



Yakeen NEET 2.0 (2026)

Rank Booster Test - 01

DURATION : 180 Minutes

DATE : 13/07/2025

M. MARKS : 720

Topics Covered

Physics:	Basic Maths & Calculus (Mathematical Tools), Vectors
Chemistry:	Some Basic Concept of Chemistry, Redox Reaction
Biology:	(Botany): Cell - The Unit of Life, Cell Cycle and Cell Division (Zoology): Structural Organization in Animals

General Instructions:

1. Immediately fill in the particulars on this page of the test booklet.
2. The test is of **180 minutes** duration and the Test Booklet contains **180** multiple choice questions (four options with a single correct answer) from **Physics, Chemistry and Biology (Botany and Zoology)**. **45** questions in each subject
3. The test booklet consists of **180** questions. The maximum marks are **720**.
4. There is only **one correct** response for each question.
5. Each correct answer will give 4 marks while 1 Mark will be deducted for a wrong MCQ response.
6. No student is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc. inside the examination room/hall.
7. Use of white fluid for correction is **not permissible** on the **Answer Sheet**.
8. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator on duty in the Room/Hall. However, the candidates are allowed to take away this Test Booklet with them.

OMR Instructions:

1. Use blue/black dark ballpoint pens.
2. Darken the bubbles completely. Don't put a tick mark or a cross mark where it is specified that you fill the bubbles completely. Half-filled or over-filled bubbles will not be read by the software.
3. Never use pencils to mark your answers.
4. Never use whiteners to rectify filling errors as they may disrupt the scanning and evaluation process.
5. Writing on the **OMR Sheet** is permitted on the specified area only and even small marks other than the specified area may create problems during the evaluation.
6. Multiple markings will be treated as invalid responses.
7. **Do not fold or make any stray mark on the Answer Sheet (OMR).**

Name of the Student (In CAPITALS) : _____

Roll Number : _____

OMR Bar Code Number : _____

Candidate's Signature : _____ Invigilator's Signature _____

Practice Test-01

Yakeen NEET 2.0 (2026) Rank Booster Test

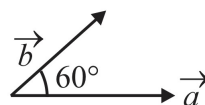
- Q1** A patient is given a special therapy where, first, his body temperature is increased by 6°C . After one hour, a cooling pack is applied, which decreases his temperature by 3°C . In the following hour, the heat therapy is repeated, increasing his temperature by 1.5°C , and then again, a cooling pack decreases it by 0.75°C in the next hour. This process keeps repeating for many hours, with each new effect being half as strong as the previous one and the effect alternating between increasing and decreasing the temperature. After a very long time, what will be the total change in the patient's body temperature?
- (1) 2°C (2) 3°C
(3) 4°C (4) 6°C

- Q2** Let $|\vec{A}_1| = 3$ unit, $|\vec{A}_2| = 5$ unit and $|\vec{A}_1 + \vec{A}_2| = 5$ unit. The value of $\left(2\vec{A}_1 + 3\vec{A}_2\right) \cdot \left(3\vec{A}_1 - 2\vec{A}_2\right)$ is:
- (1) -112.5
(2) -106.5
(3) -118.5
(4) -99.5

- Q3** If $2x - x^5 + y^2 - y = 0$, find $\frac{dy}{dx}$ at $x = 0$
- (1) 1 (2) 2
(3) -2 (4) Both 2 and 3

- Q4** If $y = \left(\frac{1}{z+1}\right)^2$, find $\frac{dz}{dy}$
- (1) $-2(z+1)^{-3}$
(2) $\frac{-1}{2}(z+1)^3$
(3) $-2(z+1)^{-1}$
(4) $\frac{-1}{2}(z+1)$

- Q5** Resultant of \vec{a} and \vec{b} is having magnitude $\sqrt{7}b$, then value of $\frac{b}{a}$ is:



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

- Q6** If $y = 2at$, $x = at^2$, then $\frac{d^2y}{dx^2} =$
- (1) $-\frac{1}{(t^2)}$ (2) $\frac{1}{(2at^3)}$
(3) $-\frac{1}{(t^3)}$ (4) $-\frac{1}{(2at^3)}$

- Q7** Find $\int_0^{\pi/2} (\sin\theta + \cos\theta) d\theta$
- (1) 1 (2) 0
(3) 2 (4) -1

- Q8** An army officer is planning a surveillance mission. The officer needs to send a drone from the base camp (located at the origin) directly towards the North-East (NE) direction to monitor two enemy checkpoints, one due North and one due East, both at equal distances from the base. For the drone's navigation, the officer assigns the East direction as the x-axis and the North direction as the y-axis. To ensure the drone flies exactly in the North-East direction, what should be the unit vector direction that the officer programs into the drone's navigation system?

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

- Q9** Value of $\int_0^2 4x^3 dx + \int_0^{\pi/2} \cos x dx$ is:
- (1) 16 (2) 15
(3) 17 (4) 18



Q10 Simplify the following, using binomial theorem

$$E = K \left[\left(1 + \frac{\Delta\theta}{\theta_0} \right)^4 - 1 \right], \text{ where}$$

$$\Delta\theta \ll \theta_0$$

(1) $\frac{2K\Delta\theta}{\theta_0}$

(2) $\frac{4K\Delta\theta}{\theta_0}$

(3) $\frac{6K\Delta\theta}{\theta_0}$

(4) Data is insufficient.

