



इस परीक्षा पुस्तिका को तब तक न खोलें जब तक कहा न जाए।
Do not open this Test Booklet until you are asked to do so.
इस परीक्षा पुस्तिका के पिछले आवरण पर दिए निर्देशों को ध्यान से पढ़ें।
Read carefully the Instructions on the Back Cover of this Test Booklet.

Date: 20-07-2025

DURATION: 180 Minutes

CLASS – Dropper

M. MARKS: 300

Important Instructions:

- (a) Total duration of NEET UG Paper is **180** min.
(b) NEET UG Paper Contains **180** question.
(c) Maximum Marks **720**
- The question paper consists of 3 Subjects (Physics, Chemistry, Biology).
- Each correct answer will give 4 marks while 1 Mark will be deducted for a wrong response.

महत्वपूर्ण निर्देश:

- (a) सभी प्रश्नों को हल करने की कुल अवधि NEET UG Paper के लिए **180** मिनट है।
(b) NEET UG Paper में **180** प्रश्न हैं।
(c) अधिकतम अंक **720**
- इस प्रश्न पत्र में 3 विषय (भौतिक विज्ञान, रसायन विज्ञान, जीव विज्ञान) हैं।
- प्रत्येक सही उत्तर पर 4 अंक दिए जाएंगे जबकि प्रश्नों के लिए गलत उत्तर के लिए 1 अंक काटा जाएगा।

REAL TEST

SYLLABUS

Physics: Mathematical Tools, Units and Measurements, Motion in a Straight Line & Vectors

Chemistry: Some Basic Concepts of Chemistry, Redox Reaction, Solutions

Botany: Cell - The Unit of Life (Complete Chapter); Cell Cycle and Cell Division

Zoology: Structural organization in Animals and Breathing and exchange of gases

1. For what real value of k does equation $x^2 - 2(k+1)x + k\left(k + \frac{5}{2}\right) = 0$ have equal roots?
 - (1) -1 (2) 0
 - (3) 2 (4) 3
2. Which of the following triplets is dimensionally **correct** for “pressure”? (Pa \rightarrow pascal, other symbol have their usual meaning)
 - (1) $\text{N m}^{-2}, \text{kg m}^{-1} \text{s}^{-2}, \text{Pa}$
 - (2) $\text{N}, \text{kg m s}^{-2}, \text{Pa}$
 - (3) $\text{J m}^{-3}, \text{kg m}^2 \text{s}^{-2}, \text{bar}$
 - (4) $\text{N m}, \text{kg m}^2 \text{s}^{-2}, \text{atm}$
3. The ratio of distances travelled in the 4th and 5th seconds for uniformly accelerated motion from rest is 7:9. Acceleration is:
 - (1) 2 m s^{-2} only
 - (2) 3 m s^{-2} only
 - (3) 4 m s^{-2} only
 - (4) Any finite value of acceleration
4. Let $\vec{a} = \hat{i} + 2\hat{j} - \hat{k}$, $\vec{b} = 2\hat{i} - \hat{j} + 3\hat{k}$. A unit-vector perpendicular to both \vec{a} and \vec{b} is:
 - (1) $\frac{1}{\sqrt{75}}(5\hat{i} + 5\hat{j} + 7\hat{k})$
 - (2) $\frac{1}{\sqrt{75}}(7\hat{i} - 5\hat{j} - 7\hat{k})$
 - (3) $\frac{1}{\sqrt{75}}(5\hat{i} + 5\hat{j} - 5\hat{k})$
 - (4) $\frac{1}{\sqrt{75}}(5\hat{i} - 5\hat{j} - 5\hat{k})$
5. In CGS systems, the unit of viscosity “poise” has dimensions:
 - (1) $[ML^{-1}T^{-1}]$ (2) $[ML^{-1}T^{-2}]$
 - (3) $[ML^{-2}T^{-1}]$ (4) $[MLT^{-1}]$
6. If α and β are the roots of quadratic equation $x^2 - 5x + 6 = 0$, then what is the value of $\frac{\alpha + \beta}{\alpha\beta}$?
 - (1) $\frac{5}{6}$ (2) $\frac{2}{3}$
 - (3) $-\frac{2}{3}$ (4) $-\frac{5}{6}$
7. A stone is thrown vertically upward with 40 m s^{-1} . Time for the stone to rise from 35 m to 68.75 m above the point of projection is: ($g = 10 \text{ m/s}^2$)
 - (1) 1 s (2) 1.5 s
 - (3) 2 s (4) 2.5 s
8. Which pair of physical quantities are dimensionless?
 - (1) Refractive index, Universal gravitational constant
 - (2) Specific gravity, coefficient of friction
 - (3) Stefan constant, Poisson ratio
 - (4) Coulomb constant, Reynolds number
9. If \vec{a}, \vec{b} are non-collinear vector and $|\vec{a} + \vec{b}| = |\vec{a} - \vec{b}| \neq 0$, then angle between \vec{a} and \vec{b} is:
 - (1) 30° (2) 45°
 - (3) 60° (4) 90°
10. Determine value of x (in radian) from the equation, $\sin(2x) = \sin x$, for $0 < x < 2\pi$.
 - (1) $0, \pi, 2\pi$ only
 - (2) $\frac{\pi}{3}, \pi, \frac{5\pi}{3}$ only
 - (3) $0, \frac{\pi}{3}, \pi, \frac{5\pi}{3}$ only
 - (4) infinitely many
11. The velocity of a particle moving along the x -axis is described by the equation $\vec{v}(t) = (\pi/2)\cos(\pi t/2)\hat{i}$ for the time interval $0 \leq t \leq 3\text{s}$. What is the ratio of the magnitude of its average velocity to its average speed over this entire time interval?
 - (1) $\frac{1}{3}$ (2) $\frac{1}{2}$
 - (3) $\frac{2}{3}$ (4) $\frac{\pi}{4}$
12. The drag force F on a sphere is proposed as $F = k\eta^a r^b v^c$. Using dimensional analysis for viscosity η , radius r , and velocity v , the exponents satisfy: (k is dimensionless constant)
 - (1) $a = 1, b = 1, c = 1$
 - (2) $a = 1, b = 2, c = 1$
 - (3) $a = 1, b = 1, c = 2$
 - (4) $a = 2, b = 1, c = -1$
13. For non-zero vectors \vec{a}, \vec{b} , the equality $|\vec{a} + \vec{b}| = |\vec{a}| + |\vec{b}|$ holds if:
 - (1) $\vec{a} \cdot \vec{b} = 0$
 - (2) \vec{a} is parallel to \vec{b} and in same direction
 - (3) \vec{a} is parallel to \vec{b} and in opposite direction
 - (4) $|\vec{a}| = |\vec{b}|$

14. If power P , mass density ρ , and length L are taken as fundamental quantities, then the dimensional formula of speed is:

- (1) $[P^{1/3}\rho^{-1/3}L^0]$
 (2) $[P^{1/2}\rho^{-1/2}L^{-1/2}]$
 (3) $[P^{1/3}\rho^{-1/3}L^{-2/3}]$
 (4) $[P^{1/2}\rho^{-1/2}L^0]$

15. For acute angle θ , if $\sin \theta = \frac{3}{5}$, then the value of

$(\sin 2\theta + \cos 2\theta)$ is:

- (1) $\frac{31}{25}$ (2) $\frac{7}{25}$
 (3) $\frac{24}{25}$ (4) $\frac{17}{25}$

16. A stone is dropped from the top of a cliff covers 35 m in the last 1 s before touching ground. Height of the cliff is:

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

- (1) 60 m (2) 75 m
 (3) 80 m (4) 100 m

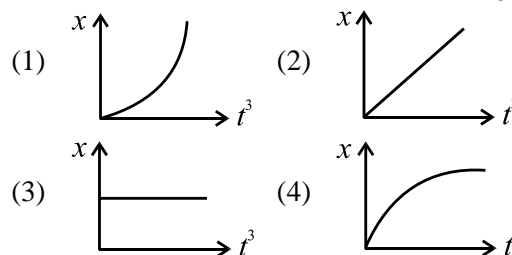
17. If $\vec{n} = \frac{1}{\sqrt{3}}(\hat{i} + \hat{j} + \hat{k})$ and $\vec{a} = a_x\hat{i} + a_y\hat{j} + a_z\hat{k}$ is any vector, the projection of \vec{a} on \vec{n} is:

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

18. Two friends Anil and Aman play a game of catching the ball near a 80 m tall building such that Aman throws the ball from grounds towards its roof and Anil stands on the window 5 m below the roof aiming to catch the ball. The ball is thrown just to reach the roof and is missed by Anil while going upwards but he manages to catch it while coming back downwards, the total time taken by him to catch the ball after its projection will be (neglect the height of the boys) $(g = 10 \text{ m/s}^2)$

- (1) 3s (2) 4s
 (3) 5s (4) 8s

19. A body is moving under variable acceleration $a = (kt) \text{ m/s}^2$ (where t is time and k is positive constant). What will be the graph between its position (x) and cube of time (t^3) if it starts the motion from origin at rest.



20. In the equation $\left(P + \frac{a}{V^2}\right)(V - b) = RT$, where P = Pressure, V = Volume, T = absolute temperature, the dimensional formula of $\frac{a}{b}$ is:

- (1) $[ML^5T^{-3}]$ (2) $[ML^2T^{-2}]$
 (3) $[M^{-1}L^3T^{-4}]$ (4) $[ML^{-2}T^2]$

21. In a circuit, resistance $R = (10.0 \pm 0.2)\Omega$, current $I = (2.00 \pm 0.05)\text{A}$. Maximum percentage error in calculating power P is:

- (1) 2% (2) 3%
 (3) 4% (4) 7%

22. If in a right-angled triangle $\triangle ABC$ ($\angle B = 90^\circ$),

$\sin A \cdot \cos C = \frac{9}{25}$, then the value of $\tan C$.

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

23. **Assertion A:** A number 1.746 rounded off to three significant figures is 1.75, while the number 1.743 would be 1.74 after rounding off to three significant figures.

Reason R: In rounding off the uncertain digits, the preceding digit is raised by 1 if the digit to be dropped is more than 5 and is left unchanged if the digit to be dropped is less than 5.

- (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.

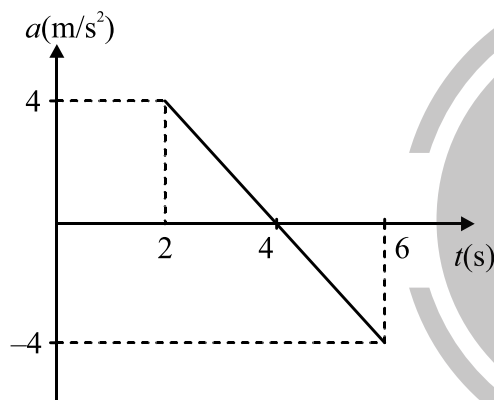
24. A stone is dropped from a balloon rising at constant speed of 8 m s^{-1} . After 5 s, stone speed w.r.t. ground is: ($g = 9.8 \text{ m/s}^2$)

(1) 41 m/s downwards
(2) 45 m/s downwards
(3) 49 m/s downwards
(4) 57 m/s downwards

25. Solve for x : $\log_2(x-2) + \log_2(x+2) = 3$.

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

26. For the acceleration-time ($a-t$) graph of a particle moving along straight line shown in figure, the magnitude of change in velocity of particle from $t = 2 \text{ s}$ to $t = 6 \text{ s}$ is:

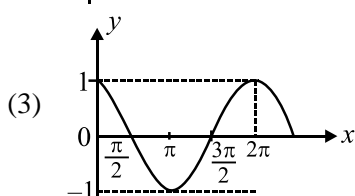
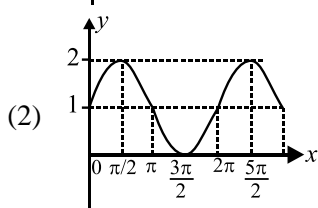
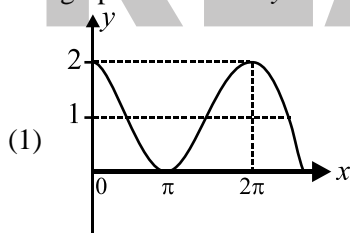


(1) 0 (2) 4 m/s
(3) 21 m/s (4) 8 m/s

27. If $5^{\log_5(2x+1)} = 625$, then $x =$

(1) 62 (2) 312
(3) 128 (4) 212

28. The graph of function $y = 1 + \cos x$ will be:



(4) None of these

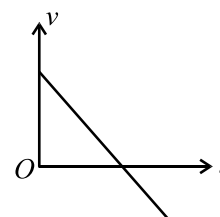
29. Particle is moving in straight line with retardation $a = (-kv) \text{ m/s}^2$ (where v is velocity in m/s , k is positive constant) slows from 30 m s^{-1} to 10 m s^{-1} . Distance travelled by particle in this period is:

(1) $\left(\frac{1}{k} 20 \ln 3\right) \text{ m}$ (2) $\left(\frac{1}{k} 20\right) \text{ m}$
(3) $\left(\frac{1}{k} 10 \ln 3\right) \text{ m}$ (4) $\left(\frac{1}{k} 40\right) \text{ m}$

30. A screw gauge has pitch 0.5 mm and 100 circular scale division. When the two jaws of the screw gauge are in contact with each other, the circular-scale zero is 6 divisions below the line of reference. Zero error is:

(1) +0.03 mm (2) -0.03 mm
(3) +0.3 mm (4) -0.3 mm

31. A body in vertical motion under gravity describe the following velocity-time ($v-t$) graph when thrown upwards. Considering no air resistance. Match the List-I with the possible corresponding graphs in List-II.



List - I		List - II	
A.	Position time ($x-t$) graph	I.	
B.	Acceleration time ($a-t$) graph	II.	
C.	Speed-time graphs ($s-t$)	III.	

(1) A-III, B-II, C-I
(2) A-III, B-I, C-II
(3) A-II, B-III, C-I
(4) A-II, B-I, C-III

32. For a particle moving in straight line, if its initial velocity is negative and acceleration has positive constant value, its speed:

(1) must increase throughout
(2) must decrease throughout
(3) initially decrease and then increase
(4) remains constant throughout

33. Area under the curve of the function $y = e^x$ from $x = 0$ to $x = \ln 3$ is:
- (1) 2 sq. units (2) 3 sq. units
(3) 4 sq. units (4) 5 sq. units
34. A 30-division vernier scale is such that 30 VSD = 29 MSD and 1 MSD = 0.02 cm. While measuring the outer diameter of a tube, the 0 mark of vernier lies between 2.48 cm and 2.50 cm and 18th VSD coincides. If zero error = +0.01 cm, **correct** outer diameter is:
- (1) 2.482 cm (2) 2.502 cm
(3) 2.521 cm (4) 2.480 cm
35. If $y = \frac{\ell \ln x}{x}$, then $\frac{dy}{dx}$ equals:
- (1) $\frac{1 - \ell \ln x}{x^2}$ (2) $\frac{\ell \ln x - 1}{x^2}$
(3) $\frac{1 + \ell \ln x}{x^2}$ (4) $\frac{\ell \ln x + 1}{x}$
36. A body is moving along x axis. Its position x (in meter) varies with time t (in sec) as $x = t^2 - 4t + 3$. The total amount of time during which the body moves in negative x direction during the time interval $t = 0$ to $t = 4$ s is:
- (1) 1 s (2) 2 s
(3) 3 s (4) 4 s
37. A vector has magnitude same as that of $\vec{A} = 3\hat{i} + 4\hat{j}$ and is parallel to $\vec{B} = 4\hat{i} + 3\hat{j}$. The x and y components of this vector in first quadrant are p and 3 respectively where p is:
- (1) 1 (2) 2
(3) 3 (4) 4
38. For $y(x) = \frac{x^2 + 1}{x}$, slope of the tangent to the curve at $x = 1$ is:
- (1) -1 (2) 0
(3) 1 (4) 2
39. If $\vec{r} = x\hat{i} + y\hat{j}$ and $|\vec{r}| = 5$ then $(\vec{r} \cdot \hat{i})^2 + (\vec{r} \cdot \hat{j})^2$ equals:
- (1) 25 (2) 81
(3) 225 (4) 135
40. A particle is thrown vertically upwards from ground. It experiences a constant air resistance which produce a retardation of 2 m/s^2 opposite to the direction of velocity of particle. If the ratio of total time of ascent to the total time of descent of particle is $\sqrt{\frac{6}{8+K}}$, the value of K is ($g = 10 \text{ m/s}^2$)
- (1) 2 (2) 1
(3) 4 (4) 3
41. For $f(x) = x^3 - 6x^2 + 9x + 4$, local maximum occurs at:
- (1) $x = 1$ (2) $x = 2$
(3) $x = 3$ (4) $x = 0$
42. A body moves in straight line covers 1 m in the first second and another 1 m in the next second. This situation is:
- (1) possible with acceleration $a = 1 \text{ m/s}^2$
(2) possible with variable acceleration
(3) impossible under constant non-zero acceleration
(4) possible with acceleration $a = 0.5 \text{ m/s}^2$
43. In an expression $a \times 10^b$:
- (1) a is order of magnitude for $b \leq 5$
(2) b is order of magnitude for $a \leq 5$
(3) b is order of magnitude for $5 < a \leq 10$
(4) b is order of magnitude for $a \geq 5$
44. The relation between time t and position x is given by $t = Ax^2 + Bx$, where A and B are constants. Then then which of the following statement is **correct**?
- A. velocity is given by $v = 2Ax + B$
B. velocity is given by $v = (2Ax + B)^{-1}$
C. retardation is given by $2Av^3$
D. retardation is given by $2Bv^3$
- (1) Only (C)
(2) Only (D)
(3) Only (B) and (C)
(4) Only (B) and (D)
45. If the volume of a sphere changes at constant rate $\left(\frac{dV}{dt} = 4 \text{ m}^3/\text{s}\right)$. If radius of the sphere is r meter, then surface area of the sphere changes at the rate: (in m^2/s)
- (1) $\frac{4}{r}$ (2) $\frac{8}{r}$
(3) $\frac{12}{r}$ (4) $\frac{16}{r}$

