA. 2. Chromatin is membrane-bound, while chromosomes are not. 3. Chromatin is loosely packed nucleoprotein fibres, while chromosomes are condensed structures visible during cell division. 4. Chromatin contains ribosomes, while chromosomes lack them. 		
1. Protein synthesis							
2. Osmoregulation and excretion							
3. Lipid synthesis							
4. DNA replication							
<p>131. Non-membranous nucleoplasmic structures in the nucleus, are the sites for active synthesis of:</p> <table border="1" data-bbox="108 745 342 795"> <tr> <td>1. protein</td> <td>2. mRNA</td></tr> <tr> <td>3. rRNA</td> <td>4. tRNA</td></tr> </table>	1. protein	2. mRNA	3. rRNA	4. tRNA	<p>136. Which of the following statements about the middle lamella is incorrect?</p>		
1. protein	2. mRNA						
3. rRNA	4. tRNA						
<p>132. Carotenoid pigments like carotene and xanthophylls:</p> <table border="1" data-bbox="108 875 342 925"> <tr> <td>I: are present on chromatophylls.</td></tr> <tr> <td>II: are not lipid soluble.</td></tr> </table> <ol style="list-style-type: none"> 1. Only I is correct 2. Only II is correct 3. Both I and II are correct 4. Both I and II are incorrect 	I: are present on chromatophylls.	II: are not lipid soluble.	<table border="1" data-bbox="518 672 911 824"> <tr> <td>1. It is primarily composed of calcium pectate.</td></tr> <tr> <td>2. It acts as a cementing layer between adjacent plant cells.</td></tr> <tr> <td>3. It is responsible for connecting the cytoplasm of neighboring cells directly.</td></tr> <tr> <td>4. Plasmodesmata traverse the middle lamella to facilitate intercellular communication.</td></tr> </table>	1. It is primarily composed of calcium pectate.	2. It acts as a cementing layer between adjacent plant cells.	3. It is responsible for connecting the cytoplasm of neighboring cells directly.	4. Plasmodesmata traverse the middle lamella to facilitate intercellular communication.
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4. Plasmodesmata traverse the middle lamella to facilitate intercellular communication.							
<p>133. Identify the incorrect statement about the nucleolus:</p> <table border="1" data-bbox="108 1048 505 1185"> <tr> <td>1. It is the site of ribosomal RNA (rRNA) synthesis.</td></tr> <tr> <td>2. It is involved in the assembly of ribosomal subunits.</td></tr> <tr> <td>3. It is surrounded by a double membrane like the nucleus.</td></tr> <tr> <td>4. Its size varies, depending on the metabolic activity of the cell.</td></tr> </table>	1. It is the site of ribosomal RNA (rRNA) synthesis.	2. It is involved in the assembly of ribosomal subunits.	3. It is surrounded by a double membrane like the nucleus.	4. Its size varies, depending on the metabolic activity of the cell.	<p>137. Unicellular organisms are capable of:</p> <table border="1" data-bbox="518 875 827 925"> <tr> <td>I: independent existence</td></tr> <tr> <td>II: performing the essential functions of life</td></tr> </table>	I: independent existence	II: performing the essential functions of life
1. It is the site of ribosomal RNA (rRNA) synthesis.							
2. It is involved in the assembly of ribosomal subunits.							
3. It is surrounded by a double membrane like the nucleus.							
4. Its size varies, depending on the metabolic activity of the cell.							
I: independent existence							
II: performing the essential functions of life							

138. Consider the given two statements:

Statement I:	The number of mitochondria per cell is variable and depends on the physiological activity of the cell.
Statement II:	The mitochondria are always spherical and have a fixed size of $0.5\mu\text{m}$ in diameter and $1.0\mu\text{m}$ in length.

1. **Statement I** is correct; **Statement II** is correct
2. **Statement I** is correct; **Statement II** is incorrect
3. **Statement I** is incorrect; **Statement II** is correct
4. **Statement I** is incorrect; **Statement II** is incorrect

139. The terms 'slime layer' and 'capsule' can be used for which layer of the complex cell envelope of a typical bacterial cell?