Q11 Let $\vec{C} = \vec{A} + \vec{B}$, then

(1) $|\vec{C}|$ is always greater than $|\vec{A}|$

(2) It is possible to have $|\vec{C}| < |\vec{A}|$ and

$$|\vec{C}| < |\vec{B}|$$

(3) C is always equal to $A + B$

(4) C is never equal to $A + B$

Q12 The adjacent sides of a rectangle with given perimeter as 100 cm and enclosing maximum area are:

(1) 100 cm and 40 cm

(2) 20 cm and 30 cm

(3) 25 cm and 25 cm

(4) 15 cm and 35 cm

Q13 If $\sqrt{3} |\vec{A} \times \vec{B}| = \vec{A} \cdot \vec{B}$. Find angle

between \vec{A} and \vec{B}

(1) 0° (2) 30°

(3) 45° (4) 90°

Q14 $\log 25 + \log 4 - \log 5$ is equal to

(1) 1.977 (2) 0.3010

(3) 1.3010 (4) 1

Q15 If $\frac{\sin \theta + \cos \theta}{\sin \theta - \cos \theta} = \frac{7}{3}$ then find $\sin^2 \theta$?

(1) $\frac{29}{25}$ (2) $\frac{25}{29}$

(3) $\frac{25}{4}$ (4) $\frac{4}{25}$

Q16 Approximate value of $\cos(2^\circ) + \sin(2^\circ)$ is:

(1) 4° (2) $\frac{\pi}{50}$

(3) $\frac{\pi}{90}$ (4) $1 + \frac{\pi}{90}$

Q17 An airplane is flying northeast (direction vector $\hat{i} + \hat{j}$). Air traffic control instructs the pilot to turn 45° to the left (anti-clockwise). What is the new direction vector?

(1) \hat{i}

(2) \hat{j}

(3) $\hat{i} - \hat{j}$

(4) $\hat{j} - \hat{i}$

Q18 Find the slope if a line whose co-ordinates are (m, n) and (q, p)

(1) $\frac{p-n}{q-n}$

(2) $\frac{p-n}{m-q}$

(3) $\frac{p-n}{q-m}$

(4) 0

Q19 Two vectors \vec{A} and \vec{B} are such that $\vec{A} + \vec{B} = \vec{C}$ and $A^2 + B^2 = C^2$. Which of the following statements is **correct**?

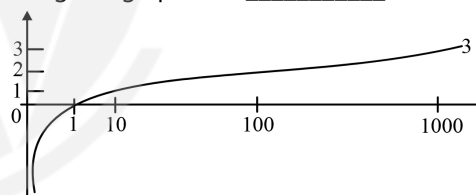
(1) \vec{A} is parallel to \vec{B} .

(2) \vec{A} is anti-parallel to \vec{B} .

(3) \vec{A} is perpendicular to \vec{B} .

(4) \vec{A} and \vec{B} are equal in magnitude.

Q20 The given graph is of _____ function.



(1) exponential

(2) logarithmic

(3) sine

(4) secant

Q21 If $\vec{A} = 2\hat{i} + \hat{j} + \hat{k}$, then the unit vector:

(1) orthogonal to \vec{A} is $\frac{\hat{j} + \hat{k}}{\sqrt{2}}$

(2) parallel to \vec{A} is $\frac{\hat{j} + \hat{k}}{\sqrt{2}}$

(3) orthogonal to \vec{A} is $\frac{\hat{k} - \hat{j}}{\sqrt{2}}$

(4) parallel to \vec{A} is $\frac{\hat{k} - \hat{j}}{\sqrt{2}}$



Q22 The equation of line making an angle 135° with positive x-axis and passing through a point (2, 3) will be:

- (1) $y = x - 5$
 (2) $y - x = 1$
 (3) $y = -x + 5$
 (4) $y - x = 5$

Q23 The maximum and minimum values of function $x^3 - 6x^2 + 9x$, are respectively.

- (1) 0, 27 (2) 27, 0
 (3) 0, 4 (4) 4, 0

Q24 Two vectors are given as $\vec{A} = 2\hat{i} - \hat{j} + 2\hat{k}$ and $\vec{B} = -\hat{i} - 2\hat{j} + 2\hat{k}$. Find a unit vector in the direction of the resultant vector $3\vec{A} - 2\vec{B}$

- (1) $\hat{R} = \frac{8\hat{i} + \hat{j} + 2\hat{k}}{\sqrt{69}}$
 (2) $\hat{R} = \frac{8\hat{i} - \hat{j} + 2\hat{k}}{\sqrt{69}}$
 (3) $\hat{R} = \frac{8\hat{i} - \hat{j} - 2\hat{k}}{\sqrt{69}}$
 (4) $\hat{R} = \frac{-8\hat{i} - \hat{j} - 2\hat{k}}{\sqrt{69}}$

Q25 What angle does $\hat{i} + \hat{j} + \sqrt{2}\hat{k}$ make with x-axis?