46. The Molarity (M) of an aqueous solution containing 11.7 g of NaCl in 500 mL water is:
(Given: Molar mass Na : 23 and Cl : 35.5 g mol⁻¹)
(1) 20 M (2) 0.2 M
(3) 0.4 M (4) 4 M

47. What will be the molecular formula of an organic compound containing 42.1% carbon, 6.4% hydrogen and remainder is oxygen. If its molecular weight is 342?
(1) C₁₁H₁₈O₁₂
(2) C₁₂H₂₀O₁₂
(3) C₁₄H₂₀O₁₁
(4) C₁₂H₂₂O₁₁

48. Vapour pressure of CHCl₃ and CH₂Cl₂ at 298 K are 400 mm Hg and 815 mm Hg respectively. Calculate the vapour pressure of the solution prepared by mixing 25.5 g of CHCl₃ and 40 g of CH₂Cl₂ at 298 K. (Molar mass of CH₂Cl₂ = 85 g/mol, CHCl₃ = 119.5 g/mol)
(1) 347.9 mm Hg
(2) 685.5 mm Hg
(3) 580 mm Hg
(4) 600 mm Hg

49. Match the List-I with List-II.

List-I (Compound)		List-II (Oxidation state of oxygen)	
(A)	BaO ₂	(I)	-1/2
(B)	OF ₂	(II)	-1
(C)	KO ₂	(III)	+2
(D)	H ₂ O	(IV)	-2

Choose the **correct** answer from the options given below;

- (1) A-II, B-III, C-I, D-IV
(2) A-III, B-I, C-II, D-IV
(3) A-IV, B-III, C-I, D-II
(4) A-II, B-I, C-III, D-IV
50. What happens to freezing point of benzene when small quantity of naphthalene is added to benzene?
(1) Increases
(2) Remains unchanged
(3) First decreases and then increases
(4) Decreases
51. Form the given list, the number of compounds with +3 oxidation state of phosphorous is ____.
P₂O₃, P₄O₁₀, POCl₃, H₃PO₃, PCl₅, PCl₃, H₄P₂O₅
(1) 4 (2) 3
(3) 2 (4) 5

52. For a reaction,
 $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$;
Identify in the following reaction mixtures where H₂ will act as limiting reagent?
(1) 7 g of N₂ + 4 g of H₂
(2) 56 g of N₂ + 6 g of H₂
(3) 56 g of N₂ + 20 g of H₂
(4) 14 g of N₂ + 8 g of H₂

53. Identify the process in which change in the oxidation state is three:
(1) $\text{CrO}_4^{2-} \rightarrow \text{Cr}^{3+}$
(2) $\text{MnO}_4^- \rightarrow \text{Mn}^{2+}$
(3) $\text{Fe}^{3+} \rightarrow \text{Fe}^{2+}$
(4) $\text{C}_2\text{O}_4^{2-} \rightarrow 2\text{CO}_2$

54. Which of the following have same number of significant figures?
A. 0.002534
B. 1.0003
C. 15.00
D. 163

Choose the **correct** answer from the options given below:

- (1) A, B and C only
(2) C and D only
(3) A, C and D only
(4) A and C only
55. Which of the following **cannot** function as an oxidising agent?
(1) S²⁻
(2) PO₄³⁻
(3) ClO₃⁻
(4) CrO₄²⁻

56. Which is **not** consistent statement about Dalton's atomic theory:
(1) Atoms of different elements combine in any ratio to form compound.
(2) All the atoms of a given element have identical properties including identical mass
(3) Matter consists of indivisible atoms
(4) Chemical reactions involve reorganization of atoms

57. We have three aqueous solutions of NaCl labelled as 'A', 'B' and 'C' with concentration 0.005 M, 0.05 M and 0.5 M, respectively. The value of van't Hoff factor (i) for these solutions will be in the order.

- (1) $i_A < i_B < i_C$
- (2) $i_A < i_C < i_B$
- (3) $i_A = i_B = i_C$
- (4) $i_A > i_B > i_C$

58. An organic compound gives 0.110 g of CO_2 and 0.18 g of H_2O on complete combustion. If the % of carbon is 24, then the % hydrogen is:

- (1) 56
- (2) 16
- (3) 26
- (4) 36

59. Given below are two statements:

Statement I: $\text{K}_2\text{Cr}_2\text{O}_7$ oxidises the indicator substance diphenylamine just after the equivalence point to produce intense blue colour.

Statement II: $\text{K}_2\text{Cr}_2\text{O}_7$ is not a self indicator.

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

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

60. An example of a disproportionation reaction is:

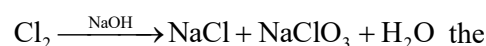
- (1) $2\text{KMnO}_4 \rightarrow \text{K}_2\text{MnO}_4 + \text{MnO}_2 + \text{O}_2$
- (2) $2\text{MnO}_4^- + 10\text{I}^- + 16\text{H}^+ \rightarrow 2\text{Mn}^{2+} + 5\text{I}_2 + 8\text{H}_2\text{O}$
- (3) $2\text{CuBr} \rightarrow \text{CuBr}_2 + \text{Cu}$
- (4) $2\text{NaBr} + \text{Cl}_2 \rightarrow 2\text{NaCl} + \text{Br}_2$

61. The species given below that does NOT show disproportionation reaction is:

- (1) ClO^-
- (2) ClO_3^-
- (3) ClO_2^-
- (4) ClO_4^-

62. Given below are two statements:

Statement I:



equivalent mass of Cl_2 in the above reaction is

$\frac{3M}{5}$

Statement II: Oxidation number of Cr atom in K_3CrO_8 is +5.

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

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

63. $2\text{IO}_3^- + x\text{I}^- + 12\text{H}^+ \rightarrow 6\text{I}_2 + y\text{H}_2\text{O}$. What are the values of x and y are respectively?

- (1) 12 and 10
- (2) 2 and 6
- (3) 6 and 10
- (4) 10 and 6

64. Combustion of glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) produces CO_2 and water. The amount of oxygen (in g) required for the complete combustion of 1260 g of glucose is: (molar mass of glucose in $\text{g mol}^{-1} = 180$)

- (1) 1480
- (2) 1344
- (3) 1800
- (4) 1320

65. Among the following statements:

- (I) The mass of a molecule of CH_4 is 2.66×10^{-23} g
- (II) 11 g of CO_2 occupies 7.6 L of volume at STP.
- (III) The volume of 1 g of H_2 at STP is 22.4 L.

The correct statements is/are;

- (1) I only
- (2) I and II
- (3) III only
- (4) II and III

66. Given below are two statements:

Statement I: In redox titration, the indicators used are sensitive to change in pH of the solution.

Statement II: In oxidation number method the two half equation are balanced separately and then added together to give balanced equation.

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

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

67. Identify the mixture that shows positive deviations from Raoult's Law
 (1) $C_2H_5Br + C_2H_5Cl$
 (2) $CHCl_3 + C_6H_6$
 (3) $CHCl_3 + (CH_3)_2CO$
 (4) $(CH_3)_2CO + CS_2$
68. Which of the following solution have highest depression in freezing point?
 (K_f water = $1.86 \text{ K kg mol}^{-1}$
 $K_f C_6H_6 = 5.12 \text{ K kg mol}^{-1}$)
 (1) 180 g of acetic acid dissolved in 1 kg water
 (2) 180 g of acetic acid dissolved in 1 kg benzene
 (3) 180 g of benzoic acid dissolved in 1 kg benzene
 (4) 180 g of glucose dissolved in 1 kg water
69. A 100 g solution contains 18% water, 46% ethanol and 36% acetic acid by mass then:
 (A) Number of moles of water is 1
 (B) Number of moles of ethanol is 1.
 (C) Number of moles of acetic acid is 2.
 (D) Total moles of solution = 4
 The **correct** statements is/are;
 (1) A only (2) A and B
 (3) B, C and D (4) D only
70. Consider the following statements:
 A. $KMnO_4$ can act as a self-indicator in titrations.
 B. I_2 though insoluble in water remains in solution containing KI as KI_3 .
 C. Iodine gives blue colour with starch only in acidic medium.
 D. Redox titrations are based on equivalence of electron gain and loss.
 Identify the **correct** statements;
 (1) A, B and C
 (2) B, C and D
 (3) A, B and D
 (4) A, C and D
71. Which of the following are **correct** regarding empirical and molecular formulas?
 A. Molecular formula is a whole-number multiple of empirical formula.
 B. Ethene and butene have the same empirical formula.
 C. Empirical formula gives the exact number of atoms in a molecule.
 D. Knowledge of molar mass helps derive molecular formula from empirical formula.
 (1) A, B and C (2) B, C and D
 (3) A, B and D (4) A, C and D
72. A compound of sulphur shows an average oxidation number of +2.5. Which of the following must be **true** for the species involved?
 (1) All sulphur atoms are in the +2.5 oxidation state.
 (2) The compound contains both elemental sulphur and sulphide ions.
 (3) The compound has sulphur atoms in multiple distinct oxidation states.
 (4) The oxidation number is due to resonance between sulphur atoms.
73. Given below are two statements:
Statement I: One mole of water weighs 18.02 amu.
Statement II: Molar mass of water is numerically equal to its molecular mass in atomic mass units.
 In the light of the above statements, choose the *most appropriate* answer from the options given below:
 (1) Both Statement I and Statement II are correct.
 (2) Statement I is correct but Statement II is incorrect.
 (3) Statement I is incorrect but Statement II is correct.
 (4) Both Statement I and Statement II are incorrect.
74. Consider the skeletal equation:
 $MnO_4^- + I^- \rightarrow MnO_2 + I_2$ (in basic medium)
 How many electrons are exchanged in the balanced reaction?
 (1) 2 (2) 3
 (3) 4 (4) 6
75. A student repeatedly weighs a sample and obtains 9.81 g, 9.82 g, and 9.80 g, while the actual mass is 10.00 g. Which of the following **correctly** interprets this data?
 (1) The data is precise but not accurate.
 (2) The data is accurate but not precise.
 (3) The data is both precise and accurate.
 (4) The data is neither precise nor accurate.
76. In a basic medium, the **correct** balanced form of:
 $Br_2 + OH^- \rightarrow Br^- + BrO_3^-$
 Includes which of the following total coefficients (Br_2 , OH^- , Br^- , BrO_3^- , H_2O) respectively?
 (1) 1, 6, 5, 1, 3
 (2) 1, 3, 5, 1, 6
 (3) 3, 6, 5, 1, 3
 (4) 1, 5, 3, 2, 3

77. Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:
Assertion A: In the reaction between Zn and CuSO_4 , zinc acts as a reducing agent.

Reason R: Zinc has a lower standard electrode potential than copper.

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

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

78. Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:
Assertion A: Solutions of ethanol and water exhibit positive deviation from Raoult's law.

Reason R: Ethanol and water form hydrogen bonds, which are stronger than the interactions in pure components.

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

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

79. In the disproportionation of ClO^- , the oxidation state of Cl changes. Choose the **correct** combination of products and oxidation number changes:

- (1) $\text{ClO}^- (+1)$ to $\text{Cl}_2 (+1)$ and $\text{ClO}_3^- (+5)$
- (2) $\text{ClO}^- (+1)$ to $\text{Cl}^- (-1)$ and $\text{ClO}_3^- (+5)$
- (3) $\text{ClO}^- (+1)$ to $\text{Cl}_2 (0)$ and $\text{Cl}^+ (+1)$
- (4) $\text{ClO}^- (+1)$ to $\text{Cl}_2 (+2)$ and $\text{Cl}^- (-1)$

80. Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:
Assertion A: Henry's law explains why scuba divers suffer from bends when ascending rapidly.
Reason R: Increased pressure underwater leads to more nitrogen dissolving in the blood.

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

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

81. A 1.00 g sample of a polymer is dissolved in 100 mL of benzene. The osmotic pressure of the solution at 298 K is found to be 2.46 mm Hg. What is the approximate molar mass of the polymer?

- (1) 5100 g/mol
- (2) 75757 g/mol
- (3) 10120 g/mol
- (4) 24300 g/mol

82. Match the List-I with List-II.

List-I (Compound)		List-II (Equivalent mass M in acidic medium)	
(A)	KMnO_4	(I)	$\frac{M}{1}$
(B)	FeSO_4	(II)	$\frac{M}{5}$
(C)	$\text{K}_2\text{Cr}_2\text{O}_7$	(III)	$\frac{M}{6}$

Choose the **correct** answer from the options given below;

- (1) A-III; B-II; C-I
- (2) A-I; B-II; C-III
- (3) A-II; B-I; C-III
- (4) A-II; B-III; C-I

83. A binary solution of liquids A and B shows a total vapour pressure of 400 mm Hg at 298 K when the mole fraction of A is 0.6. Given that the vapour pressure of pure A is 300 mm Hg and that of B is 500 mm Hg, the nature of deviation from Raoult's Law and intermolecular interactions can be concluded as:

- (1) Positive deviation; AB interactions stronger than AA or BB
- (2) Negative deviation; AB interactions weaker than AA or BB
- (3) Positive deviation; AB interactions weaker than AA or BB
- (4) Ideal behavior; AB interactions equal to AA and BB

84. The solution contains 3.0 g of a solute (molar mass = 60 g/mol) in 100 g of water. If the observed depression in freezing point is 0.28 K, which of the following is the most likely cause?

- (1) Solute undergoes association in water
- (2) Solute undergoes dissociation into 2 ions
- (3) Solute undergoes dissociation into 4 ions
- (4) Water's K_f was incorrectly used

85. Match the List-I with List-II.

List-I		List-II	
(A)	Elevation of boiling point	(I)	$\frac{\Delta P}{P^0} = x$
(B)	Osmotic pressure	(II)	$\Delta T_f = k_f m$
(C)	Freezing point depression	(III)	$\Delta T_b = k_b m$
(D)	Relative lowering of vapour pressure	(IV)	$\pi = CRT$

Choose the **correct** answer from the options given below;

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

86. Given below are two statements:

Statement I: A 0.1 molal solution of glucose and a 0.1 molal solution of NaCl will elevate the boiling point of water by the same amount.

Statement II: Elevation in boiling point depends solely on the molality of the solute, regardless of whether it dissociates in solution.

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

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

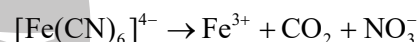
87. A 1 molal aqueous solution of K_2SO_4 exhibits a freezing point depression of 5.58 K. If K_f (water) = $1.86 \text{ K} \cdot \text{kg} \cdot \text{mol}^{-1}$, what does this indicate about the dissociation of K_2SO_4 ?

- (1) The salt is completely undissociated
- (2) The salt is only partially dissociated
- (3) The salt dissociates completely into two ions
- (4) The salt dissociates completely into three ions

88. A metal M displaces copper from CuSO_4 solution and silver from AgNO_3 solution. Based on standard redox behavior, which of the following orders of reducing strength is **correct**?

- (1) $\text{Cu} > \text{M} > \text{Ag}$
- (2) $\text{Ag} > \text{Cu} > \text{M}$
- (3) $\text{Ag} > \text{M} > \text{Cu}$
- (4) $\text{M} > \text{Cu} > \text{Ag}$

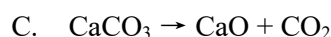
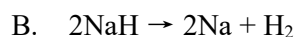
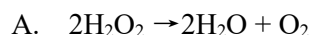
89. Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:
Assertion (A): In the given reaction, the equivalent weight of reactant is 3.47



Reason (R): In the above reaction, the equivalent weight of reactant is $\frac{\text{Mol. wt.}}{61}$.

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

90. Three reactions are given below:



Which of these qualify as redox reactions?

- (1) All three are redox; all involve gas evolution
- (2) Only A and B are redox; C is decomposition but not redox
- (3) Only B is redox; A is not because no metal is involved
- (4) Only C is redox; oxygen is neither oxidized nor reduced in any

91. Arrange the following events of reduction division in correct sequence.
- Formation of tetrad of haploid cells.
 - Separation of sister chromatids of each chromosome.
 - Alignment of bivalents on equatorial plate.
 - Exchange of genetic material between non-sister chromatids of homologous chromosomes.
 - Cytokinesis leading to formation of dyad of haploid cells.