1. Glycocalyx
2. Gram positive cell wall
3. Gram negative cell wall
4. Cell membrane

140. The Golgi apparatus principally performs the function of packaging materials. From which face of the Golgi apparatus are materials released after modification?

1. Trans face
2. Cis face
3. Medial face
4. Lateral face

141. The smooth Endoplasmic Reticulum is expected to be especially abundant in cells that synthesize extensive amounts of:

1. toxins
2. proteins
3. enzymes
4. lipids

142. What is the primary function of plasmids in a bacterial cell?

1. They encode the main genetic material necessary for bacterial survival.
2. They function as the main site for protein synthesis in bacteria.
3. They regulate cell division and replication in bacterial cells.
4. They provide resistance to antibiotics and confer unique phenotypic traits.

143. The _____ are spherical structures in the nucleoplasm and are involved in the synthesis of _____ RNA.

1. nucleoli, ribosomal
2. ribosomes, messenger
3. centrioles, transfer
4. chromatin, ribosomal

144. Which of the following is a key difference between prokaryotic and eukaryotic cells?

1. Only eukaryotic cells contain a cell membrane.
2. Prokaryotic cells have membrane-bound organelles, while eukaryotic cells do not.
3. Eukaryotic cells have a well-defined nucleus, while prokaryotic cells do not.
4. Prokaryotic cells are generally larger than eukaryotic cells.

145. Cell membrane proteins can be classified as integral and peripheral on the basis of

- | | |
|-----------------------|--------------------|
| 1. Their size | 2. Their function |
| 3. Ease of extraction | 4. Chemical nature |

146. Which of the following organelles are part of the endomembrane system due to their coordinated functions?

- | |
|---|
| 1. Endoplasmic Reticulum, Golgi Complex, Lysosomes, and Vacuoles |
| 2. Mitochondria, Chloroplast, Peroxisomes, and Golgi Complex |
| 3. Endoplasmic Reticulum, Peroxisomes, Lysosomes, and Chloroplast |
| 4. Golgi Complex, Vacuoles, Mitochondria, and Lysosomes |

147. Which of the following distinguishes plasmodesmata from other cell connections in plants?

- | |
|--|
| 1. They facilitate passive transport of ions. |
| 2. They are involved in the synthesis of secondary cell walls. |
| 3. They are restricted to transport of water molecules. |
| 4. They create direct cytoplasmic continuity between neighbouring cells. |

148. Golgi apparatus:

- | |
|--|
| I: is an important site of formation of glycoproteins and glycolipids. |
| II: is not a part of the endomembrane system of a eukaryotic cell. |
| 1. Only I is correct |
| 2. Only II is correct |
| 3. Both I and II are correct |
| 4. Both I and II are incorrect |

149. Mesosome in a cell is a:

- | |
|---|
| 1. Membrane bound vesicular structure |
| 2. Chain of many ribosomes attached to a single mRNA |
| 3. Special structure formed by the extension of plasma membrane |
| 4. Medium sized chromosome |

150. Match List I with List II:

List I	List II
A. Metacentric chromosome	I. Chromosome has a terminal centromere
B. Sub-metacentric chromosome	II. Middle centromere forming two equal arms of chromosome
C. Acrocentric chromosome	III. Centromere is slightly away from the middle chromosome resulting into two unequal arms
D. Telocentric chromosome	IV. Centromere is situated close to its end forming one extremely short and one very long arm

Choose the correct answer from the options given below:

1. A-II, B-I, C- IV, D- III
2. A-IV, B-I, C- II, D- III
3. A-I, B-II, C- III, D- IV
4. A-II, B-III, C- IV, D- I

151. Which organelle is seen in both prokaryotic and eukaryotic cells?

- | | |
|--------------------|---------------|
| 1. Chloroplast | 2. Centrosome |
| 3. Golgi apparatus | 4. Ribosome |

152. The nucleus was discovered by:

1. Robert Hooke
2. Robert Brown
3. Anton Von Leeuwenhoek
4. Purkinje

153. In bacteria, the formation of peptide bond is catalyzed by a ribozyme that is a part of the:

- | |
|---|
| 1. 50S (23S component) ribosome subunit |
| 2. 30S (28S component) ribosome subunit |
| 3. 60S (28S component) ribosome subunit |
| 4. 40S (23S component) ribosome subunit |