- (1) 30° (2) 60°
 (3) 45° (4) 90°

Q26 Find the area under the curve $y = 2x^2 - 4x + 6$, from $x = 2$ to $x = 4$.

- (1) $\frac{28}{3}$ (2) $\frac{76}{3}$
 (3) $\frac{78}{3}$ (4) $\frac{64}{3}$

Q27 Can the resultant of 2 vectors be zero:

- (1) Yes, when the 2 vectors are same in magnitude and direction.
 (2) No
 (3) Yes, when the 2 vectors are same in magnitude but opposite in sense.
 (4) Yes, when the 2 vectors are same in magnitude making an angle of $\frac{2\pi}{3}$ with each other.

Q28 If $x = \sin \theta - \cos \theta$, find

$$\left(\frac{d^2x}{d\theta^2}\right)^2 + \left(\frac{dx}{d\theta}\right)^2$$

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

Q29 Find the average value of $\sin^2 x$ over one complete cycle

- (1) 1 (2) 2
 (3) $\frac{1}{2}$ (4) 0

Q30 If $\vec{A} = \hat{i} + \hat{j} + \hat{k}$, $\vec{B} = 3\hat{i} + 2\hat{j} + \hat{k}$ and $\vec{C} = 2\hat{i} + \hat{j} - \hat{k}$, Find value of

- $2\vec{B} + \vec{C} - \vec{A}$
 (1) $3\hat{i} + 2\hat{j}$
 (2) $7\hat{i} + 4\hat{j}$
 (3) $3\hat{i} + 2\hat{j} - \hat{k}$
 (4) $7\hat{i} + 4\hat{j} - 2\hat{k}$

Q31 If $y = \cos u$, where $u = \sin x$, find $\frac{dy}{dx}$:

- (1) $-\sin u \cdot \cos x$
 (2) $-\sin u \cdot \sqrt{1 - u^2}$
 (3) $-\cos x \cdot \sqrt{1 - y^2}$
 (4) All of above

Q32 Find approximate value of $\sqrt{0.23}$

- (1) 0.42 (2) 0.44
 (3) 0.46 (4) 0.48

Q33 The resultant of two vectors A and B is perpendicular to the vector A and its magnitude is $\frac{\sqrt{3}}{2}$ times the magnitude of vector B . The angle between \vec{A} and \vec{B} is:

- (1) 30° (2) 60°
 (3) 90° (4) 120°

Q34 Find projection of \vec{A} on \vec{B} (Length only).

$$\vec{A} = \hat{i} + \hat{j} + \hat{k} \text{ and } \vec{B} = 4\hat{i} + 3\hat{j} + 5\hat{k}$$

- (1) $\frac{10}{5\sqrt{2}}$ unit (2) $\frac{11}{5\sqrt{2}}$ unit
 (3) $\frac{12}{5\sqrt{2}}$ unit (4) $\frac{13}{5\sqrt{2}}$ unit

Q35 Slope of given curve, $y = x^2 - 2x + 1$, at $x = 2$ will be:

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



Q36 Which term of series 3, 5, 7, 9, is 101?

- (1) 46 (2) 48
(3) 50 (4) 52

Q37 Find a unit vector perpendicular to $\hat{i} + \hat{j} - \hat{k}$ and $-2\hat{i} - 3\hat{j} + 5\hat{k}$.

- (1) $\frac{-2\hat{i} + 3\hat{j} - \hat{k}}{\sqrt{14}}$
(2) $\frac{2\hat{i} - 3\hat{j} - \hat{k}}{\sqrt{14}}$
(3) $\frac{2\hat{i} + 3\hat{j} + \hat{k}}{\sqrt{14}}$
(4) $\frac{2\hat{i} + 3\hat{j} - \hat{k}}{\sqrt{14}}$

Q38 Evaluate the following integral:

$$\int_0^{\frac{2e^3-2}{3}} \frac{1}{3x+2} dx$$

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

Q39 If 8 m and 3 m are two paths covered by a body in different directions, then which of the following cannot be resultant displacement.

- (1) 13 m (2) 6 m
(3) 9 m (4) 7 m

Q40 If roots of a quadratic equation are 3, -1. Then choose the **correct** quadratic equation.

- (1) $x^2 + 2x - 3 = 0$
(2) $x^2 - 2x - 3 = 0$
(3) $x^2 - 2x + 3 = 0$
(4) $x^2 + 2x + 5 = 0$

Q41 A student is asked to find the value of $\cos(15^\circ)$. Which of the following expressions *correctly* evaluates the given value?