Choose the **correct** option:

- A – B – C – D – E
- B – E – A – C – D
- C – A – D – E – B
- D – C – E – B – A

92. Match List-I with List-II.

List-I (Organelle)		List-II (Function)	
(A)	Lysosome	(I)	Hydrolysis of cellular waste and macromolecules
(B)	Ribosome	(II)	Providing structural support and maintaining cell shape
(C)	Chloroplast	(III)	Synthesis of polypeptides
(D)	Cytoskeleton	(IV)	Trapping light energy for photosynthesis

Choose the *most appropriate* answer from the options given below:

- A-I, B-III, C-IV, D-II
- A-I, B-II, C-IV, D-III
- A-II, B-III, C-I, D-IV
- A-II, B-III, C-IV, D-I

93. A scientist while observing an onion root tip cell under the microscope was able to study the morphological characteristics of its chromosomes as well as count their number. What is true for this cell?
- Mitotic apparatus has not yet formed.
 - Condensation of chromosomes is completed.
 - The nucleolus and nuclear membrane are visible.
 - Chromosomes undergo dispersion and reach the extremely extended state of the interphase nucleus.

94. Matthias Schleiden and Theodore Schwann are collectively renowned for their contribution to which of the following?

- The identification of the cell nucleus as a distinct organelle.
- The development of the fluid mosaic model describing plasma membrane structure.
- The formulation of the cell theory.
- The discovery and characterization of chromatin within the nucleus.

95. Identify the **incorrect** statement.

- The equational division is usually restricted to the diploid cells only.
- In some lower plants and in some social insects haploid cells can also divide by mitosis.
- Mitosis usually results in the production of diploid daughter cells with different genetic complement.
- Mitotic divisions in the apical and the lateral cambium result in a continuous growth of plants throughout their life.

96. Given below are two statements:

Statement I: The length of chromatid arms in metacentric and acrocentric chromosomes is same.

Statement II: The telocentric chromosome lacks the disc shaped structures around the primary constriction.

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

- Statement I is correct but Statement II is incorrect.
- Statement I is incorrect but Statement II is correct.
- Both Statement I and Statement II are correct.
- Both Statement I and Statement II are incorrect.

97. Which of the following cells do not appear to exhibit division in adult humans?

- Cells of the upper layer of the epidermis
- Nerve cells
- Heart cells
- Blood cells
- Cells of lining of gut

- A and B
- B and C
- C and D
- D and E

98. Choose the **correctly** matched pair.
- (1) Leucoplasts : Contain photosynthetic pigments
 - (2) Chloroplasts : Colourless plastids
 - (3) Chromoplasts : Usually function as nutrient storage plastids
 - (4) Plastids : Double membrane bound organelles

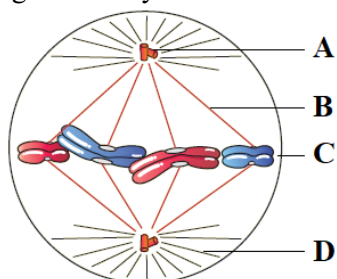
99. A gamete produced from a somatic cell had 30 chromosomes and 50 pg DNA. What would be the number of chromosomes and amount of DNA in its parent diploid cell in G_1 phase?
- (1) 60 chromosomes and 200 pg DNA
 - (2) 30 chromosomes and 100 pg DNA
 - (3) 30 chromosomes and 200 pg DNA
 - (4) 60 chromosomes and 100 pg DNA

100. The physico-chemical approach using cell-free systems enables us to;
- A. study and understand the physiological processes of the cell.
 - B. study and understand the behavioural processes of the cell.
 - C. describe the various processes of cell in molecular terms.
 - D. identify the types of organic compounds present in dead cells.
 - E. understand the abnormal processes that occur during any diseased condition.

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

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

101. Choose the **incorrect** statement for the labels of given stage of cell cycle.



- (1) 'B' represents microtubules that attach to the centromere of the chromosome.
- (2) 'C' is the plane of alignment of chromosomes at metaphase.
- (3) 'A' is the centrosome containing two centrioles perpendicularly aligned to each other.
- (4) 'D' represents astral rays radiated out by centrosome

102. Match the **List-I** with **List-II**.

List-I (Bacterial structure)		List-II (Characteristic description)	
(A)	Fimbriae	(I)	Short, bristle-like fibres projecting from cell surface
(B)	Mesosome	(II)	Infoldings and extensions of the plasma membrane into the cytoplasm
(C)	Slime layer	(III)	A loose polysaccharide layer outside the cell wall
(D)	Capsule	(IV)	A thick, rigid, and well-defined glycocalyx layer

Choose the *most appropriate* answer from the options given below:

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

103. Consider the following statements:

Statement I: The nucleus of a cell when it is not dividing is said to be interphase nucleus.

Statement II: The interphase is said to be the resting phase of cell cycle.

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

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

104. Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:
- Assertion A:** Bacterial cells exhibit variability in their ability to move, being either motile or non-motile.

Reason R: The presence, number, and specific arrangement of flagella vary among different species of bacteria.

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

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

105. Match List-I with List-II.

List-I		List-II	
(A)	Divided into 3 sub stages	(I)	Karyokinesis
(B)	Divided into 5 phases	(II)	Prophase I
(C)	Divided into 4 stages	(III)	Meiosis
(D)	Divided into 2 cycles of nuclear and cell division	(IV)	Interphase

Choose the *most appropriate* answer from the options given below.

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

106. Arrange the following cells/organisms in increasing order of their size.

- A. Bacteria
- B. Human RBC
- C. Virus
- D. Ostrich egg
- E. Mycoplasma

Choose the **correct** option.

- (1) C - E - A - B - D
- (2) D - B - A - E - C
- (3) C - A - E - D - B
- (4) A - D - B - C - E

107. Choose the **incorrectly** matched pair.

- (1) Meiosis I : Produces diploid daughter cells
- (2) Meiosis II : Similar to mitosis
- (3) Cytokinesis : Occurs differently in plant and animal cells
- (4) Interkinesis : Occurs after telophase I and before prophase II

108. Consider the following statements:

Statement I: Peroxisomes and Golgi apparatus both are endomembrane structures in a eukaryotic cell.

Statement II: Peroxisomes and Golgi apparatus differ in terms of their functions.

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

109. Read the following statements.

- A. A typical plant cell has a distinct cell wall as its outer boundary.
- B. The plant cell wall is relatively more extensible as compared to the plasma membrane.
- C. The cytokinesis in plant cells begins with the formation of a cell plate composed of calcium pectate.
- D. The middle lamella formed during cytokinesis in plant cells grows from periphery to the centre of the cell.
- E. The cell plate represents a layer present between the walls of two adjacent cells.

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

- (1) A, C and E are correct but B and D are incorrect
- (2) A, B and C are correct but D and E are incorrect
- (3) A, B and D are correct but C and E are incorrect
- (4) B, C and D are correct but A and E are incorrect

110. The movement of water across a plasma membrane will occur by;

- (1) simple diffusion from lower to higher concentration.
- (2) facilitated diffusion with the help of carrier proteins.
- (3) osmosis along the concentration gradient.
- (4) active transport using ATP.

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

Assertion A: In oocytes of some vertebrates, X-shaped chiasmata may be visible for months or years.

Reason R: In oocytes of such vertebrates, diplotene can last for months or years.

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

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

112. How many of the following cellular structures are exclusively present in eukaryotic cells?

- A. Plasmid
- B. Ribosomes
- C. Inclusion bodies
- D. Genetic material
- E. Cell wall

Choose the **correct** option:

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

113. Consider the following statements:

Statement I: Prophase of the second meiotic division is typically longer and more complex when compared to prophase of mitosis.

Statement II: Chromosomal structure forms the basis of division of prophase I into further stages.

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

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

114. The *trans* face of the Golgi cisternae is:

- (1) exactly same as *cis* face.
- (2) responsible for glycosylation of proteins.
- (3) also called the convex face.
- (4) the maturing face.

115. Choose the **correct** statement.

- (1) Centriole duplicates in all plant cells in S phase in the cytoplasm.
- (2) DNA replicates in all plant cells in S phase in the nucleus.
- (3) DNA replicates in all animal cells in S phase in the cytoplasm.
- (4) Centriole duplicates in all animal cells in S phase in the nucleus.

116. Considering the fluid mosaic model of the plasma membrane, which statement accurately describes the characteristics and orientation of the polar head groups of phospholipids?

- (1) They primarily consist of long chains of saturated hydrocarbons.
- (2) They are hydrophobic and face towards the interior of the lipid bilayer.
- (3) They are hydrophilic and are exposed to the aqueous environments on both sides of the membrane.
- (4) They are primarily composed of sterols, such as cholesterol.

117. Match List-I with List-II.

List-I		List-II	
(A)	Most of the organelle duplication occurs during this phase	(I)	Telophase
(B)	Chromosome condensation occurs	(II)	G ₁ phase
(C)	Chromosome elongation starts	(III)	Prophase
(D)	Period of cytoplasmic growth	(IV)	G ₂ phase

Choose the **most appropriate** answer from the options given below.

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

118. Choose the **incorrect** statement.

- (1) In all living organisms, cytoplasm is the main arena of cellular activities.
- (2) In mycoplasma, the ER divides the cytoplasm into luminal and extra luminal compartments.
- (3) In fungi, membrane bound organelles are present along with a well-defined nucleus.
- (4) In bacteria, the ribosomes have two subunits i.e 30S and 50S.

119. Read the following statements.

- A. The process by which cells arise from pre-existing cells is called cell division.
- B. Any asexually reproducing organism starts its life cycle from a single-celled zygote.
- C. The duration of cell cycle varies from organism to organism.
- D. Generally, the eukaryotic cells multiply more rapidly than the prokaryotic cells.
- E. Cell division stops with the formation of the mature organism.

The **incorrect** statements are;

- (1) A, C and E (2) A, B and C
- (3) B, D and E (4) B, C and D

120. Match List I with List II.

List-I		List-II	
(A)	Mitochondria	(I)	Help in synthesis of glycogen
(B)	ER	(II)	Connect cytoplasm of neighboring plant cells
(C)	Plasmodesmata	(III)	Form spindle fibers during cell division
(D)	Centrioles	(IV)	Synthesize the energy currency of cell

Choose the **correct** answer from the options given below:

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

121. Starting with a single yeast cell, in how much time will we obtain 64 yeast cells, assuming that the daughter cells are also dividing at the same rate?

- (1) 9 hours (2) 90 hours
(3) 9 minutes (4) 90 minutes

122. Nucleus is not present in;

- A. a mature erythrocyte of humans.
B. a nerve cell.
C. a mesophyll cell.
D. a mature sieve tube element.
E. virus.

- (1) A, C and D
(2) A, D and E
(3) B, C and E
(4) B, C and D

123. It becomes essential for a cell to divide because;

- (1) with the passage of time the efficiency of cell organelles reduces significantly.
(2) cell growth results in disturbing the ratio between the nucleus and the cytoplasm.
(3) replication of DNA leads to doubling of chromosomes in a cell.
(4) if it does not divide it will enter the quiescent stage.

124. Choose the **incorrect** statement.

- (1) The number of interdoublet bridges in axoneme of a cilium is nine.
(2) In the axoneme of a flagellum, a total of twenty microtubules are present.
(3) In a centriole, the number of bridges that connect central tubules is one.
(4) The number of radial spokes in the axoneme of a cilium/flagellum and that in a centriole is same.

125. Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:
Assertion A: The cells present in G_0 phase do not divide.

Reason R: The cells present in G_0 phase are metabolically inactive.

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

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

explanation of A.

126. In a eukaryotic cell, where can ribosomes typically be found?

- A. Attached to the outer surface of the smooth endoplasmic reticulum.
B. Freely dispersed within the cytosol.
C. Within the matrix of mitochondria.
D. On the surface of the inner nuclear membrane.
E. In the stroma of chloroplast.

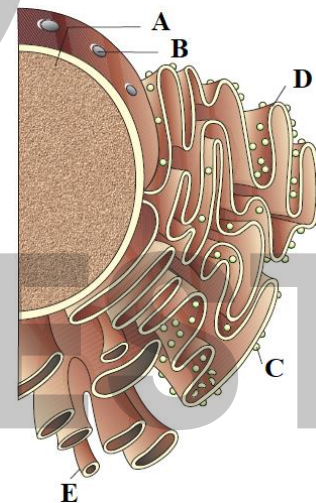
Choose the **correct** option:

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

127. The most dramatic period of cell cycle;

- (1) is divided into 4 stages of cytokinesis.
(2) is seen only in prokaryotic cells.
(3) lasts more than 95% of the duration of cell cycle.
(4) involves a major reorganisation of virtually all components of the cell.

128. Identify the **incorrect** statement for the given figure.



- (1) 'B' allows bidirectional movement of proteins and RNA between nucleus and cytoplasm.
(2) 'D' is frequently observed in the cells actively involved in protein synthesis and secretion.
(3) 'C' is present in all living cells.
(4) 'A' is the only organelle in eukaryotic cells that contains DNA.

129. Which of the following events does **not** occur during cell cycle?

- (1) Duplication of genome
(2) Cell growth
(3) Formation of zygote
(4) Synthesis of the other constituents of the cell

- 130.** Which of the following is a **correct** statement?
- (1) The mRNA of a polysome translate the ribosomes into proteins.
 - (2) Multicellular organisms have division of labour.
 - (3) Mitochondrial matrix possesses three circular DNA molecules.
 - (4) Chloroplasts have single stranded circular DNA.
- 131.** Splitting of centromere occurs during;
- (1) anaphase I and anaphase II.
 - (2) mitotic anaphase and anaphase II.
 - (3) mitotic anaphase and anaphase I.
 - (4) mitotic anaphase, anaphase I and anaphase II.
- 132.** Identify the **incorrect** statement about human RBC.
- (1) Its diameter is about 7.0 μm .
 - (2) Its plasma membrane is composed of about 52% proteins.
 - (3) Its plasma membrane is composed of about 40% lipids.
 - (4) It is round and oval in shape.
- 133.** Arrange the following characteristics/events of prophase I in the **correct** order of their occurrence.
- A. Action of enzyme recombinase.
 - B. Homologous chromosomes of the bivalents separate from each other except at the sites of crossovers.
 - C. Formation of synaptonemal complex.
 - D. Chromosomes become gradually visible under the light microscope.
 - E. The chromosomes are fully condensed and the meiotic spindle is assembled to prepare the homologous chromosomes for separation.
- Choose the **correct** option:
- (1) A – E – D – C – B
 - (2) C – B – E – D – A
 - (3) B – A – C – E – D
 - (4) D – C – A – B – E
- 134.** Proteins cannot be synthesized in;
- (1) cytoplasm of eukaryotic cells.
 - (2) the matrix of mitochondria.
 - (3) the thylakoid lumen of chloroplast.
 - (4) cytoplasm of prokaryotic cells.
- 135.** Identify the **correct** statement about interkinesis.
- (1) Long-lived stage
 - (2) Occurs during equational division
 - (3) DNA does not replicate
 - (4) Stage between two successive M phases



REAL TEST

136. Which of the following statements is **true** regarding dense connective tissues?

- (1) Dense regular connective tissue has fibres arranged in a crisscross manner.
- (2) Tendons and ligaments are examples of dense irregular connective tissues.
- (3) Dense irregular connective tissue is avascularized and found in skin.
- (4) Fibroblasts are the primary fibre-secreting cells in both types.

137. Choose **incorrectly** paired matches regarding frog?

- A. Conus → Receives blood from arteriosus major veins
- B. Sinus venosus → Leads blood away from the ventricle
- C. Mesorchium → Supports and holds testes in place
- D. Bidder's canal → Collects sperm from vasa efferentia

- (1) A and B
- (2) B and C
- (3) A and D
- (4) C and D

138. Which of the following statements are **correct** regarding respiration in different animal groups?

- A. Gills are present in both aquatic molluscs and terrestrial arthropods.
- B. Amphibians can use both cutaneous and pulmonary modes of respiration.
- C. The tracheal system in insects allows direct oxygen delivery to tissues without involving the circulatory system.
- D. All terrestrial animals use lungs exclusively for respiration.
- E. Branchial respiration is present in fishes and aquatic reptiles

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

139. Which of the following groups of organs have single unit smooth muscle?

- (1) Stomach, intestine, urinary bladder
- (2) Lungs, urinogenital tract, larger blood vessel
- (3) Arrectores pillorum of hair, blood vessel, urinary bladder
- (4) Biceps, larger blood vessel, lingual muscle

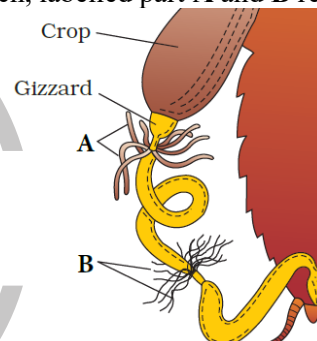
140. Match **List-I** with **List-II**.

List-I		List-II	
(A)	Epiglottis	(I)	Sound production
(B)	Larynx	(II)	Prevents food entry into respiratory tract
(C)	Terminal bronchiole	(III)	Gaseous exchange
(D)	Alveolus	(IV)	End of conducting part

Choose the **correct** answer from the options given below:

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

141. In the given diagram of alimentary canal of cockroach, labelled part **A** and **B** represents:



- (1) A- Malpighian tubules, B- Gastric caeca
- (2) A-Gastric caeca, B- Uricose glands
- (3) A- Malpighian tubules, B- Rectum
- (4) A- Gastric caeca, B- Malpighian tubules

142. A patient is admitted with high fever and metabolic acidosis (increased H^+ concentration). What effect will this condition most likely have on the oxygen dissociation curve and oxygen delivery to tissues?