154. Which of the following statements is NOT true about the genetic material and its organization in prokaryotic cells?

- | |
|---|
| 1. The genetic material in prokaryotic cells is typically a single circular DNA molecule. |
| 2. Prokaryotic cells may contain small, additional DNA molecules called plasmids, which confer unique traits such as antibiotic resistance. |
| 3. The nucleoid region in prokaryotic cells is surrounded by a double membrane similar to the nuclear envelope in eukaryotic cells. |
| 4. Prokaryotic DNA is associated with proteins, but not organized into chromatin structures as in eukaryotic cells. |

155. Which of the following statements about mitochondria is true?

- | |
|--|
| 1. Mitochondria contain their own DNA and ribosomes, which allows them to replicate independently within the cell. |
| 2. Mitochondria are primarily involved in the degradation of long-chain fatty acids. |
| 3. The outer membrane of mitochondria is highly permeable to protons, helping establish the proton gradient. |
| 4. Mitochondria are found only in animal cells and not in plant cells. |

156. The endomembrane system is composed of the different membranes that are suspended in the cytoplasm within a eukaryotic cell. These membranes divide the cell into functional and structural compartments, or organelles. The system includes all the following except:

- | | |
|-----------------|--------------------|
| 1. ER | 2. Golgi apparatus |
| 3. Chloroplasts | 4. Vacuoles |

157. The prokaryotic cells are represented by all the following except:

1. yeast
2. bacteria
3. blue-green algae
4. mycoplasma

158. The endoplasmic reticulum (ER) divides the intracellular space into two distinct compartments. What are these compartments called?

- | |
|---|
| 1. Lumenal and nuclear compartments |
| 2. Lumenal and extra-luminal compartments |
| 3. Cytoplasmic and nuclear compartments |
| 4. Cytoplasmic and nucleoplasmic compartments |

159. Consider the given two statements:

Assertion (A):	Mitochondria and chloroplasts are not regarded as part of the endomembrane system in a eukaryotic cell.
Reason (R):	Mitochondria and chloroplasts are double membrane bound organelles.

- | |
|---|
| 1. Both (A) and (R) are True and (R) correctly explains (A) |
| 2. Both (A) and (R) are True but (R) does not correctly explain (A) |
| 3. (A) is True but (R) is False |
| 4. (A) is False but (R) is True |

160. Consider the given two statements:

- I:** No animal cell has cell wall.
II: No animal cell has centrosome.
1. Only I is correct
 2. Only II is correct
 3. Both I and II are correct
 4. Both I and II are incorrect

161. Mesosomes in bacteria are infoldings of the plasma membrane that function in:

- | |
|--|
| 1. Protein synthesis and lipid storage |
| 2. Absorption of nutrients and production of antibiotics |
| 3. Providing structural support to bacterial cell walls |
| 4. Respiration, DNA replication, and cell division |

162. All bacterial cells are:

- | |
|--|
| 1. motile. |
| 2. enclosed by peptidoglycan cell wall. |
| 3. prokaryotic. |
| 4. capable of fixing atmospheric nitrogen. |

163. The Golgi complex plays a major role:

- | |
|---|
| 1. in digesting proteins and carbohydrates |
| 2. as energy transferring organelles |
| 3. in post-translational modification of proteins and glycosylation of lipids |
| 4. in trapping the light and transforming it into chemical energy |

164.

Statement I:	It is a non-membrane bound organelle which helps in cell division
Statement II:	It forms the basal body of cilia and flagella.

Above statements are true for:

1. Nucleus
2. Centromere
3. Centriole
4. Golgi apparatus

165. What functional role does the middle lamella play in plant cells?

- | |
|---|
| 1. It synthesizes cellulose for the primary cell wall. |
| 2. It connects neighbouring cells by providing a pathway for plasmodesmata. |
| 3. It glues neighbouring cells together using calcium pectate. |
| 4. It stores water and ions for neighbouring cells. |

166. Identify the correct statements regarding mitochondria:

- | |
|---|
| a. Mitochondria are easily visible under the microscope without any staining. |
| b. The number of mitochondria per cell is always fixed irrespective of the physiological activity of the cells. |
| c. Mitochondria are the sites of aerobic respiration. |
| d. Mitochondria divide by fission. |