- (1) $\cos(45^\circ) - \cos(30^\circ)$
(2) $\cos(45^\circ) \cos(30^\circ) - \sin(45^\circ) \sin(30^\circ)$
(3) $\sin(45^\circ) \sin(30^\circ) + \cos(45^\circ) \cos(30^\circ)$
(4) $\frac{\cos(30^\circ)}{2}$

Q42 If $y = 6\sqrt{x}$, then graph between x and y^2 is a:

- (1) circle (2) straight line
(3) parabola (4) hyperbola

Q43 Evaluate $\int (x^2 - \cos x + \frac{1}{x}) dx$

- (1) $x^3 - \sin x + \ln x + c$

(2) $2x^3 - \sin x + \ln x + c$

(3) $\frac{x^3}{3} + \sin x + \ln x + c$

(4) $\frac{x^3}{3} - \sin x + \ln x + c$

Q44 If $\vec{A} = (2\hat{i} - 3\hat{j} + 4\hat{k})$ and

$\vec{B} = (4\hat{i} - 6\hat{j} + 8\hat{k})$, then calculate

$(\vec{A} \times \vec{B})$

- (1) Null vector
(2) $-20\hat{k}$
(3) $9\hat{i} + 18\hat{j} + 9\hat{k}$
(4) $9\hat{i} - 3\hat{j} + 10\hat{k}$

Q45 Consider the following statements about vectors \vec{A} and \vec{B} :

A. The cross product $\vec{A} \times \vec{B}$ is perpendicular to both \vec{A} and \vec{B} .

B. The magnitude of the cross product $|\vec{A} \times \vec{B}|$ equals the area of the parallelogram formed by \vec{A} and \vec{B} .

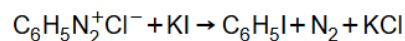
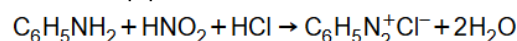
C. The dot product $\vec{A} \cdot (\vec{A} \times \vec{B})$ is always zero.

D. The cross product is commutative: $\vec{A} \times \vec{B} = \vec{B} \times \vec{A}$.

Which of the above statements are **correct**?

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

Q46 Iodobenzene is prepared from aniline ($C_6H_5NH_2$) in a two step process as shown here.



In an actual preparation, 9.30 g of aniline was converted to 15.6 g of iodobenzene. The percentage yield of iodobenzene is [Given: Atomic weight of I = 127 u]

- (1) 82.91% (2) 62.31%
(3) 76.47% (4) 45.63%



- Q47** Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:

Assertion A: The number of significant figures in 324000 is three.

Reason R: All zeros are significant in 324000.

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.

- Q48** Oxidation state of iron in brown ring complex $[\text{Fe}(\text{H}_2\text{O})_5(\text{NO})]\text{SO}_4$ is:

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

- Q49** A mixture of 3.011×10^{21} molecules of X and 1.5055×10^{21} molecules of Y weighs 0.688 g. If molar mass Y is 200 g mol^{-1} , what is the molar mass of X?

- (1) 24.6 g mol^{-1}
- (2) 12.9 g mol^{-1}
- (3) 42.8 g mol^{-1}
- (4) 37.6 g mol^{-1}

- Q50** Compound(s) in which chromium is **not** present in +6 oxidation state is/are:

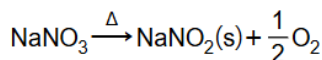
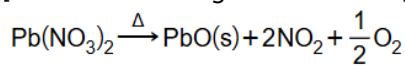
- I. $\text{K}_2\text{Cr}_2\text{O}_7$
- II. CrO_3
- III. CrO_5
- IV. Na_2CrO_4
- V. $\text{Cr}_2(\text{SO}_4)_3$
- VI. CrCl_2

- (1) III, V and VI
- (2) V and VI
- (3) II, III, V and VI
- (4) I, III, IV and V

- Q51** A solid mixture (5 g) consisting of lead nitrate and sodium nitrate was heated below 600°C until the weight of the residue was constant. If the loss in weight is 30%, then the amount of

lead nitrate present in the mixture is:

[Given: Atomic weight of Pb = 207 u]



- (1) 3.61 g
- (2) 1.42 g
- (3) 4.04 g
- (4) 2.83 g

- Q52** Equivalent weight (g/eq) of ammonia in the Haber's process is:

- (1) 9.33
- (2) 2.83
- (3) 4.66
- (4) 5.66

- Q53** What volume of CO_2 will be obtained at STP by thermal decomposition of 20 g CaCO_3 ? [Given: At. wt. of Ca = 40 u]

- (1) 5.62 L
- (2) 1.12 L
- (3) 4.48 L
- (4) 2.24 L

- Q54** 4 g of NaOH is dissolved in 18 g of H_2O . Mole fraction of NaOH in solution and molality of the solution respectively are:

- (1) 0.09, 55.55 m
- (2) 10, 5.55 m
- (3) 10, 55.55 m
- (4) 0.09, 5.55 m

- Q55** A gaseous mixture of H_2 and CO_2 gases contains 88% by mass of CO_2 . The vapour density of the mixture is:

- (1) 6.25
- (2) 3.92
- (3) 4.86
- (4) 5.36

- Q56** The **correct** order of decreasing oxidation number of sulphur is:

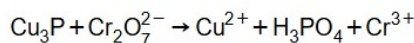
- (1) $\text{H}_2\text{S}_2\text{O}_8 > \text{SCl}_2 > \text{S}_8 > \text{H}_2\text{S}$
- (2) $\text{H}_2\text{S}_2\text{O}_8 > \text{SCl}_2 > \text{H}_2\text{S} > \text{S}_8$
- (3) $\text{S}_8 > \text{SCl}_2 > \text{H}_2\text{S} > \text{H}_2\text{S}_2\text{O}_8$
- (4) $\text{S}_8 > \text{H}_2\text{S} > \text{SCl}_2 > \text{H}_2\text{S}_2\text{O}_8$

- Q57** When a mixture of 15 moles of SO_2 and 16 moles of O_2 were reacted. 12 moles of SO_3 were formed at equilibrium. The number of moles of SO_2 and O_2 remained unreacted respectively are:

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

- Q58** In the following unbalanced redox reaction:





equivalent weight (g/eq) of H_3PO_4 is:

- (1) 12.25 (2) 19.6
(3) 49.0 (4) 24.5

Q59 44 g sample containing C, H and O on complete combustion given 88 g of CO_2 and 36 g of H_2O .