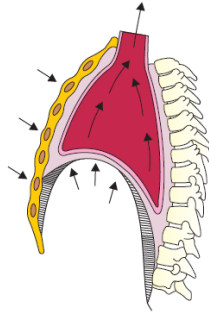
- (1) Leftward shift; reduced oxygen delivery to tissues.
- (2) Rightward shift; reduced oxygen delivery to tissues.
- (3) Leftward shift; enhanced oxygen binding in tissues.
- (4) Rightward shift; enhanced oxygen delivery to tissues.

143. Which of the following statements is/are **correct** regarding frogs?

- A. Male frogs possess vocal sacs and copulatory pads.
- B. Frogs drink water through their mouth during aestivation.
- C. Frog skin assists in both water absorption and respiration.
- D. Frogs can change body color to avoid predators.

- (1) A and B only
- (2) B and C only
- (3) A, C and D
- (4) A, B and D

144. Which of the followings observations is/are **incorrect** regarding the image given below:



- A. Diaphragm flattened
B. Ribs elevated
C. Thoracic volume increased
D. Diaphragm relaxed
E. Pulmonary pressure < atmospheric pressure
F. Pulmonary volume reduced
(1) D and F only (2) A, C and D
(3) A, B, C and E (4) D, E and F
145. Which of the following statements about connective tissue matrix is **incorrect**?
- (1) It is composed of fibres like collagen and elastin.
(2) It contains a ground substance formed by modified polysaccharides.
(3) It surrounds the connective tissue cells, providing support and structural framework.
(4) It provides only rigidity and has no role in elasticity or flexibility.
146. Which of the following **correctly** matches the connective tissue with its key structural or cellular feature?
- (1) Areolar tissue – Parallel rows of collagen bundles
(2) Tendon – Dense irregular connective tissue
(3) Adipose tissue – Loose connective tissue with fat-storing cells
(4) Ligament – Loose connective tissue with elastic fibres only
147. Which of the following statements are **correct** regarding mechanism of breathing?
- A. Breathing is same as that of cellular respiration.
B. A molecule of Hb has 4 iron atoms.
C. Frogs and mammals exhibit positive pressure breathing.
D. Frogs and mammals both show elastic recoil of lungs during exhalation.
E. Spirometry can access residual volume in the lungs.
(1) B, D and E
(2) A, C and E
(3) B and D only
(4) C, D and E

148. Which of the following statements is **incorrect** regarding cartilage?

- (1) It is a specialized connective tissue.
(2) It is present in the tip of nose and outer ear joints.
(3) Intercellular material is solid and non-pliable.
(4) Most of the cartilages in vertebrate embryos are replaced by bones in adults.

149. A patient undergoing a pulmonary function test shows the following data:

Tidal Volume (TV): 500 mL

Inspiratory Reserve Volume (IRV): 2800 mL

Expiratory Reserve Volume (ERV): 1100 mL

Residual Volume (RV): 1200 mL

If the patient exhales forcefully after a deep inhalation, what volume of air is expected to be expelled?

- (1) 6600 mL
(2) 4400 mL
(3) 3900 mL
(4) 5800 mL

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

Assertion A: In case of carbon monoxide poisoning, oxygen haemoglobin curve shifts.

Reason R: Carboxyhaemoglobin is relatively unstable and cannot bind with the oxygen.

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

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

151. Which of the following statements is/are logically **incorrect** with respect to frogs?

- A. They are ectothermic vertebrates that exhibit both aestivation and hibernation.
B. They survive temperature extremes through behavioral adaptations.
C. Their body temperature is regulated through sweating and vasodilation.
D. Their moist skin is essential for cutaneous respiration.
(1) A, B and C
(2) A and C only
(3) C only
(4) A only

152. Which of the following statements is **incorrect**?
- (1) The pleura has simple squamous epithelium as alveoli.
 - (2) Inspiration is a passive process whereas expiration is an active process.
 - (3) Exhalation takes longer than inspiration.
 - (4) When CO₂ concentration in blood decreases, breathing becomes shallower.

153. Which of the following statements is **false** regarding *Periplaneta americana*?

- (1) Each female lays around 9–10 oothecae, each containing 14–16 eggs.
- (2) Spermatophores are released into the genital chamber during mating.
- (3) Cockroaches are dioecious and only males have well developed reproductive organs.
- (4) Cockroach nymphs undergo 13 moults to become adults.

154. Which of the following is/are **not** associated with decreased respiratory surface area?

- A. Emphysema
- B. Asthma
- C. Fibrosis due to dust exposure
- D. Pneumonia

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

155. Match List-I with List-II w.r.t. frog.

List-I		List-II	
(A)	Nictitating membrane	(I)	Sound reception
(B)	Tympanum	(II)	Survival during high summer heat
(C)	Webbed digits	(III)	Protection of eyes in aquatic habitat
(D)	Aestivation	(IV)	Help in swimming

Choose the **correct** answer from the options given below:

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

156. A 55-year-old industrial worker presents with chronic cough and progressive difficulty in breathing. He has worked in a stone-grinding factory for over 25 years without protective gear. Chest X-ray shows fibrotic patches in lung tissue. What is the most likely pathological change and cause?

- (1) Breakdown of alveolar septa due to smoking.
- (2) Inflammatory constriction of bronchi.
- (3) Fibrosis of lung tissue due to dust inhalation.
- (4) Hypersensitivity to allergens.

157. Which of the following statements regarding the frog circulatory and excretory systems are **correct**?

- A. Frogs possess a closed circulatory system with nucleated RBCs.
- B. The renal portal system allows venous blood from lower body to pass through kidneys.
- C. Ventricle of the frog's heart pumps oxygenated blood only.
- D. Cloaca is a common outlet for urine, faeces, and gametes.

- (1) Only A, B and D
- (2) Only A and C
- (3) Only B and C
- (4) A, B, C and D

158. Given below are two statements:

Statement I: In cockroach, exchange of gases take place at the spiracles by diffusion.

Statement II: In cockroaches, excretion is performed by Malpighian tubules and each tubule is lined by glandular and ciliated cells.

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

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

159. Which of the following **correctly** differentiates between the roles of the respiratory rhythm centre and the pneumotaxic centre in the regulation of respiration?

- (1) Rhythm centre increases the rate of breathing while pneumotaxic centre controls exhalation only
- (2) Pneumotaxic centre directly initiates inhalation, while rhythm centre stops it
- (3) Rhythm centre sets the basic rhythm, while pneumotaxic centre modifies the duration of inspiration
- (4) Both centres are chemoreceptor-based and respond mainly to oxygen levels

160. Which of the following accurately distinguishes a late-stage nymph from an adult cockroach?
- Presence of spermatophores and mushroom glands
 - Presence of developing ovaries and spermathecae
 - Wing pads present but no fully developed wings
 - Possession of compound eyes and long antennae
161. Which of the following **correctly** explains the sigmoidal shape of the oxygen dissociation curve?
- Binding of one O₂ molecule reduces affinity for the next
 - Binding of O₂ to haemoglobin is non-cooperative
 - Each haemoglobin binds only one molecule of O₂
 - Binding of each O₂ molecule increases the affinity for the next
162. Read the following statements and choose **incorrect** statement(s) regarding female cockroaches.
- Two large ovaries are present in the 2nd – 6th abdominal segments.
 - Each ovary is formed of a group of eight ovarian tubules or ovarioles.
 - A characteristic mushroom shaped gland is present in the 6th-7th abdominal segments.
 - Fertilised eggs are encased in capsules called oothecae.
 - A pair of spermatophores is present in the 6th segment which opens into the genital chamber.
- A, B and D
 - B, C and D
 - C and E only
 - C, D and E
163. Given below are two statements:
- Statement I:** Unilocular adipocytes are found in fat deposits of human body.
- Statement II:** Its main role is to insulate the body and also provide cushion around visceral organs.
- In the light of the above statements, choose the most appropriate answer from the options given below:
- Statement I is correct but Statement II is incorrect.
 - Statement I is incorrect but Statement II is correct.
 - Both Statement I and Statement II are correct.
 - Both Statement I and Statement II are incorrect.

164. If 100 ml of deoxygenated blood delivers approximately 4 ml of CO₂ to the alveoli, how much CO₂ (in ml) will be delivered by 5 litres of deoxygenated blood circulating through the lungs in one minute, assuming similar CO₂ content?
- 200 ml
 - 250 ml
 - 300 ml
 - 400 ml
165. Which of the following statements is/are **true**?
- Inspiratory capacity does not include expiratory reserve volume.
 - Functional Residual Capacity includes the volume left after tidal expiration during normal respiration.
 - Vital capacity is always equal to total lung capacity.
 - Residual volume ensures that lungs do not collapse after forceful expiration.
 - Respiratory volumes and capacities are of no clinical significance.
- A, B and D
 - C and E only
 - B and D only
 - D and E only
166. Choose **incorrectly** matched pair regarding frog.
- Pituitary – Master endocrine gland
 - Optic lobes – Midbrain
 - Olfactory lobes – Hind brain
 - Medulla oblongata – Continuation into spinal cord

167. Match **List-I** with **List-II**.

List-I		List-II	
(A)	Pulmonary ventilation	(I)	Hemoglobin carries O ₂ and CO ₂ via blood
(B)	Gas exchange	(II)	Diffusion of O ₂ and CO ₂ across alveoli
(C)	Gas transport	(III)	O ₂ used by tissues; CO ₂ generated
(D)	Cellular respiration	(IV)	Movement of air in and out of lungs

Choose the **correct** answer from the options given below:

- A-IV, B-I, C-II, D-III
- A-IV, B-II, C-I, D-III
- A-IV, B-II, C-III, D-I
- A-II, B-I, C-III, D-IV

168. Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:
Assertion A: Right lung has 3 lobes whereas left lung has 2 lobes.

Reason R: Right lung has an additional horizontal fissure.

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

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

169. Which of the following differentiates male from female frogs anatomically?

- (1) Presence of mesorchium and Bidder's canal in females
- (2) Absence of connection between oviduct and kidneys in females
- (3) Cloacal opening present only in males
- (4) Females possess 10–12 vasa efferentia arising from ovaries

170. Given below are two statements regarding cockroaches.

Statement I: In females, the 7th sternum is boat shaped and together with the 8th and 9th sterna forms a brood or genital pouch.

Statement II: In males, genital pouch or chamber lies at the hind end of abdomen bounded dorsally by 8th and 9th terga and ventrally by the 10th sternum.

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

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

171. Which of the following statements are **correct** regarding CO₂ transport in blood?

- A. Only 7% of CO₂ is transported in plasma as dissolved state.
 - B. Formation of HCO₃⁻ occurs inside RBCs due to carbonic anhydrase.
 - C. High pO₂ at the alveolar site promotes dissociation of CO₂ from haemoglobin.
 - D. 100 ml of deoxygenated blood delivers approximately 4 ml of CO₂ to alveoli.
 - E. CO₂ is carried by haemoglobin in the same binding site as O₂.
- (1) A, B, C and D only
 - (2) B, C and D only
 - (3) A, B, D and E only
 - (4) All statements are correct

172. Which of the following **best** explains the functional difference between lymph and blood in frogs?

- (1) Lymph carries all types of blood cells including nucleated RBCs.
- (2) Lymph lacks plasma and is meant for hormonal transport only.
- (3) Lymph lacks RBCs and some proteins, and returns excess interstitial fluid to blood.
- (4) Lymph flows in arteries and is pumped by the heart.

173. If an injury tore a small hole in the membrane surrounding the lungs, what effect on lung function one would expect?

- (1) Expulsion of air from the space between the inner and outer layer of the double membrane, resulting in stickiness of pleural membranes.
- (2) Entrance of air into the space between pleural membranes resulting in collapse of lung with the hole.
- (3) Increase in secretion of surfactant that results in stickiness of pleural membranes.
- (4) Stimulation of release of cortisol that decreases the secretion of lecithin.

174. Read the following statements regarding cockroach.

- A. The body of the cockroach is segmented and divisible into three distinct regions – head, neck and abdomen.
- B. The entire body is covered by a hard chitinous endoskeleton.
- C. Head is triangular in shape and lies anteriorly at right angles to the longitudinal body axis.
- D. Anterior end of the head bears appendages forming biting and sucking type of mouth parts.
- E. Neck is formed by fusion of six segments.

How many of the above segments are **incorrect**?

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

175. Match List-I with List-II.

List-I		List-II	
(A)	Tight junctions	(I)	Limited role in secretion and absorption
(B)	Adhering junctions	(II)	Stop substances leaking across the tissue
(C)	Gap junctions	(III)	Perform cementing to keep neighbouring cells together
(D)	Compound epithelium	(IV)	Facilitate the cells to communicate with each other

Choose the **correct** answer from the options given below:

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

176. Given below are two statements:

Statement I: At high altitudes, human beings do not survive for long, even though air still contains 20.95% O₂.

Statement II: Skin is covered by keratinised whereas moist surface of buccal cavity is covered by non-keratinised simple epithelium.

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.

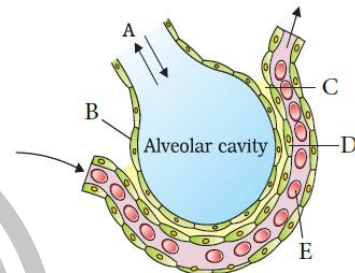
177. Which of the following is **correctly** matched with respect to respiratory structures and their characteristics?

- (1) Primary bronchi – site of gas exchange
- (2) Trachea – supported by complete cartilaginous rings
- (3) Alveoli – lined with non-vascular, thick epithelial walls
- (4) Pleural fluid – reduces friction during lung movement

178. A researcher blocks the **internal nares** of a frog in a dry environment and observes the animal. Which of the following is most likely to occur?

- (1) The frog continues to survive using cutaneous respiration only.
- (2) The frog suffocates due to loss of pulmonary respiration.
- (3) Gaseous exchange continues via gills.
- (4) Buccal respiration compensates completely for lung blockage.

179. Which of the following labelled parts in the given diagram form the diffusion membrane through which exchange of gases takes place in alveoli?



- (1) A, C and D
- (2) B, D and E
- (3) B, C and D
- (4) A, B and D

180. What is the function of ostia in the cockroach heart?

- (1) Pump blood forward to the head
- (2) Close off the haemocoel during moulting
- (3) Allow haemolymph to enter the heart from sinuses
- (4) Help in digestion by producing enzymes

REAL TEST

ANSWER KEY

1. (3)
2. (1)
3. (4)
4. (4)
5. (1)
6. (1)
7. (2)
8. (2)
9. (4)
10. (2)
11. (1)
12. (1)
13. (2)
14. (3)
15. (1)
16. (3)
17. (1)
18. (3)
19. (2)
20. (2)
21. (4)
22. (1)
23. (1)

24. (1)
25. (2)
26. (1)
27. (2)
28. (1)
29. (2)
30. (1)
31. (2)
32. (3)
33. (1)
34. (1)
35. (1)
36. (2)
37. (4)
38. (2)
39. (1)
40. (2)
41. (1)
42. (3)
43. (2)
44. (3)
45. (2)



REAL TEST

ANSWER KEY

- 46. (3)
- 47. (4)
- 48. (2)
- 49. (1)
- 50. (4)
- 51. (1)
- 52. (2)
- 53. (1)
- 54. (4)
- 55. (1)
- 56. (1)
- 57. (4)
- 58. (2)
- 59. (1)
- 60. (3)
- 61. (4)
- 62. (1)
- 63. (4)
- 64. (2)
- 65. (1)
- 66. (2)
- 67. (4)
- 68. (1)

- 69. (2)
- 70. (3)
- 71. (3)
- 72. (3)
- 73. (3)
- 74. (4)
- 75. (1)
- 76. (3)
- 77. (3)
- 78. (1)
- 79. (2)
- 80. (3)
- 81. (2)
- 82. (3)
- 83. (3)
- 84. (1)
- 85. (4)
- 86. (4)
- 87. (4)
- 88. (4)
- 89. (1)
- 90. (2)



REAL TEST

ANSWER KEY

91. (4)
92. (1)
93. (2)
94. (3)
95. (3)
96. (4)
97. (2)
98. (4)
99. (4)
100. (2)
101. (1)
102. (1)
103. (1)
104. (3)
105. (2)
106. (1)
107. (1)
108. (4)
109. (1)
110. (3)
111. (3)
112. (2)
113. (2)

114. (4)
115. (2)
116. (3)
117. (3)
118. (2)
119. (3)
120. (1)
121. (1)
122. (2)
123. (2)
124. (3)
125. (1)
126. (2)
127. (4)
128. (4)
129. (3)
130. (2)
131. (2)
132. (4)
133. (4)
134. (3)
135. (3)

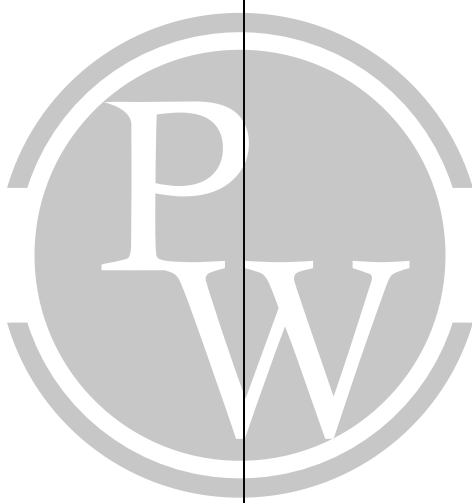


REAL TEST

ANSWER KEY

136. (4)
137. (1)
138. (2)
139. (1)
140. (4)
141. (4)
142. (4)
143. (3)
144. (3)
145. (4)
146. (3)
147. (3)
148. (3)
149. (2)
150. (3)
151. (3)
152. (2)
153. (3)
154. (2)
155. (4)
156. (3)
157. (1)
158. (3)

159. (3)
160. (3)
161. (4)
162. (3)
163. (3)
164. (1)
165. (1)
166. (3)
167. (2)
168. (1)
169. (2)
170. (2)
171. (1)
172. (3)
173. (2)
174. (2)
175. (1)
176. (1)
177. (4)
178. (2)
179. (3)
180. (3)



REAL TEST

HINTS & SOLUTIONS

1. (3)

Discriminant zero i.e. $b^2 - 4ac = 0$

$$\Rightarrow (k+1)^2 = k \left(k + \frac{5}{2} \right)$$

On solving, $k^2 + 1 + 2k - k^2 - \frac{5}{2}k = 0$

$$\Rightarrow k = 2$$

2. (1)

Option 1 contains all three units of pressure.