1. a and b
2. c and d
3. a and c
4. b and d

167. Which of the following movement across a cell membrane will require the utilisation of ATP energy?

- | |
|---|
| 1. Movement of neutral solutes along the concentration gradient. |
| 2. Osmosis of water from higher to lower concentration. |
| 3. Movement of polar molecules along the concentration gradient facilitated by a carrier protein. |
| 4. Transport of ions against their concentration gradient. |

168. Flagella of prokaryotic and eukaryotic cells differ in:

- | |
|---|
| 1. Location in cell and mode of functioning |
| 2. Microtubular organization and type of movement |
| 3. Microtubular organization and function |
| 4. Type of movement & placement in the cell |

169. Golgi apparatus plays a crucial role in modifying and packaging cellular components. What important biomolecules are synthesized within the Golgi complex?

1. Nucleic acids
2. Glycoproteins and glycolipids
3. Phospholipids and triglycerides
4. Ribosomal proteins

170. Consider the given two statements:

Assertion (A):	Prokaryotic cells have a simpler structure than eukaryotic cells but can carry out essential life processes.
Reason (R):	Prokaryotic cells lack membrane-bound organelles, but they have ribosomes and a plasma membrane for metabolic functions.

- | |
|---|
| 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. |

171. The nucleolus is best described as:

- | |
|---|
| 1. The site of lipid synthesis. |
| 2. The primary location for ribosome assembly. |
| 3. A storage area for cellular waste products. |
| 4. The cell's primary energy-producing structure. |

172. Consider the two statements:

Assertion (A):	The cells of testes and ovaries have abundance of Smooth Endoplasmic Reticulum.
Reason (R):	The cells of testes and ovaries secrete steroid hormones.

- | |
|--|
| 1. Both (A) and (R) are True and (R) correctly explains (A). |
| 2. (A) is True but (R) is False. |
| 3. Both (A) and (R) are True but (R) does not explain (A). |
| 4. (A) is False but (R) is True. |

173. Which organelle in a eukaryotic cell contains acid hydrolases?

1. Golgi apparatus
2. Smooth Endoplasmic Reticulum
3. Lysosomes
4. Peroxisomes

174. What are the three layers of the prokaryotic cell envelope, starting from the outermost layer?

- | |
|---|
| 1. Cell wall, plasma membrane, cytoplasm |
| 2. Glycocalyx, cell wall, plasma membrane |
| 3. Plasma membrane, glycocalyx, cytoplasm |
| 4. Glycocalyx, plasma membrane, cell wall |

175. The structures that are formed by stacking of organised flattened membranous sacks in the chloroplasts are:

1. cristae
2. grana
3. stroma lamellae
4. stroma

176. The membranes of which of the following cell organelles are not included in the endomembrane system of a eukaryotic cell?

1. Vacuole
2. Lysosome
3. Plastid
4. Endoplasmic reticulum

177. The vacuole is bound by tonoplast which is:

- | |
|---|
| 1. a single membrane. |
| 2. a double layered membrane with pore complexes. |
| 3. a protein rich S layer. |
| 4. freely permeable to all ions. |

178. In a prokaryotic cell, phosphate granules, cyanophycean granules and glycogen granules are examples of:

- | |
|--|
| 1. inclusion bodies. |
| 2. subunits of ribosomes. |
| 3. enzyme rich locations in cell membrane. |
| 4. products of plasmid genes. |

179. Consider the given two statements:

Statement I:	The ratio of protein to lipid in the cell membrane is constant across all cell types.
Statement II:	In human erythrocytes, the plasma membrane is composed of approximately 52% protein and 40% lipids.

1. **Statement I** is correct; **Statement II** is correct.
2. **Statement I** is correct; **Statement II** is incorrect.
3. **Statement I** is incorrect; **Statement II** is correct.
4. **Statement I** is incorrect; **Statement II** is incorrect.

180. Which among the following scientists contributed the idea that all plants are composed of cells?

1. Matthias Schleiden
2. Rudolf Virchow
3. Theodor Schwann
4. Anton von Leeuwenhoek

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