The molecular formula of the compound may be:

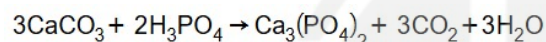
- (1) CHO_2 (2) $\text{C}_2\text{H}_6\text{O}$
(3) $\text{C}_2\text{H}_4\text{O}$ (4) $\text{C}_3\text{H}_6\text{O}$

Q60 Oxidation state of sulphur in Caro's acid is:

- (1) +4 (2) +6
(3) +5 (4) +2

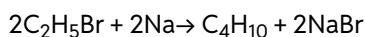
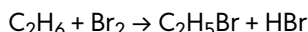
Q61 100 g sample of calcium carbonate reacts with 98 g of orthophosphoric acid. The amount of calcium phosphate that could be produced is:

[Given At. wt. Ca = 40 u, P = 31 u]



- (1) 120.42 g (2) 131.72 g
(3) 155.61 g (4) 103.33 g

Q62 n-butane is produced by monobromination of ethane followed by Wurtz's reaction. Calculate volume of ethane at STP required to produce 29 g n-butane, if the bromination takes place with 90% yield and the Wurtz's reaction with 80% yield.

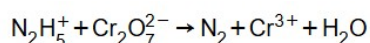


- (1) 51.32 L (2) 42.36 L
(3) 32.40 L (4) 30.91 L

Q63 100 mL of H_2SO_4 solution having molarity 1 M and density 1.2 g/mL is mixed with 500 mL of water. The final molarity of H_2SO_4 solution, if final density is 1.55 g/mL is:

- (1) 0.25 M (2) 0.56 M
(3) 0.32 M (4) 0.40 M

Q64 The number of moles of $\text{Cr}_2\text{O}_7^{2-}$ needed to oxidize 0.258 equivalent of N_2H_5^+ through the reaction is:



- (1) 0.086 (2) 0.027
(3) 0.039 (4) 0.043

Q65 If 72 g Mg and 64 g O_2 reacts to form MgO, then the residual mixture contains:

I. 16 g O_2

II. 120 g MgO

III. 160 g MgO

IV. 24 g Mg

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

Q66 Given below are two statements:

Statement I: MnO_4^- acts as the self indicator.

Statement II: $\text{Cr}_2\text{O}_7^{2-}$ is not a self indicator.

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.

Q67 Match List-I with List-II:

List-I		List-II	
(A)	1.6 g CH_4	(I)	6.022×10^{24} protons
(B)	17 g NH_3	(II)	6.022×10^{23} electrons
(C)	HCHO	(III)	Vapour density = 90
(D)	$\text{C}_6\text{H}_{12}\text{O}_6$	(IV)	Vapour density = 15

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

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

Q68 The **correct** statement regarding Br_3O_8 is:

- (1) All Br-atoms are in +6 oxidation state.
(2) All Br-atoms are in +4 oxidation state.
(3)

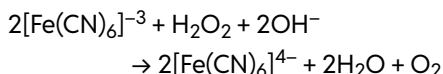


Two Br-atoms are in +6 oxidation state while one Br-atom is in +4 oxidation state.

- (4) Two Br-atoms are in +4 oxidation state while one Br-atom is in +6 oxidation state.

Q69 What would be the equivalent weight (g/eq) of reductant in the reaction?

[Atomic weight of Fe = 56 u]



- (1) 17 (2) 212
(3) 34 (4) 32

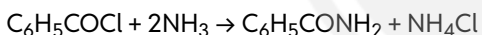
Q70 A certain amount of a reducing agent reduces x mole of KMnO_4 and y mole of $\text{K}_2\text{Cr}_2\text{O}_7$ in different experiments in acidic medium. If the change in oxidation state in reducing agent is same in both experiments, x : y is:

- (1) 5 : 3 (2) 3 : 5
(3) 6 : 5 (4) 5 : 6

Q71 Calculate the molality of 1 L solution of 80% H_2SO_4 (w/V), given that the density of the solution is 1.80 g mL^{-1} .

- (1) 8.16 m (2) 8.61 m
(3) 8.49 m (4) 8.94 m

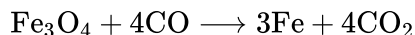
Q72 In the given reaction:



If 170 g of ammonia was reacted with 562 g of $\text{C}_6\text{H}_5\text{COCl}$ (MM = 140.5 g mol^{-1}) to give 342 g of $\text{C}_6\text{H}_5\text{CONH}_2$ (MM = 121 g mol^{-1}). The percentage yield of $\text{C}_6\text{H}_5\text{CONH}_2$ is:

- (1) 83.21% (2) 70.66%
(3) 50% (4) 25.31%

Q73 Magnetite, Fe_3O_4 , can be converted into metallic iron by heating with carbon monoxide as represented by this equation:



How many kilogram of Fe_3O_4 must be processed in this way to obtain 10 kg iron; if the process is 80% efficient?