(NEW NCERT 2025-26, 11th, Page No. 20)

3. (4)

$$S_n = \frac{a}{2}(2n-1). \text{Ratio } 7 : 9$$

$$\frac{S_4}{S_5} = \frac{7}{9} \rightarrow \text{independent of acceleration}$$

(NEW NCERT 2025-26, 11th, Page No. 20)

4. (4)

$$\text{Vector along } (\vec{a} \times \vec{b}) = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & 2 & -1 \\ 2 & -1 & 3 \end{vmatrix}$$

$$= \hat{i}(6-1) - \hat{j}(3+2) + \hat{k}(-1-4)$$

$$= 5\hat{i} - 5\hat{j} - 5\hat{k}$$

$$\text{Unit vector along } (\vec{a} \times \vec{b}) = \frac{1}{\sqrt{75}}(5\hat{i} - 5\hat{j} - 5\hat{k})$$

5. (1)

$$\frac{F}{A} = \eta \frac{dv}{dy}$$

$$\eta = \frac{MLT^{-2}L}{L^2LT^{-1}} = ML^{-1}T^{-1}$$

(NEW NCERT 2025-26, 11th, Page No. 24)

6. (1)

$$\frac{\alpha + \beta}{\alpha\beta} = \frac{\frac{-b}{a}}{\frac{c}{a}} = \frac{-b}{c}$$

$$= \frac{-(-5)}{6} = \frac{5}{6}$$

7. (2)

Velocity on reaching 35 m,

$$v^2 = (40)^2 - 2(10)(35)$$

$$v = 30 \text{ m/s}$$

Now, time taken between height 35 m & 68.75 m,

$$33.75 = 30(t) - \frac{1}{2}(10)t^2$$

$$t^2 - 6t + 6.75 = 0$$

$$t = 1.5\text{s or } 4.5\text{s}$$

(NEW NCERT 2025-26, 11th, Page No. 18)

8. (2)

Both specific gravity and μ do not carry dimension.

(NEW NCERT 2025-26, 11th, Page No. 8)

9. (4)

$$a^2 + b^2 + 2ab\cos\theta = a^2 + b^2 - 2ab\cos\theta$$

$$\Rightarrow 4ab\cos\theta = 0$$

$$\text{or } \vec{a} \cdot \vec{b} = 0 \Rightarrow \vec{a} \perp \vec{b}$$

10. (2)

$$\sin 2x = 2 \sin x \cos x = \sin x \text{ (given)}$$

$$\sin x(2\cos x - 1) = 0.$$

Either,

$$\sin x = 0 \Rightarrow x = 0, \pi, 2\pi$$

$$\text{or } 2\cos x - 1 = 0 \Rightarrow \cos x = \frac{1}{2}$$

$$\Rightarrow x = \frac{\pi}{3}, \frac{5\pi}{3}.$$

$$\text{Value of } x \text{ between } 0 \text{ to } 2\pi = \frac{\pi}{3}, \pi, \frac{5\pi}{3}$$

11. (1)

The velocity $v(t) = (\pi/2)\cos(\pi t/2)$ is positive for $0 \leq t < 1$, zero at $t = 1$ negative for $1 < t < 3$, and zero at $t = 3$. The particle reverse direction at $t = 1$.

$$\Delta x = \int_0^3 v(t) dt = \int_0^3 (\pi/2) \cos(\pi t/2) dt$$

$$\Delta x = [\sin(\pi t/2)]_0^3$$

$$\Delta x = \sin(3\pi/2) - \sin(0) = -1 - 0 = -1$$

Magnitude of average velocity

$$= |\Delta x / \Delta t| = 1/3.$$

Calculate total distance traveled (for average speed):

We split the integral at $t = 1$ where velocity changes sign.

$$D = \int_0^1 v(t) dt + \int_1^3 v(t) dt$$

$$\text{First part: } \int_0^1 v(t) dt = [\sin(\pi t/2)]_0^1$$

$$= \sin(\pi/2) - \sin(0) = 1 - 0 = 1.$$

$$\text{Second part } \left| \int_1^3 v(t) dt \right| = [\sin(\pi t/2)]_1^3$$

$$= [\sin(3\pi/2) - \sin(\pi/2)] = |-2| = 2$$

Total Distance: $D = 1 + 2 = 3$

Average speed $= 3/3 = 1$.

(Magnitude of average velocity)/(Average Speed)

$$= (1/3)/1 = 1/3.$$

(NEW NCERT 2025-26, 11th, Page No. 14, 15)

12. (1)

From Stoke's law $F = 6\pi\eta r v$.

We know, $F \propto \eta r v$

$$\therefore a = 1, b = 1, c = 1$$

(NEW NCERT 2025-26, 11th, Page No. 9)

13. (2)

$$|\vec{a} + \vec{b}| = |\vec{a}| + |\vec{b}|$$

$$\sqrt{a^2 + b^2 + 2ab\cos\theta} = a + b$$

$$a^2 + b^2 + 2ab\cos\theta = a^2 + b^2 + 2ab$$

$$2ab(\cos\theta - 1) = 0$$

$$\cos\theta = 1, \theta = 0$$

14. (3)

$$v = P^x \rho^y L^z$$

$$M^0 L T^{-1} = (M^x L^{2x} T^{-3x})(M L^{-3})^y L^z$$

$$\Rightarrow 0 = x + y; 1 = 2x - 3y + z; -1 = -3x$$

$$y = \frac{-1}{3}; z = \frac{-2}{3} \text{ and } x = \frac{1}{3}$$

$$\therefore v = P^{1/3} \rho^{-1/3} L^{-2/3}$$

(NEW NCERT 2025-26, 11th, Page No. 9)

15. (1)

$$\cos\theta = \frac{4}{5}$$

$$\sin 2\theta = 2 \sin\theta \cos\theta = \frac{24}{25}$$

$$\cos 2\theta = \cos^2\theta - \sin^2\theta = \frac{16-9}{25} = \frac{7}{25}$$

$$\text{Sum} = \frac{31}{25}$$

16. (3)

$$S_n = u + \frac{a}{2}(2n-1)$$

Putting, $u = 0$ and $a = 10 \text{ m/s}^2$

$$35 = 0 + \frac{10}{2}(2n-1)$$

$$\Rightarrow n = 4$$

Total time of flight $= 4s$

$$\therefore h = \frac{1}{2} g t^2 = \frac{1}{2} \times 10 \times 4^2$$

$$= 80 \text{ m}$$

(NEW NCERT 2025-26, 11th, Page No. 18)

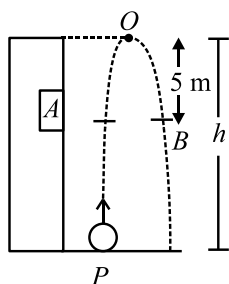
17. (1)

$$\text{Projection} = \frac{(\vec{a} \cdot \vec{n})}{|\vec{n}|}$$

$$= \frac{1}{\sqrt{3}} (a_x \hat{i} + a_y \hat{j} + a_z \hat{k}) \cdot (\hat{i} + \hat{j} + \hat{k})$$

$$= \frac{1}{\sqrt{3}} (a_x + a_y + a_z)$$

18. (3)



$$h = 80 \text{ m}$$

$$T = \sqrt{\frac{2h}{g}} = \sqrt{\frac{2 \times 80}{10}} = 4 \text{ s} \rightarrow \text{half time}$$

$$OB = 5 \text{ m}$$

$$\text{So time taken} = \sqrt{\frac{2 \times 5}{10}} = 1 \text{ s}$$

$$\text{total time} = 4 + 1 = 5 \text{ s.}$$

(NEW NCERT 2025-26, 11th, Page No. 18)

19. (2)

$$a = kt$$

$$\frac{dv}{dt} = kt \Rightarrow v = u + \frac{kt^2}{2}$$

$$\frac{dx}{dt} = u + \frac{kt^2}{2}$$

$$\Rightarrow x = ut + \frac{kt^3}{6}$$

$$\text{as } u = 0,$$

$$x = \frac{kt^3}{6} \Rightarrow x \propto t^3$$

(NEW NCERT 2025-26, 11th, Page No. 18)

20. (2)

$$\left[\frac{a}{v^2} \right] = [P]$$

$$[a] = [ML^{-1}T^{-2}L^6] = [ML^5T^{-2}]$$

$$[b] = [L^3]$$

$$\left[\frac{a}{b} \right] = [ML^2T^{-2}]$$

21. (4)

$$\frac{\Delta P}{P} = \frac{2\Delta I}{I} + \frac{\Delta R}{R}$$

$$= \frac{2(0.05)}{2} + \frac{0.2}{10} = 0.07$$

$$\frac{\Delta P}{P} \% = 7\%$$

(NEW NCERT 2025-26, 11th, Page No. 6)

22. (1)

$$\sin A \cos C = \sin(90 - C) \cos C$$

$$= \cos^2 C = \frac{9}{25} \text{ (given)}$$

$$\therefore \cos C = \frac{3}{5} \Rightarrow C = 53^\circ$$

$$\text{Hence, } \tan C = \frac{4}{3}.$$

23. (1)

Both A and R are correct and R is the correct explanation.

If the digit to be dropped is greater than 5 the preceding digit is raised by 1 and when digit to be dropped is less than 5, then digit is simply dropped.

(NEW NCERT 2025-26, 11th, Page No. 4, 5)

24. (1)

$$v = u + at$$

$$= 8 - 9.8(5)$$

$$= -41 \text{ m/s}$$

$$\therefore 41 \text{ m/s downwards}$$

(NEW NCERT 2025-26, 11th, Page No. 18)

25. (2)

$$\text{RHS} = 3 \log_2 2$$

$$= \log_2 2^3 = \log_2 8$$

$$\therefore \text{LHS} = \log_2 (x-2)(x+2) = \text{RHS}$$

$$\therefore (x-2)(x+2) = 8$$

$$x^2 - 2^2 = 8$$

$$x = \sqrt{12}$$

$$= 2\sqrt{3}$$

26. (1)

Change in velocity = area under $a-t$ graph

$$= \left(\frac{1}{2} \times 2 \times 4 \right) - \left(\frac{1}{2} \times 2 \times 4 \right)$$

$$= 4 - 4 = 0$$

(NEW NCERT 2025-26, 11th, Page No. 17, 18)

27. (2)

$$5^{\log_5(2x+1)} = 625$$

$$\therefore 2x+1 = 625 \quad (a^{\log_a x} = x)$$

$$x = \frac{624}{2} = 312$$

28. (1)

$$\text{at } x = 0, \cos x = 1$$

$$y = 2$$

$$\& \text{ at } x = \frac{\pi}{2}, \cos \frac{\pi}{2} = 0$$

$$y = 1$$

So, graph is shifted upwards by $y = 1$.

29. (2)

$$a = -kv$$

$$\frac{v dv}{dx} = -kv$$

$$\int dv = -k \int dx$$

$$\Delta x = \frac{-1}{k}(10 - 30) = \frac{20}{k}$$

$$\text{distance travelled} = \frac{20}{k} \text{ m}$$

(NEW NCERT 2025-26, 11th, Page No. 18)

30. (1)

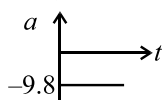
$$LC = \frac{0.5}{100} = 0.005 \text{ mm}$$

$$ZE = +6 \times LC = +0.03 \text{ mm}$$

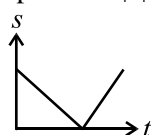
(NEW NCERT 2025-26, 11th, Page No. 11)

31. (2)

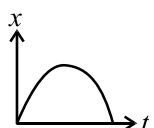
$$a = g = -9.8 \text{ m/s}^2 \text{ (const)}$$



$$\text{speed } s = |v|$$



$$x = ut - \frac{1}{2}gt^2 \text{ is a downward opening-parabola}$$



(NEW NCERT 2025-26, 11th, Page No. 19)

32. (3)

Speed decreases until velocity reverses sign and then it increases.

(NEW NCERT 2025-26, 11th, Page No. 23)

33. (1)

$$\int_0^{\ln 3} e^x dx = 3 - 1 = 2$$

34. (1)

$$1 \text{ VSD} = \frac{29}{30} \text{ MSD}$$

$$LC = 1 \text{ MSD} - 1 \text{ VSD}$$

$$= \frac{1}{30} \text{ MSD} = \frac{0.02}{30} \text{ cm}$$

$$\text{Diameter} = 2.48 + 18 \times LC - ZE$$

$$= 2.48 + 18 \times \frac{0.02}{30} - 0.01$$

$$= 2.482 \text{ cm}$$

(NEW NCERT 2025-26, 11th, Page No. 11)

35. (1)

Using product rule.

$$\frac{dy}{dx} = \frac{1}{x} \left(\frac{d}{dx} \ln x \right) + \ln x \left(\frac{d}{dx} \frac{1}{x} \right)$$

$$= \frac{1}{x^2} - \frac{\ln x}{x^2}$$

36. (2)

Velocity $v = 2t - 4$ negative for $t < 2$.

$$v = \frac{dx}{dt} = 2t - 4$$

$v \rightarrow$ negative for $t < 2$.

(NEW NCERT 2025-26, 11th, Page No. 15)

37. (4)

$$\vec{A} = 3\hat{i} + 4\hat{j} \quad \& \quad \vec{B} = 4\hat{i} + 3\hat{j}$$

$$\vec{N} = |\vec{A} \cdot \vec{B}| = \frac{5(4\hat{i} + 3\hat{j})}{5} = 4\hat{i} + 3\hat{j}$$

$$\therefore p = 4$$

38. (2)

Using Quotient Rule

$$\frac{dy}{dx} = \frac{x(2x) - (x^2 + 1)}{x^2}$$

$$\left(\frac{dy}{dx}\right)_{x=1} = 0$$

39. (1)

$$\vec{r} = x\hat{i} + y\hat{j}$$

$$\text{Now, } (\vec{r} \cdot \hat{i})^2 + (\vec{r} \cdot \hat{j})^2 = x^2 + y^2 = |\vec{r}|^2 = 25$$

40. (2)

Let a be the retardation produced by resistive force,
 t_a and t_d be the time of ascent and time of descent
respectively.

If the particle rises upto a height h

$$\therefore \frac{t_a}{t_d} = \sqrt{\frac{g-a}{g+a}} = \sqrt{\frac{10-2}{10+2}} = \sqrt{\frac{2}{3}}$$

$$\sqrt{\frac{2}{3}} = \sqrt{\frac{6}{8+K}}$$

$$\frac{1}{3} = \frac{3}{8+K} \Rightarrow K = 1$$

(NEW NCERT 2025-26, 11th, Page No. 18, 19)

41. (1)

$$f'(x) = 3x^2 - 12x + 9 = 0$$

$$\text{put } x^2 - 4x + 3 = 0$$

$$x = 1, 3$$

$$\text{at } x = 1, f''(x) = -6 \rightarrow \text{maxima}$$

$$\text{at } x = 3, f''(x) = +6 \rightarrow \text{minima}$$

42. (3)

Equal distance cover in equal time \Rightarrow constant
velocity

$$\therefore \vec{a} = 0$$

(NEW NCERT 2025-26, 11th, Page No. 20)

43. (2)

Write any measurement as $a \times 10^b$ with $1 \leq a \leq 10$.

Order of magnitude rule:

if $a \leq 5 \rightarrow$ order of magnitude = b

if $a > 5 \rightarrow$ order of magnitude = $b + 1$

Therefore the exponent b itself is the order of
magnitude only when $a \leq 5$, which is exactly
statement (2).

(NEW NCERT 2025-26, 11th, Page No. 4)

44. (3)

Differentiate $t = Ax^2 + Bx$ with respect to x

$$\frac{dt}{dx} = 2Ax + B$$

Velocity

$$v = \frac{dx}{dt} = \frac{1}{dt/dx} = (2Ax + B)^{-1} \rightarrow \text{statement (B) is}$$

true

Acceleration

$$a = \frac{dv}{dx} v$$

$$\frac{dv}{dx} = -\frac{2A}{(2Ax + B)^2}$$

$$a = -\frac{2A}{(2Ax + B)^3} = -2Av^3$$

Magnitude (retardation) = $2Av^3 \rightarrow$ statement (C) is
true

Statement (A) and (D) are false.

Hence only (B) and (C) are correct.

(NEW NCERT 2025-26, 11th, Page No. 18)

45. (2)

Surface area, $S = 4\pi r^2$

$$\frac{dS}{dt} = 8\pi r \frac{dr}{dt} \dots (1)$$

$$\text{And, } \frac{dV}{dt} = \frac{d}{dt} \left(\frac{4}{3} \pi r^3 \right)$$

$$= \frac{4}{3} \pi 3r^2 \frac{dr}{dt} = 4 \dots (2)$$

Divide (1) & (2)

$$\frac{dS/dt}{4} = \frac{8\pi r \frac{dr}{dt}}{4\pi r^2 \frac{dr}{dt}}$$

$$\frac{dS}{dt} = \frac{2}{r} \times 4 = \frac{8}{r}$$

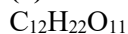
46. (3)

$$\text{Molarity} = \frac{\text{moles}}{V(L)} = \frac{\text{moles} \times 1000}{V(\text{mL})}$$

$$= \frac{11.7}{58.5} \times \frac{1000}{500} = 0.4 \text{ M}$$

(NEW NCERT 12th Part-I Page No. 04)

47. (4)

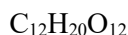


$$\text{Mass} = 12 \times 12 + 22 \times 1 + 11 \times 16$$

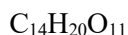
$$= 144 + 22 + 176 = 342 \text{ g/mol}$$



$$\text{Mass} = 132 + 18 + 192 = 342 \text{ g/mol}$$



$$\text{Mass} = 144 + 20 + 192 = 164 + 192 = 356 \text{ g/mol}$$



$$168 + 196 = 364 \text{ g/mol}$$



$$\% \text{ of carbon} = \frac{144 \times 100}{342} = 42.1\%$$



$$\% \text{ of carbon} = \frac{132 \times 100}{342} = 38.5\%$$

(NEW NCERT 11th Part-I Page No. 19)

48. (2)

$$\text{Moles of } \text{CH}_2\text{Cl}_2 = \frac{40}{85} = 0.47 \text{ mol}$$

$$\text{Moles of } \text{CHCl}_3 = \frac{25}{119.5} = 0.213 \text{ mol}$$

$$\chi_{\text{CH}_2\text{Cl}_2} = \frac{0.47}{0.683} = 0.688$$

$$\chi_{\text{CHCl}_3} = 1 - 0.688 = 0.312$$

$$P_t = P_1^0 + (P_2^0 - P_1^0)x_2 = 400 + (815 - 400) 0.688$$

$$= 400 + 285.52 = 685.52 \text{ mm Hg}$$

(NEW NCERT 12th Part-I Page No. 10)

49. (1)

$$\text{BaO}_2 : 2 + 2(x) = 0 \quad x = -1$$

$$\text{OF}_2 : x - 2 = 0 \quad x = +2$$

$$\text{KO}_2 : 1 + 2x = 0 \quad x = -\frac{1}{2}$$

$$\text{H}_2\text{O} : 2 + x = 0 \quad x = -2$$

(NEW NCERT 11th Part-II Page No. 240)

50. (4)

On adding solute freezing point decreases.

(NEW NCERT 12th Part-I Page No. 18)

51. (1)

$$\text{P}_2\text{O}_3 = +3; \quad \text{P}_4\text{O}_{10} = +5$$

$$\text{POCl}_3 = +5; \quad \text{H}_3\text{PO}_3 = +3$$

$$\text{PCl}_5 = +5; \quad \text{PCl}_3 = +3$$

$$\text{H}_4\text{P}_2\text{O}_5 = +3$$

(NEW NCERT 11th Part-II Page No. 240)

52. (2)

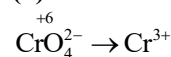
In option (2) Moles of $\text{N}_2 = 2$ mole

Moles of $\text{H}_2 = 3$ mole

Hence H_2 is limiting reagent for 3 moles of H_2 only 1 mole N_2 is required.

(NEW NCERT 11th Part-I Page No. 21)

53. (1)



Change in O.S. = $6 - 3 = 3$

(NEW NCERT 11th Part-II Page No. 240)

54. (4)

$$0.002534 \rightarrow 4 \text{ S.F.}; \quad 1.0003 \rightarrow 5 \text{ S.F.}$$

$$15.00 \rightarrow 4 \text{ S.F.}; \quad 163 \rightarrow 3 \text{ S.F.}$$

(NEW NCERT 11th Part-I Page No. 12)

55. (1)

S in S^{2-} is in its minimum oxidation state hence it will oxidise itself and reduce others.

(NEW NCERT 11th Part-II Page No. 241)

56. (1)

Atom of different elements combine in fixed whole number ratio to form compounds.

(NEW NCERT 11th Part-I Page No. 15)

57. (4)

i approaches 2 as the solution becomes very dilute.

(NEW NCERT 12th Part-I Page No. 24)

58. (2)

$$\text{Moles of } \text{CO}_2 = \frac{0.11}{44} = \frac{1}{400}$$

$$\text{Weight of C} = \frac{1}{400} \times 12 = 0.03$$

$$\% \text{ of C} = \frac{0.03}{w} \times 100 = 24; \quad w = 0.125 \text{ g}$$

$$\text{Moles of } \text{H}_2\text{O} = \frac{0.18}{18} = 0.01$$

$$\text{Moles of H atom} = 0.02$$

$$\% \text{ of hydrogen} = \frac{0.02 \times 100}{w} = 16$$

(NEW NCERT 11th Part-I Page No. 20)

59. (1)

Both the statements are true.

(NEW NCERT 11th Part-II Page No. 249)

60. (3)



in (3) option Cu shows disproportionation.

(NEW NCERT 11th Part-II Page No. 244)

61. (4)

In ClO_4^- , Cl is in its maximum O.S. i.e. +7

Hence it cannot disproportionate..

(NEW NCERT 11th Part-II Page No. 244)

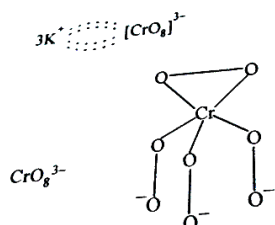
62. (1)

$$n \text{ factor} = \frac{n_1 n_2}{n_1 + n_2}; \quad \overset{0}{\text{Cl}_2} \rightarrow \overset{-1}{\text{Cl}^-} + \overset{+5}{\text{ClO}_3^-}$$

$$n_1 = \text{Cl}_2 \rightarrow 2\text{Cl}^- \quad n_f = 1 \times 2 = 2$$

$$n_2 = \text{Cl}_2 \rightarrow 2\text{ClO}_3^- \quad n_f = 2 \times 5 = 10$$

$$n_f = \frac{2 \times 10}{2 + 10} = \frac{20}{12} = \frac{5}{3}; \quad \text{EW} = \frac{3M}{5}$$



(NEW NCERT 11th Part-II Page No. 240)

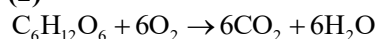
63. (4)



$$X = 10; \quad Y = 6$$

(NEW NCERT 11th Part-II Page No. 247)

64. (2)



$$\text{Moles of } \text{C}_6\text{H}_{12}\text{O}_6 = \frac{1260}{180} = 7$$

1 mole require 6 moles of oxygen

7 moles will require 42 moles

Molar mass of oxygen gas = 32 g/mol

$$\text{Mass of } \text{O}_2 = 30 \times 32 = 1344 \text{ g}$$

(NEW NCERT 11th Part-I Page No. 20)

65. (1)

- Mass of 1 molecule of CH_4 is $2.66 \times 10^{-23} \text{ g}$
- 11 g of CO_2 occupies 5.6 L of vol at STP
- The vol of 1 g H_2 at STP is 11.2 L

(NEW NCERT 11th Part-I Page No. 18)

66. (2)

Statement II is incorrect as it is the process for half reaction method.

(NEW NCERT 11th Part-II Page No. 247)

67. (4)

$(\text{CH}_3)_2\text{CO} + \text{CS}_2$ shows positive deviation.

(NEW NCERT 12th Part-I Page No. 13)

68. (1)

$$\Delta T_f = i k_f \times m$$

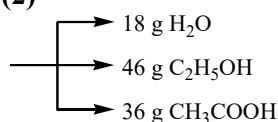
$$(1) (1 + \alpha) \times 1.86 \times 3 \quad (1 + \alpha \text{ will be } > 1)$$

$$(2) 0.5 \times 5.12 \times 3$$

$$(3) 0.5 \times 5.12 \times 1.4 \quad (4) 1.86$$

(NEW NCERT 12th Part-I Page No. 24)

69. (2)



$$\text{Moles of water} = \frac{18}{18} = 1$$

$$\text{Moles of ethanol} = \frac{46}{46} = 1$$

$$\text{Moles of acetic acid} = \frac{36}{60} = 0.6$$

$$\text{Total moles} = 2.6$$

(NEW NCERT 11th Part-I Page No. 18)

70. (3)

- Statement 3: Incorrect. Iodine forms a blue complex with starch in neutral/slightly acidic medium; not restricted to acidic.

(NEW NCERT 11th Part-II Page No. 249)

71. (3)

- Statement 3 is incorrect; it defines molecular, not empirical formula.

(NEW NCERT 11th Part-I Page No. 19)

72. (3)

+2.5 average oxidation number means compound has sulphur atom in multiple O.S.

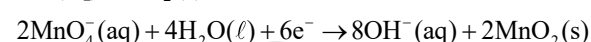
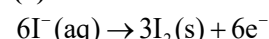
(NEW NCERT 11th Part-II Page No. 240)

73. (3)

Statement I is incorrect 18.02 g is the molar mass, not in amu.

(NEW NCERT 11th Part-I Page No. 18)

74. (4)



$$\text{No. of } \text{e}^- = 6\text{e}^-$$

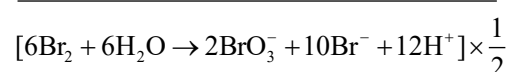
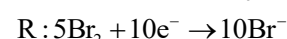
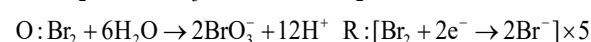
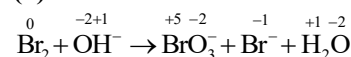
(NEW NCERT 11th Part-II Page No. 247)

75. (1)

As all values are near to each other hence it is precise

(NEW NCERT 11th Part-I Page No. 111)

76. (3)



(NEW NCERT 11th Part-II Page No. 247)

77. (3)
Both A and R are true Zn will oxidise it self to Zn^{2+} and will reduce Cu^{2+} to Cu
(NEW NCERT 11th Part-II Page No. 250)

78. (1)
Hydrogen bonding is actually disrupted in the mixture.
(NEW NCERT 12th Part-I Page No. 14)

79. (2)
 $3\text{ClO}^- \rightarrow 2\text{Cl}^- + \text{ClO}_3^-$
 ClO^- will disproportionate into -1 to +5 O.S.
(NEW NCERT 11th Part-II Page No. 244)

80. (3)
Both A and R are true. Increase pressure causes nitrogen to dissolve when pressure drops quickly it escapes as bubbles, leading to bends.
(NEW NCERT 12th Part-I Page No. 08)

81. (2)
 $\pi = \frac{n}{V}RT$; $n = \frac{\pi V}{RT}$
 $\pi = 2.46 \text{ mm Hg} = \frac{2.46}{760} \text{ atm}$
 $n = \frac{2.46 \times 0.1}{760 \times 0.0821 \times 298} = 1.3 \times 10^{-5} \text{ mol}$
 $n = \frac{\text{Given mass}}{\text{Molar mass}}$
 $\text{Molar mass} = \frac{1}{1.32 \times 10^{-5}} = 75757 \text{ g/mol}$
(NEW NCERT 12th Part-I Page No. 22)

82. (3)
 $\text{MnO}_4^- \xrightarrow{\text{H}^+} \text{Mn}^{2+}$ change in oxidation state = 5
 $\text{KMnO}_4 = \frac{M}{5}$
 $\text{Fe}^{2+} \xrightarrow{\text{H}^+} \text{Fe}^{3+}$ change in oxidation state = 1
 $\text{FeSO}_4 = \frac{M}{1}$
 $\text{Cr}_2\text{O}_7^{2-} \xrightarrow{\text{H}^+} \text{Cr}^{3+}$ change in oxidation state = 3
 $n - \text{factor} = 3 \times 2$
 $\text{K}_2\text{Cr}_2\text{O}_7 = \frac{M}{6}$
(NEW NCERT 11th Part-II Page No. 237)

83. (3)
 $P_t = 400 \text{ mm Hg}$
 $x_A = 0.6$ $x_B = 0.4$
 $P_A^0 = 300 \text{ mm Hg}$ $P_B^0 = 500 \text{ mm Hg}$
 $P_i = x_A P_A^0 + x_B P_B^0 = (0.6 \times 300) + (0.4 \times 500)$
 $= 180 + 200 = 380 \text{ mm Hg}$; $P_t > P_i$
Hence positive deviation
(NEW NCERT 12th Part-I Page No. 14)

84. (1)
 $\text{Molality} = \frac{\text{Moles}}{\text{Mass of solvent (kg)}}$
 $= \frac{3}{60} \times \frac{1000}{100} = \frac{1}{2} = 0.5 \text{ m}$
 $\Delta T_f = K_f m$
 $\Delta T_f = 1.86 \times 0.5$
 $\Delta T_f = 0.93 \text{ K}$
Observed $\Delta T_f = 0.28 \text{ K}$
Association will occur.
(NEW NCERT 12th Part-I Page No. 18)

85. (4)
- | List-I | List-II |
|--|----------------------------|
| • Elevation in boiling point | $\Delta T_b = k_b m$ |
| • Osmotic pressure | $\pi = CRT$ |
| • Freezing point depression | $\Delta T_f = k_f m$ |
| • Relative lowering of vapour pressure | $\frac{\Delta P}{P^0} = x$ |
- (NEW NCERT 12th Part-I Page No. 18)

86. (4)
NaCl dissociates to produce more particles, increasing colligative effect.
(NEW NCERT 12th Part-I Page No. 24)

87. (4)
 $\Delta T_f = i K_f m$
 $5.58 = i \times 1.86 \times 1$
 $i = \frac{5.58}{1.86} = 3$
(NEW NCERT 12th Part-I Page No. 24)

88. (4)
M can displace both Cu and Ag hence $M > \text{Cu} > \text{Ag}$
(NEW NCERT 11th Part-II Page No. 250)

89. (1)
 $[\text{Fe}(\text{CN})_6]^{4-} \rightarrow \text{Fe}^{3+} + \text{CO}_2 + \text{NO}_3^-$
 $\text{Fe} \rightarrow +2 \text{ to } +3$
 $\text{C} \rightarrow +2 \text{ to } +4$
 $\text{N} \rightarrow -3 \text{ to } +5$
 $n \text{ factor} = 1(\text{change in O.S of Fe}) + 12(\text{change in O.S of C}) + 48(\text{change in O.S of N}) = 61$
 $\text{Eq mass} = \frac{212}{61} = 3.47$
(NEW NCERT 11th Part-II Page No. 237)

90. (2)
A and B reactions are redox. C is not redox
(NEW NCERT 11th Part-II Page No. 237)

HINTS & SOLUTIONS

91. (4)

- D. Exchange of genetic material between non-sister chromatids of homologous chromosomes. This refers to crossing over, which occurs during Pachytene, a sub-stage of Prophase I.
- C. Alignment of bivalents on equatorial plate. This describes Metaphase I, where homologous chromosomes (bivalents) align at the center of the cell.
- E. Cytokinesis leading to formation of dyad of haploid cells. After Telophase I, cytokinesis occurs, resulting in two cells, each with a haploid set of chromosomes (a dyad of cells).
- B. Separation of sister chromatids of each chromosome. This is the defining event of Anaphase II, where the centromeres split and sister chromatids move to opposite poles.
- A. Formation of tetrad of haploid cells. This is the final outcome of meiosis, specifically after Telophase II and subsequent cytokinesis, where four haploid daughter cells are formed.

Therefore, the correct sequence is D – C – E – B – A.

(NCERT 11th Edition 2025-26 Page No. 126, 127, 128)

92. (1)

Ribosomes are the site of protein (polypeptide) synthesis. The isolated lysosomal vesicles have been found to be very rich in almost all types of hydrolytic enzymes (hydrolases – lipases, proteases, carbohydrases) optimally active at the acidic pH. These enzymes are capable of digesting carbohydrates, proteins, lipids and nucleic acids. The chloroplasts contain chlorophyll and carotenoid pigments which are responsible for trapping light energy essential for photosynthesis. The cytoskeleton in a cell are involved in many functions such as mechanical support, motility, maintenance of the shape of the cell.

(NCERT 11th Edition 2025-26 Page No. 91, 96, 97, 98)

93. (2)

In prophase, the two asters together with spindle fibres forms mitotic apparatus. Cells at the end of prophase, when viewed under the microscope, do not show golgi complexes, endoplasmic reticulum, nucleolus and the nuclear envelope. By metaphase, condensation of chromosomes is completed and they can be observed clearly under the microscope.

This then, is the stage at which morphology of chromosomes is most easily studied.

(NCERT 11th Edition 2025-26 Page No. 122, 123)

94. (3)

Schleiden and Schwann together formulated the cell theory.

(NCERT 11th Edition 2025-26 Page No. 88)

95. (3)

Mitosis usually results in the production of diploid daughter cells with identical genetic complement.