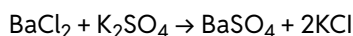
[Given: Molar mass of Fe_3O_4 = 232 g/mol]

- (1) 19.63 kg (2) 21.31 kg

- (3) 17.25 kg (4) 28.31 kg

Q74 87 g of K_2SO_4 is dissolved in 500 mL of solution. How many mL of this solution should be used so that 23.3 g of BaSO_4 is precipitated from BaCl_2 solution?

[Given: Molar mass of BaSO_4 = 233 g mol^{-1} and of K_2SO_4 = 174 g mol^{-1}]



- (1) 150 mL (2) 250 mL
(3) 100 mL (4) 300 mL

Q75 1 M HCl and 3 M HCl are mixed in the volume ratio 5 : 1. What is the final molarity of HCl solution?

- (1) 1.52 M (2) 1.03 M
(3) 1.23 M (4) 1.33 M

Q76 In alkaline medium, ClO_2 oxidises H_2O_2 to O_2 and itself gets reduced to Cl^- . How many moles of H_2O_2 are oxidised by 0.5 mole of ClO_2 ?

- (1) 1.5 (2) 2.5
(3) 1.25 (4) 2.25

Q77 When 10 g of 80% pure limestone [$\text{CaCO}_3(\text{s})$] is heated, the volume of CO_2 liberated at STP is:

- (1) 179.2 L (2) 0.1792 L
(3) 17.92 L (4) 1.792 L

Q78 Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:

Assertion A: Nitride ion cannot act as an oxidising agent.

Reason R: Nitrogen in nitride ion is present in its maximum oxidation state.

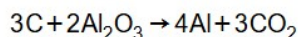
In the light of the above statements, choose the **correct** answer from the options given below:

- (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.

Q79 The mass of carbon consumed in the production of 432 g of Al metal from bauxite (Al_2O_3) by Hall

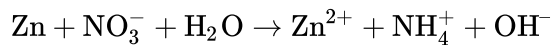


process is:



- (1) 36 g (2) 108 g
(3) 144 g (4) 432 g

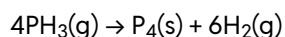
Q80 For the redox reaction,



sum of coefficients of Zn, NO_3^- and OH^- in the balanced equation is:

- (1) 15 (2) 14
(3) 16 (4) 10

Q81 100 mL of PH_3 on heating forms P_4 and H_2 , volume changes in the reaction is:



- (1) an increase of 50 mL
(2) an increase of 100 mL
(3) an increase of 150 mL
(4) a decrease of 50 mL

Q82 Match List-I with List-II:

List-I		List-II	
(A)	0.1 mol of $\text{SO}_2(\text{g})$	(I)	Occupy 11.2 L at STP
(B)	1 g of $\text{H}_2(\text{g})$	(II)	Weighs 48 g
(C)	1 mole of $\text{O}_3(\text{g})$	(III)	Total number of atoms = $0.3 N_A$
(D)	1 g molecule of $\text{O}_2(\text{g})$	(IV)	Weighs 32 g

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

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

Q83 A compound on analysis, was found to have the sodium = 14.31%, Sulphur = 9.97%, Oxygen = 69.50% and Hydrogen = 6.22%. The molecular formula of the compound is, assuming that

whole of hydrogen in the compound is present as water of crystallisation. [Molar mass of the compound is equals to empirical formula mass]

- (1) $\text{Na}_2\text{SO}_4 \cdot 8\text{H}_2\text{O}$ (2) $\text{Na}_2\text{SO}_4 \cdot 14\text{H}_2\text{O}$
(3) $\text{Na}_2\text{SO}_4 \cdot 7\text{H}_2\text{O}$ (4) $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$

Q84 In which of the following, oxidation state of carbon is same as that of present in $\text{C}_6\text{H}_{12}\text{O}_6$?

- (1) CH_2Cl_2 (2) CH_4
(3) CCl_4 (4) HCOOH

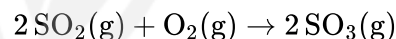
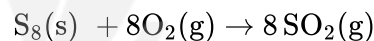
Q85 Hydrated sulphate of a bivalent metal of atomic weight 63.55 u loses 36.06% of its weight on dehydration. Number of molecules of water of crystallisation in the formula of hydrated salt is:

- (1) 7 (2) 5
(3) 8 (4) 4

Q86 Which one of the following reaction is **not** a redox reaction?

- (1) $\text{CuSO}_4 + 4\text{NH}_3 \rightarrow [\text{Cu}(\text{NH}_3)_4]\text{SO}_4$
(2) $\text{SnCl}_2 + 2\text{FeCl}_3 \rightarrow \text{SnCl}_4 + 2\text{FeCl}_2$
(3) $\text{MnO}_2 + 4\text{HCl} \rightarrow \text{MnCl}_2 + \text{Cl}_2 + 2\text{H}_2\text{O}$
(4) $2\text{CuSO}_4 + 4\text{KI} \rightarrow \text{Cu}_2\text{I}_2 + 2\text{K}_2\text{SO}_4 + \text{I}_2$

Q87 Sulphur trioxide is prepared by the following two reactions:



How many molecules of SO_3 are produced from 5 moles of S_8 ?

- (1) $8 N_A$ (2) $10 N_A$
(3) $5 N_A$ (4) $40 N_A$

Q88 Given below are two statements:

Statement I: Iron in Fe_3O_4 is present in two different oxidation state.

Statement II: Average oxidation state of sulphur in tetrathionate ion is +2.5.

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.

Q89 An organic compound contains 49.30% carbon, 6.84% hydrogen and rest is oxygen. Empirical formula of the compound is:

- (1) $C_3H_6O_2$ (2) $C_6H_{10}O_4$
 (3) C_6H_9O (4) $C_3H_5O_2$

Q90 The equivalent weight of $MnSO_4$ is half of its molecular weight, when it converts to:

- (1) Mn_2O_3 (2) MnO_2
 (3) MnO_4^- (4) MnO_4^{2-}

Q91 Select the **incorrect** statement(s) with respect to the plasma membrane of a eukaryotic cell.

- (I) Polar tail of saturated hydrocarbons is found towards the aqueous environment.
 (II) Peripheral proteins can be easily extracted and can be found on both surfaces of the membrane.
 (III) Partially buried proteins can also be easily extracted, so considered as peripheral proteins.
 (IV) The integral proteins can span only one lipid layer or both lipid layers.
 (V) The proportion of protein and lipid varies considerably in different cell types.

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

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

Q92 To visualize bivalent most clearly under a microscope, one should observe cells at which specific stage of meiosis?

- (1) Pachytene, in which crossing over takes place.
 (2) Zygotene, when homologous chromosomes are pairing.
 (3) Diplotene, after the dissolution of the synaptonemal complex.
 (4) Metaphase I, when bivalents are at the equatorial plate.

Q93 The development of frogs is indirect, while that of cockroaches is paurometabolous. What is the key distinction between these two developmental patterns?

- (1) The frog's life cycle includes a pupal stage, while the cockroach's does not.
 (2) The frog's larva (tadpole) is morphologically very different from the adult, while the cockroach nymph resembles the adult.
 (3) The cockroaches undergo complete metamorphosis, while the frogs undergo incomplete metamorphosis.
 (4) The frogs moult to grow, while the cockroaches do not.

Q94 The antennal sockets of a cockroach are located:

- (1) behind the eyes.
 (2) in the thorax region.
 (3) at the posterior end of the head.
 (4) in front of the eyes.

Q95 A tissue sample observed under a microscope shows multinucleated, cylindrical fibres arranged in parallel bundles. This tissue is responsible for which of the following actions?

- (1) Movement of food through the alimentary canal.
 (2) Pumping of blood.
 (3) Movement of the forelimbs in humans.
 (4) Constriction of blood vessels.

Q96 Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:

Assertion A: Plant cells undergo cytokinesis by a different mechanism than the animal cytokinesis.

Reason R: Plant cells are enclosed by a relatively inextensible cell wall.

In the light of the above statements, choose the most appropriate 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.

Q97 In a typical cell, during which phase of the cell cycle is the nucleo-cytoplasmic ratio at its lowest?

- (1) Early G_1 phase (2) Late S phase
- (3) G_2 phase (4) Late G_1 phase

Q98 A key event in frog digestion occurs in the duodenum, where pancreatic juice and bile are received. The bile, which is produced by the liver and stored in the gall bladder, plays a crucial role in:

- (1) the digestion of carbohydrates into monosaccharides.
- (2) the emulsification of fats, breaking large globules into smaller droplets.
- (3) the chemical breakdown of proteins into amino acids.
- (4) the secretion of HCl to maintain an acidic environment.

Q99 During the dissection of a male cockroach, a student identifies a prominent mushroom-shaped gland in the posterior abdomen. This structure is part of the:

- (1) excretory system, for storing uric acid.
- (2) digestive system, for secreting enzymes.
- (3) nervous system, as a major ganglion.
- (4) reproductive system, as an accessory gland.

Q100 If a diploid cell of an organism has a DNA content of 20 picograms (pg) in the G_1 phase, what would be the DNA content in the gametes formed by this cell, and the zygote formed by the fusion of such gametes, respectively?

- (1) 20 pg and 10 pg
- (2) 20 pg and 20 pg
- (3) 10 pg and 20 pg
- (4) 20 pg and 40 pg

Q101 The tendons and ligaments are both dense regular connective tissue. The primary distinction is that:

- (1) Tendons attach skeletal muscles to bones, and ligaments attach one bone to another.
- (2) Tendons contain fibroblasts, while ligaments do not.
- (3) Tendons are found beneath the skin, while ligaments are found around organs only.
- (4) Tendons have a semi-fluid ground substance, while ligaments have a solid matrix.

Q102 In which of the following pairs do both structures serve a primarily sensory function?