(NCERT 11th Edition 2025-26 Page No. 125)

96. (4)

Every chromosome (visible only in dividing cells) essentially has a primary constriction or the centromere on the sides of which disc shaped structures called kinetochores are present. Centromere holds two chromatids of a chromosome. Based on the position of the centromere, the chromosomes can be classified into four types. The metacentric chromosome has middle centromere forming two equal arms of the chromosome. The sub-metacentric chromosome has centromere slightly away from the middle of the chromosome resulting into one shorter arm and one longer arm. In case of acrocentric chromosome the centromere is situated close to its end forming one extremely short and one very long arm, whereas the telocentric chromosome has a terminal centromere.

(NCERT 11th Edition 2025-26 Page No. 101)

97. (2)

Some cells in the adult animals do not appear to exhibit division (e.g., heart cells, nerve cells) and many other cells divide only occasionally, as needed to replace cells that have been lost because of injury or cell death. These cells that do not divide further exit G₁ phase to enter an inactive stage called quiescent stage (G₀) of the cell cycle. Cells in this stage remain metabolically active but no longer proliferate unless called on to do so depending on the requirement of the organism. A very significant contribution of mitosis is cell repair. The cells of the upper layer of the epidermis, cells of the lining of the gut, and blood cells are being constantly replaced.

(NCERT 11th Edition 2025-26 Page No. 122, 125)

98. (4)

Plastids are found in all plant cells and in euglenoides. They bear some specific pigments, thus imparting specific colours to the plants. Based on the type of pigments plastids can be classified into chloroplasts, chromoplasts and leucoplasts. The chloroplasts contain chlorophyll and carotenoid pigments which are responsible for trapping light energy essential for photosynthesis. In the chromoplasts, fat soluble carotenoid pigments like carotene, xanthophylls and others are present. This gives the part of the plant a yellow, orange or red colour. The leucoplasts are the colourless plastids of varied shapes and sizes with stored nutrients.

(NCERT 11th Edition 2025-26 Page No. 97)

99. (4)

Gametes are haploid (n): This means they contain half the number of chromosomes and half the amount of DNA compared to the diploid (2n) parent somatic cell in G₁ phase.

To find diploid (2n) G₁ cell:

Chromosomes in diploid cell = $2 \times 30 = 60$ chromosomes

DNA in diploid cell at G₁ = $2 \times 50 \text{ pg} = 100 \text{ pg}$

(NCERT 11th Edition 2025-26 Page No. 121)

100. (2)

It is the cell theory that emphasised the unity underlying this diversity of forms, i.e., the cellular organisation of all life forms. A description of cell structure and cell growth by division is given in the chapters comprising this unit. Cell theory also created a sense of mystery around living phenomena, i.e., physiological and behavioural processes. This mystery was the requirement of integrity of cellular organisation for living phenomena to be demonstrated or observed. In studying and understanding the physiological and behavioural processes, one can take a physico-chemical approach and use cell-free systems to investigate. This approach enables us to describe the various processes in molecular terms. The approach is established by analysis of living tissues for elements and compounds. It will tell us what types of organic compounds are present in living organisms. In the next stage, one can ask the question: What are these compounds doing inside a cell? And, in what way they carry out gross physiological processes like digestion, excretion, memory, defense, recognition, etc. In other words we answer the question, what is the molecular basis of all physiological processes? It

can also explain the abnormal processes that occur during any diseased condition. This physico-chemical approach to study and understand living organisms is called 'Reductionist Biology'.

(NCERT 11th Edition 2025-26 Page No. 85)

101. (1)

'B' represents microtubules that form spindle fibres which attach to the kinetochores (small disc-shaped structures at the surface of the centromeres).

(NCERT 11th Edition 2025-26 Page No. 123)

102. (1)

A special membranous structure is the mesosome which is formed by the extensions of plasma membrane into the cell. The fimbriae are small bristle like fibres sprouting out of the cell. In some bacteria, they are known to help attach the bacteria to rocks in streams and also to the host tissues. Glycocalyx differs in composition and thickness among different bacteria. It could be a loose sheath called the slime layer in some, while in others it may be thick and tough, called the capsule.

(NCERT 11th Edition 2025-26 Page No. 90, 91)

103. (1)

The interphase nucleus (nucleus of a cell when it is not dividing) has highly extended and elaborate nucleoprotein fibres called chromatin, nuclear matrix and one or more spherical bodies called nucleoli. The interphase, though called the resting phase, is the time during which the cell is preparing for division by undergoing both cell growth and DNA replication in an orderly manner.

(NCERT 11th Edition 2025-26 Page No. 100, 121)

104. (3)

Bacterial cells may be motile or non-motile. If motile, they have thin filamentous extensions from their cell wall called flagella. Bacteria show a range in the number and arrangement of flagella.

(NCERT 11th Edition 2025-26 Page No. 91)

105. (2)

The interphase is divided into three further phases: G₁ phase (Gap 1), S phase (Synthesis), G₂ phase (Gap 2). Though for convenience mitosis (M phase) has been divided into four stages of nuclear division (karyokinesis), it is very essential to understand that cell division is a progressive process and very clear-cut lines cannot be drawn between various stages.

Meiosis involves two sequential cycles of nuclear

and cell division called meiosis I and meiosis II but only a single cycle of DNA replication. Prophase of the first meiotic division is typically longer and more complex when compared to prophase of mitosis. It has been further subdivided into the following five phases based on chromosomal behaviour, i.e., Leptotene, Zygotene, Pachytene, Diplotene and Diakinesis.

(NCERT 11th Edition 2025-26 Page No. 122, 125, 126)

106. (1)

Mycoplasmas, the smallest cells, are only 0.3 μm in length while bacteria could be 3 to 5 μm . The largest isolated single cell is the egg of an ostrich. Among multicellular organisms, human red blood cells are about 7.0 μm in diameter.

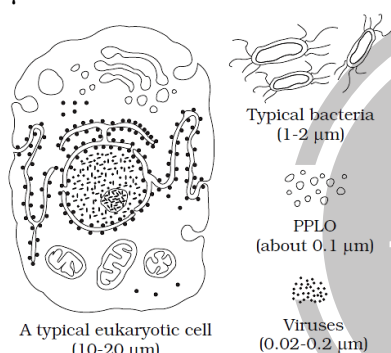


Diagram showing comparison of eukaryotic cell with other organisms

(NCERT 11th Edition 2025-26 Page No. 88, 89)

107. (1)

During meiosis, in anaphase I homologous chromosomes move to the opposite poles with both their chromatids. Each pole receives half the chromosome number of the parent cell. In telophase I, the nuclear membrane and nucleolus reappear. It is followed by cytokinesis thus forming haploid daughter cells.

(NCERT 11th Edition 2025-26 Page No. 129)

108. (4)

While each of the membranous organelles is distinct in terms of its structure and function, many of these are considered together as an endomembrane system because their functions are coordinated. The endomembrane system include endoplasmic reticulum (ER), golgi complex, lysosomes and vacuoles. Since the functions of the mitochondria, chloroplast and peroxisomes are not coordinated with the above components, these are not considered as part of the endomembrane system. The golgi apparatus principally performs the

function of packaging materials, to be delivered either to the intra-cellular targets or secreted outside the cell. Golgi apparatus is the important site of formation of glycoproteins and glycolipids. Peroxisomes are microbodies that perform peroxide biosynthesis.

(NCERT 11th Edition 2025-26 Page No. 95, 96)

109. (1)

A typical plant cell has a distinct cell wall as its outer boundary and just within it is the cell membrane. The middle lamella is a layer mainly of calcium pectate which holds or glues the different neighbouring cells together. In an animal cell, cytokinesis is achieved by the appearance of a furrow in the plasma membrane. The furrow gradually deepens and ultimately joins in the centre dividing the cell cytoplasm into two. Plant cells however, are enclosed by a relatively inextensible cell wall, therefore they undergo cytokinesis by a different mechanism. In plant cells, wall formation starts in the centre of the cell and grows outward to meet the existing lateral walls. The formation of the new cell wall begins with the formation of a simple precursor, called the cell-plate that represents the middle lamella between the walls of two adjacent cells.

(NCERT 11th Edition 2025-26 Page No. 88, 94, 124)

110. (3)

One of the most important functions of the plasma membrane is the transport of the molecules across it. The membrane is selectively permeable to some molecules present on either side of it. Many molecules can move briefly across the membrane without any requirement of energy and this is called the passive transport. Neutral solutes may move across the membrane by the process of simple diffusion along the concentration gradient, i.e., from higher concentration to the lower. Water may also move across this membrane from higher to lower concentration. Movement of water by diffusion is called osmosis. As the polar molecules cannot pass through the non-polar lipid bilayer, they require a carrier protein of the membrane to facilitate their transport across the membrane. A few ions or molecules are transported across the membrane against their concentration gradient, i.e., from lower to the higher concentration. Such a transport is an energy dependent process, in which ATP is utilised and is called active transport.

(NCERT 11th Edition 2025-26 Page No. 94)

111. (3)

The beginning of diplotene is recognised by the dissolution of the synaptonemal complex and the tendency of the recombined homologous chromosomes of the bivalents to separate from each other except at the sites of crossovers. These X-shaped structures, are called chiasmata. In oocytes of some vertebrates, diplotene can last for months or years.

(NCERT 11th Edition 2025-26 Page No. 126)

112. (2)

In addition to the genomic DNA (the single chromosome/circular DNA), many bacteria have small circular DNA outside the genomic DNA. These smaller DNA are called plasmids. Prokaryotes have something unique in the form of inclusions. Reserve material in prokaryotic cells are stored in the cytoplasm in the form of inclusion bodies. Therefore, none of the given structures are exclusive to eukaryotes.

(NCERT 11th Edition 2025-26 Page No. 90, 91)

113. (2)

Prophase of the first meiotic division is typically longer and more complex when compared to prophase of mitosis. It has been further subdivided into the following five phases based on chromosomal behaviour, i.e., Leptotene, Zygotene, Pachytene, Diplotene and Diakinesis.

(NCERT 11th Edition 2025-26 Page No. 126)

114. (4)

The Golgi cisternae are concentrically arranged near the nucleus with distinct convex *cis* or the forming face and concave *trans* or the maturing face. The *cis* and the *trans* faces of the organelle are entirely different, but interconnected. Materials to be packaged in the form of vesicles from the ER fuse with the *cis* face of the golgi apparatus and move towards the maturing face. This explains, why the golgi apparatus remains in close association with the endoplasmic reticulum. A number of proteins synthesised by ribosomes on the endoplasmic reticulum are modified in the cisternae of the golgi apparatus before they are released from its *trans* face.

(NCERT 11th Edition 2025-26 Page No. 95, 96)

115. (2)

Animal cells have centrioles which are absent in almost all plant cells. In animal cells, during the S phase, DNA replication begins in the nucleus, and

the centriole duplicates in the cytoplasm. In plant cells, DNA replication occurs in the nucleus.

(NCERT 11th Edition 2025-26 Page No. 91, 121)

116. (3)

The cell membrane is mainly composed of lipids and proteins. The major lipids are phospholipids that are arranged in a bilayer. Also, the lipids are arranged within the membrane with the polar head towards the outer sides and the hydrophobic tails towards the inner part. This ensures that the nonpolar tail of saturated hydrocarbons is protected from the aqueous environment.

(NCERT 11th Edition 2025-26 Page No. 93)

117. (3)

G₁ phase is the period when the cell grows and carries out normal metabolism. Most of the organelle duplication also occurs during this phase. G₂ phase is the period of cytoplasmic growth. Chromosome condensation occurs during prophase. Once the chromatids reach the two poles, in telophase the chromosomal elongation starts, nucleolus and the nuclear membrane reappear.

(NCERT 11th Edition 2025-26 Page No. 129)

118. (2)

ER divides the intracellular space into two distinct compartments, i.e., luminal (inside ER) and extra luminal (cytoplasm) compartments in eukaryotic cells. Mycoplasmas are prokaryotes.

(NCERT 11th Edition 2025-26 Page No. 89, 95)

119. (3)

The prokaryotic cells are represented by bacteria, blue-green algae, mycoplasma and PPLO (Pleuro Pneumonia Like Organisms). They are generally smaller and multiply more rapidly than the eukaryotic cells. According to the cell theory, cells arise from pre-existing cells. The process by which this occurs is called cell division. Any sexually reproducing organism starts its life cycle from a single-celled zygote. Cell division does not stop with the formation of the mature organism but continues throughout its life cycle.

(NCERT 11th Edition 2025-26 Page No. 89, 128)

120. (1)

The cell wall and middle lamellae in plant cells may be traversed by plasmodesmata which connect the cytoplasm of neighbouring cells. Mitochondria are the sites of aerobic respiration. They produce

cellular energy in the form of ATP (energy currency of cell), hence they are called 'power houses' of the cell. The centrioles form the basal body of cilia or flagella, and spindle fibres that give rise to spindle apparatus during cell division in animal cells. ER helps in the transport of substances, synthesis of proteins, lipoproteins and glycogen.

(NCERT 11th Edition 2025-26 Page No. 94, 97, 100, 102)

121. (1)

Starting with 1 yeast cell:

After 1 division: 2 cells

After 2 divisions: 4 cells

After 3 divisions: 8 cells

After 4 divisions: 16 cells

After 5 divisions: 32 cells

After 6 divisions: 64 cells

Alternatively, we can express this as $2^n = 64$, where 'n' is the number of divisions.

$2^6 = 64$, so $n = 6$. Therefore, 6 cell divisions are required.

The duration of one yeast cell cycle: the typical cell cycle duration for yeast is approximately 90 minutes (or 1.5 hours).

Now, we can calculate the total time:

Total time = Number of divisions \times Duration of one cell cycle

Total time = 6 divisions \times 90 minutes/division

Total time = 540 minutes = 9 hours

Therefore, it will take 9 hours to obtain 64 yeast cells starting from a single yeast cell, assuming all daughter cells continue to divide at the same rate.

(NCERT 11th Edition 2025-26 Page No. 121)

122. (2)

Some mature cells lack nucleus, e.g., erythrocytes of many mammals and sieve tube cells of vascular plants. Viruses are acellular organisms that lack nucleus.

(NCERT 11th Edition 2025-26 Page No. 100)

123. (2)

Cell growth results in disturbing the ratio between the nucleus and the cytoplasm. It therefore becomes essential for the cell to divide to restore the nucleo-cytoplasmic ratio.

(NCERT 11th Edition 2025-26 Page No. 125)

124. (3)

The centriole is made up of nine evenly spaced peripheral fibrils of tubulin protein. Each of the peripheral fibril is a triplet. The adjacent triplets are

also linked. The central part of the proximal region of the centriole is also proteinaceous and called the hub, which is connected with tubules of the peripheral triplets by radial spokes made of protein.

(NCERT 11th Edition 2025-26 Page No. 100)

125. (1)

Cells in G_0 phase remain metabolically active but no longer proliferate unless called on to do so depending on the requirement of the organism.

(NCERT 11th Edition 2025-26 Page No. 122)

126. (2)

In eukaryotic cells, ribosomes are found in the cytoplasm, on the outer nuclear membrane, outer surface of RER, matrix of mitochondria and stroma of chloroplast.

(NCERT 11th Edition 2025-26 Page No. 95, 97, 98, 100)

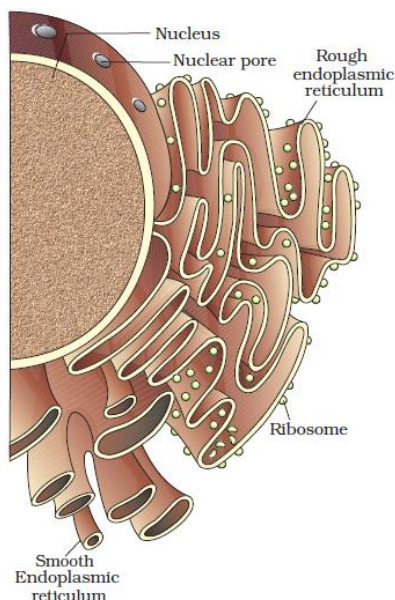
127. (4)

The M Phase represents the phase when the actual cell division or mitosis occurs and the interphase represents the phase between two successive M phases. It is significant to note that in the 24 hour average duration of cell cycle of a human cell, cell division proper lasts for only about an hour. The interphase lasts more than 95% of the duration of cell cycle. M phase is the most dramatic period of the cell cycle, involving a major reorganisation of virtually all components of the cell. Since the number of chromosomes in the parent and progeny cells is the same, it is also called as equational division. Though for convenience mitosis has been divided into four stages of nuclear division (karyokinesis), it is very essential to understand that cell division is a progressive process and very clear-cut lines cannot be drawn between various stages.

(NCERT 11th Edition 2025-26 Page No. 121, 122)

128. (4)

'B' represents the nuclear pores which are the passages through which movement of RNA and protein molecules takes place in both directions between the nucleus and the cytoplasm. 'D' represents the RER which is frequently observed in the cells actively involved in protein synthesis and secretion. 'C' represents ribosomes which is present in all prokaryotic and eukaryotic living cells. 'A' represents nucleus that contains DNA, nucleoplasm and nucleoli. However, DNA is also present in mitochondria and chloroplasts of eukaryotic cells.



Endoplasmic reticulum

(NCERT 11th Edition 2025-26 Page No. 88, 95, 97, 98, 100)

129. (3)

The sequence of events by which a cell duplicates its genome, synthesises the other constituents of the cell and eventually divides into two daughter cells is termed cell cycle. Zygote is formed during sexual reproduction as a result of fusion of gametes.

(NCERT 11th Edition 2025-26 Page No. 120)

130. (2)

The ribosomes of a polysome translate the mRNA into proteins. The mitochondrial matrix possesses single circular DNA molecule, a few RNA molecules, ribosomes (70S) and the components required for the synthesis of proteins. The stroma of the chloroplast contains enzymes required for the synthesis of carbohydrates and proteins. It also contains small, double-stranded circular DNA molecules and ribosomes. Multicellular organisms have division of labour.

(NCERT 11th Edition 2025-26 Page No. 91, 97, 98, 103)

131. (2)

At the onset of anaphase, each chromosome arranged at the metaphase plate is split simultaneously and the two daughter chromatids, now referred to as daughter chromosomes of the future daughter nuclei, begin their migration towards the two opposite poles.

Anaphase I: The homologous chromosomes separate, while sister chromatids remain associated at their centromeres.

Anaphase II: It begins with the simultaneous splitting of the centromere of each chromosome (which was holding the sister chromatids together), allowing them to move toward opposite poles of the cell by shortening of microtubules attached to kinetochores.

(NCERT 11th Edition 2025-26 Page No. 123, 127)

132. (4)

The RBC is round and biconcave in shape.

(NCERT 11th Edition 2025-26 Page No. 89)

133. (4)

Prophase I is subdivided into five stages: Leptotene, Zygotene, Pachytene, Diplotene, Diakinesis.

Leptotene: Chromosomes become gradually visible under the light microscope.

Zygotene: Synapsis occurs and homologous chromosomes start pairing. Formation of synaptonemal complex begins.

Pachytene: Crossing over occurs between non-sister chromatids. Recombinase enzyme acts.

Diplotene: The synaptonemal complex dissolves. Homologous chromosomes of the bivalents begin to separate except at chiasmata (crossovers).

Diakinesis: Chromosomes are fully condensed and meiotic spindle gets assembled.

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134. (3)

The membrane of the thylakoids enclose a space called a lumen. The stroma of the chloroplast contains enzymes required for the synthesis of carbohydrates and proteins. It also contains small, double-stranded circular DNA molecules and ribosomes. Ribosomes are the sites of protein synthesis.

(NCERT 11th Edition 2025-26 Page No. 91, 98)

135. (3)

Telophase I: The nuclear membrane and nucleolus reappear, cytokinesis follows and this is called as dyad of cells. Although in many cases the chromosomes do undergo some dispersion, they do not reach the extremely extended state of the interphase nucleus. The stage between the two meiotic divisions is called interkinesis and is generally short lived. There is no replication of DNA during interkinesis. Interkinesis is followed by prophase II, a much simpler prophase than prophase I.

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HINTS & SOLUTIONS

136. (4)

Dense regular connective tissue has parallel fibre orientation, not crisscross. Tendons and ligaments are dense regular connective tissues. Dense irregular connective tissue is found in skin but not richly vascularized. Fibroblasts are responsible for secreting fibres in both dense types.

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137. (1)

In frogs, a triangular structure called sinus venosus joins the right atrium. It receives blood through the major veins called vena cava. The ventricle opens into a sac like conus arteriosus on the ventral side of the heart.

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138. (2)

Terrestrial arthropods (like insects) do not have gills; they have a tracheal system. Gills are found in aquatic arthropods and molluscs. Amphibians (e.g., frogs) can respire through both lungs and moist skin (cutaneous respiration). Insects have a tracheal system, where air is delivered directly to tissues, bypassing blood circulation. While lungs are used by terrestrial vertebrates, not all terrestrial animals rely exclusively on lungs. Amphibians like frogs use skin as well. Fishes have branchial respiration but gills are not present in aquatic reptiles.

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139. (1)

Larger blood vessels often contain multi-unit smooth muscle.

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140. (4)

List-I	List-II
Epiglottis	Prevents food entry into respiratory tract
Larynx	Sound production
Terminal bronchiole	End of conducting part
Alveolus	Gaseous exchange

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141. (4)

In the given diagram, labelled part A represents gastric caeca and B represents Malpighian tubules.

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142. (4)

The patient presents with high fever and metabolic acidosis, both of which increase the H^+ concentration (lowering blood pH). This acidosis (along with fever-induced elevated temperature) leads to a rightward shift of the oxygen dissociation curve (ODC), a phenomenon known as the Bohr effect. This shift promotes oxygen unloading in peripheral tissues, enhancing oxygen delivery where it is needed most (e.g., metabolically active tissues during fever and acidosis).

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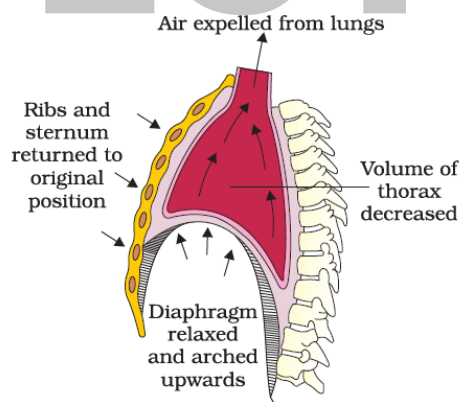
143. (3)

Male frogs have vocal sacs and copulatory pads, absent in females. Frogs do not drink water orally. They absorb it through their skin. Moist skin enables cutaneous respiration and water absorption. Frogs exhibit camouflage via color change (mimicry), a defensive strategy.

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144. (3)

The given diagram represents mechanism of breathing showing expiration. Relaxation of the diaphragm and the inter-costal muscles returns the diaphragm and sternum to their normal positions and reduce the thoracic volume and thereby the pulmonary volume. This leads to an increase in intra-pulmonary pressure to slightly above the atmospheric pressure causing the expulsion of air from the lungs, i.e., expiration.



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145. (4)

The matrix provides strength, elasticity, and flexibility — not just rigidity. Fibres like elastin give elasticity, collagen gives strength.

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146. (3)

Adipose tissue is a loose connective tissue specialized in storing fat, located beneath the skin. Areolar tissue contains loosely arranged fibres, not parallel bundles. Tendons and ligaments are examples of dense regular connective tissue, not irregular or loose.

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147. (3)

Breathing is a physical process of air exchange (inhalation/exhalation). Cellular respiration is a biochemical process that occurs inside cells to produce ATP using oxygen.

Hemoglobin (Hb) is a tetramer with 4 heme groups, and each heme contains one Fe^{2+} (iron ion). Hence, 1 Hb molecule has 4 iron atoms.

Frogs use positive pressure breathing — they force air into their lungs by buccal pumping. Mammals, including humans, use negative pressure breathing — they create a vacuum by expanding the thoracic cavity.

Elastic recoil helps in passive exhalation in mammals and also contributes to lung deflation in frogs. Both rely on the elasticity of lung tissue for exhalation.

Residual volume (RV) is the air left in lungs after maximal exhalation, and spirometry cannot measure RV directly. RV is measured using special techniques like helium dilution or body plethysmography.

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148. (3)

The intercellular material of cartilage is solid and pliable and resists compression. Cells of this tissue (chondrocytes) are enclosed in small cavities within the matrix secreted by them. Most of the cartilages in vertebrate embryos are replaced by bones in adults. Cartilage is present in the tip of nose, outer ear joints, between adjacent bones of the vertebral column, limbs and hands in adults.

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149. (2)

Forceful exhalation after deep inhalation refers to Vital Capacity (VC) = TV + IRV + ERV
= 500 + 2800 + 1100 = 4400 mL

Residual Volume (RV) remains in the lungs and is not exhaled.

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150. (3)

In carbon monoxide (CO) poisoning, CO binds with haemoglobin (Hb) to form carboxyhaemoglobin (HbCO). This binding has about 200–250 times higher affinity than oxygen. As a result, the remaining oxygen molecules on Hb are held more tightly, reducing their release to tissues. This causes

the oxygen dissociation curve to shift to the left, indicating increased Hb–O₂ affinity but reduced delivery to tissues.

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151. (3)

Frogs are poikilothermic (cold-blooded) animals. They do not regulate temperature via sweating (a mammalian trait). They rely on behavioral means (burrowing, aestivation, hibernation).

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152. (2)

The pleura (lining of the lungs and thoracic cavity) is composed of mesothelium, a type of simple squamous epithelium, similar to the alveolar epithelium.

Inspiration is an active process — it requires muscle contraction (diaphragm and external intercostals). Expiration at rest is usually a passive process, due to elastic recoil of lungs and relaxation of muscles. Expiration generally takes longer than inspiration, especially at rest, due to the slower elastic recoil and relaxation compared to active muscle contraction in inhalation.

Low CO₂ levels (hypocapnia) reduce the stimulation of respiratory centers, leading to shallower or slower breathing. This is part of the body's feedback mechanism to maintain CO₂–O₂ balance.

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153. (3)

Cockroaches are dioecious and both sexes have well developed reproductive organs.

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154. (2)

Emphysema: destroys alveolar walls → reduced surface area.

Fibrosis: scarring reduces effective respiratory area.

Pneumonia: fluid-filled alveoli interfere with gas exchange → functionally reduces surface area.

Asthma: Does not damage alveoli, it only narrows airways → no reduction in surface area

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155. (4)

List-I	List-II
Nictitating membrane	Protection of eyes in aquatic habitat
Tympanum	Sound reception
Webbed digits	Help in swimming
Aestivation	Survival during high summer heat

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156. (3)

The most likely pathological change and cause in this case is fibrosis of lung tissue due to dust inhalation. The patient's long-term exposure (25 years) to stone dust in a grinding factory without protective gear strongly suggests occupational lung disease, specifically silicosis or pneumoconiosis. These conditions result from the inhalation of inorganic dust particles (such as silica), which trigger chronic inflammation, leading to progressive lung fibrosis.

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157. (1)

Frogs have closed circulation and nucleated RBCs. Renal portal system is present in frogs. Ventricle is single and mixed blood (oxygenated + deoxygenated) is pumped. Cloaca is a common opening for all excretory and reproductive functions.

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158. (3)

In Cockroaches, the gas exchange in cockroache does not occur at the spiracles by diffusion. While spiracles are the external openings of the tracheal system, actual gas exchange (O_2 and CO_2 diffusion) happens in the tracheoles (fine branching tubes) directly with the tissues, not at the spiracles.

Excretion in cockroaches, which is carried out by Malpighian tubules. These tubules are lined with glandular and ciliated cells that help in nitrogenous waste removal and osmoregulation.

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159. (3)

The respiratory rhythm centre in the medulla sets the basic involuntary breathing rhythm. The pneumotaxic centre in the pons fine-tunes this by reducing the duration of inspiration, thus influencing breathing rate.

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160. (3)

Both nymphs and adults possess compound eyes and antennae → not a differentiator. Sexual maturity structures like mushroom gland, spermatheca are adult-specific but not externally obvious. Late-stage nymphs have wing pads, but only adults have functional wings, making this the correct morphological distinction.

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161. (4)

The sigmoidal (S-shaped) curve arises due to cooperative binding of O_2 . When one O_2 binds to haemoglobin, a conformational change increases its affinity for the next O_2 . This cooperative effect leads to the characteristic sigmoid curve.

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162. (3)

A characteristic mushroom shaped gland is present in the 6th-7th abdominal segments in male cockroaches only not in females. A pair of spermatheca is present in the 6th segment which opens into the genital chamber. Spermatophores are bundles of sperms formed in male cockroaches.

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163. (3)

- Unilocular adipocytes are characteristic of white adipose tissue: Contain a single large fat droplet. Found widely in adults (subcutaneous layer, around organs, etc.).

Multilocular adipocytes are found in brown adipose tissue:

- Contain multiple small fat droplets.
- Rich in mitochondria.
- Found in infants and in some specific regions of adults (e.g., neck, shoulders).
- Important in non-shivering thermogenesis.

Adipose tissue (especially white fat) functions to:

- Insulate the body (reduce heat loss).
- Provide cushioning and mechanical protection to organs (e.g., kidneys, eyes).
- Also serves as an energy reservoir.

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164. (1)

100 ml blood → 4 ml CO_2

So, 1000 ml (1 L) → 40 ml CO_2

For 5 L: $40 \times 5 = 200$ ml CO_2

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165. (1)

Inspiratory Capacity (IC) = Tidal Volume (TV) + Inspiratory Reserve Volume (IRV). It does not include Expiratory Reserve Volume (ERV). Functional Residual Capacity (FRC) = Expiratory Reserve Volume (ERV) + Residual Volume (RV). It represents the air remaining in the lungs after normal (tidal) expiration. Vital Capacity (VC) = IRV + TV + ERV. Total Lung Capacity (TLC) = VC + Residual Volume (RV). Thus, VC < TLC (since RV is excluded from VC). Residual Volume (RV) (~1200 mL) prevents lung collapse by maintaining air in alveoli even after maximal expiration. Tidal Volume (TV) (~500 mL) is much lower than Residual Volume (RV) (~1200 mL).

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166. (3)

In frog, olfactory lobes are involved in smell detection, not balance/posture. Balance is maintained by internal ears (vestibular function) and cerebellum.

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167. (2)

List-I	List-II
Pulmonary ventilation	Movement of air in and out of lungs
Gas exchange	Diffusion of O ₂ and CO ₂ across alveoli
Gas transport	Hemoglobin carries O ₂ and CO ₂ via blood
Cellular respiration	O ₂ used by tissues; CO ₂ generated

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168. (1)

The right lung is divided into:

- Upper, middle, and lower lobes
- By horizontal and oblique fissures

The left lung has only:

- Upper and lower lobes
- Divided by a single oblique fissure
- The middle lobe is absent due to the cardiac notch

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169. (2)

In female frogs, the oviducts are separate and not connected to kidneys, unlike the male urinogenital ducts. Bidder's canal and vasa efferentia are male-specific. Cloaca is present in both sexes.

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170. (2)

The abdomen in both males and females consists of 10 segments. In females, the 7th sternum is boat shaped and together with the 8th and 9th sterna forms a brood or genital pouch whose anterior part contains female gonopore, spermathecal pores and collateral glands. In males, genital pouch or chamber lies at the hind end of abdomen bounded dorsally by 9th and 10th terga and ventrally by the 9th sternum.

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171. (1)

Carbon dioxide (CO₂) binds to hemoglobin in a different manner than oxygen (O₂). While O₂ attaches to the iron-containing heme groups of hemoglobin, CO₂ primarily binds to the amino

groups (-NH₂) of the globin protein chains, forming carbaminohemoglobin. This binding occurs on the polypeptide portions of hemoglobin rather than the heme sites, allowing CO₂ and O₂ to be transported simultaneously without direct competition for the same binding locations. Approximately 23% of CO₂ in the blood is carried this way. The remaining CO₂ is transported either as bicarbonate (HCO₃⁻) (70%) or dissolved in plasma (7%).

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172. (3)

Lymph lacks RBCs and is low in proteins. It plays a major role in returning tissue fluid to the venous system. It is not pumped by the heart, and doesn't flow in arteries.

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173. (2)

A hole would allow air to enter the space between the inner and layer of the double membrane, resulting in a condition called pneumothorax. The two layers would no longer stick together and the lung on the side with the hole would collapse.

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174. (2)

- The body of a cockroach is divisible into three regions: head, thorax, and abdomen (not "neck").
- The cockroach's body is covered by a hard exoskeleton (not endoskeleton) made of chitin.
- Head is triangular in shape and lies anteriorly at right angles to the longitudinal body axis. It is formed by the fusion of six segments and shows great mobility in all directions due to flexible neck. The mouthparts of a cockroach are biting and chewing type (not "sucking").

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175. (1)

List-I	List-II
Tight junctions	Stop substances leaking across the tissue
Adhering junctions	Perform cementing to keep neighbouring cells together
Gap junctions	Facilitate the cells to communicate with each other
Compound epithelium	Limited role in secretion and absorption

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176. (1)

At high altitudes, human beings do not survive for long, even though air still contains 20.95% O₂ because the atmospheric pressure is less than the pressure at sea level. Skin is covered by keratinised whereas moist surface of buccal cavity is covered by non-keratinised stratified squamous epithelium.

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177. (4)

Gas exchange occurs in alveoli, not bronchi. Trachea has incomplete cartilaginous rings. Alveoli are thin-walled and highly vascularised. Pleural fluid reduces friction between lung and thoracic wall.

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178. (2)

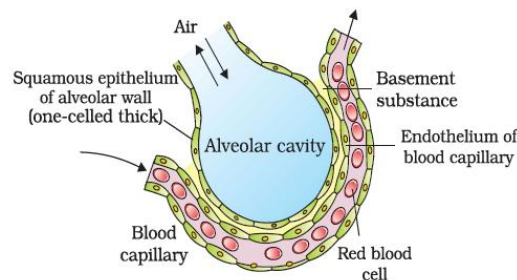
On land, frogs depend primarily on lungs (pulmonary respiration) and buccal cavity. In a dry environment, cutaneous respiration is ineffective (skin must be moist). Blocking internal nares obstructs air from reaching lungs, resulting in oxygen deficit and suffocation.

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179. (3)

The given diagram represents a section of an alveolus with a pulmonary capillary. In this labelled part B, C and D forms the diffusion membrane which comprises the thin squamous epithelium of alveoli, the endothelium of alveolar capillaries and

the basement substance (composed of a thin basement membrane supporting the squamous epithelium and the basement membrane surrounding the single layer endothelial cells of capillaries) in between them.



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180. (3)

In cockroaches, ostia are small lateral openings in the heart chambers. They allow haemolymph to re-enter the heart from the surrounding sinuses during circulation. They do not pump blood or aid in digestion.

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REAL TEST