- (1) Antennae of a cockroach and vocal sacs of a frog.
- (2) Anal cerci of cockroach and nictitating membrane of frog.
- (3) Compound eyes of the cockroach and the tympanum of the frog.
- (4) Maxillary palps of the cockroach and the copulatory pad of the frog.

Q103 A significant difference between mitotic anaphase and meiotic anaphase I is that:

- (1) In mitotic anaphase, chromosomes decondense, while in anaphase I, they remain condensed.
- (2) In mitotic anaphase, sister chromatids separate, while in anaphase I, homologous chromosomes separate.
- (3) In mitotic anaphase, the cell becomes haploid, while in anaphase I, the cell remains diploid.
- (4) Spindle fibres are involved in anaphase I but not in mitotic anaphase.

Q104 Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:

Assertion A: The Golgi apparatus remains in close association with the endoplasmic reticulum.

Reason R: Materials to be packaged in the form of vesicles from the ER fuse with the *trans* face of the Golgi apparatus and move towards the maturing *cis* face.

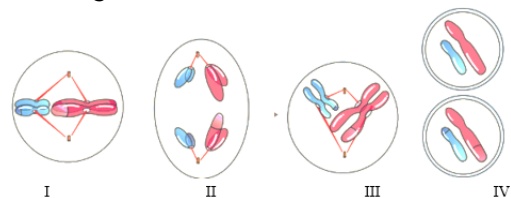
In the light of the above statements, choose the most appropriate answer from the options given below:

- (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.

Q105 Given below are the stages of meiosis II. Choose the option that shows the **correct** sequence of these stages:



- (1) I → II → III → IV
 (2) III → I → II → IV
 (3) III → II → I → IV
 (4) IV → III → II → I

Q106 A tissue is characterised by cells compactly packed with little intercellular matrix and having a free surface. This tissue, however, has a limited role in secretion and absorption but protects against mechanical stress. This tissue is most likely:

- (1) simple cuboidal epithelium.
 (2) compound epithelium.
 (3) dense irregular connective tissue.
 (4) glandular epithelium.

Q107 A student observes a connective tissue where collagen fibres are present in rows between many parallel bundles of fibres. This arrangement is characteristic of:

- (1) tissue present in the skin.
 (2) tissue that attaches bone to bone.
 (3) tissue that forms a support framework for epithelium.
 (4) tissue that stores fats beneath the skin.

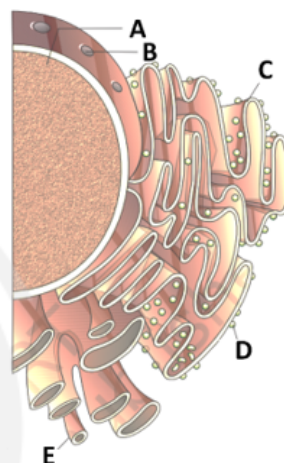
Q108 Select the **odd** one out w.r.t the prominent endocrine glands in frogs.

- (1) Gonads
 (2) Adrenal glands
 (3) Pancreatic islets
 (4) Spleen

Q109 Which of the following features are common in both chloroplasts and mitochondria?

- (1) Presence of a double membrane.
 (2) Presence of circular DNA molecule and ribosomes.
 (3) Their number can vary in different cell types and species.
 (4) Called as the powerhouse of the cell as they both produce ATP.

Q110 Identify the **incorrect** statement regarding given figure.



- (1) C is frequently observed in cells actively involved in protein synthesis and secretion, whereas E, in animal cells, is involved in the synthesis of lipid-like steroidal hormones.
 (2) B is formed by the fusion of two nuclear membranes and facilitates the movement of RNA and protein molecules in both directions between the nucleus and the cytoplasm.
 (3) A refers to the matrix that contains the nucleolus and chromatin, and it is absent in prokaryotic cells.
 (4) D is a non-membrane-bound organelle that can be found only on the endoplasmic reticulum, and within chloroplasts and mitochondria in eukaryotic cells.

Q111 Which of the following organelles may possess ribosomes and are part of endomembrane system?

- (1) Mitochondria
 (2) Endoplasmic reticulum



- (3) Microbodies
(4) Chloroplasts

- Q112** The term "poikilotherm" describes an organism whose body temperature varies with the environment. This is a physiological condition, not an adaptation. Which of the following is an adaptation to deal with this condition?
- (1) Having a three-chambered heart.
(2) Lacking a diaphragm.
(3) Hibernating in winter and aestivating in summer.
(4) Having oval shaped red blood cells.
- Q113** A researcher is studying a tissue sample. The cells are fusiform, unstriated, and uninucleate. They are held together by cell junctions and bundled in a connective tissue sheath. Where would this tissue most likely be found?
- (1) The biceps muscle of a human arm.
(2) The wall of heart in a frog.
(3) The wall of heart in a cockroach.
(4) The wall of intestine in a human.
- Q114** Read the following statements w.r.t. *Rana tigrina*.
- (I) The forelimbs and hind limbs help in swimming, walking, leaping and burrowing.
(II) Oesophagus is a long tube that opens into the stomach.
(III) Food is captured by the bilobed tongue.
(IV) The ovaries are situated near kidneys and there is a functional connection with kidneys.
- Which of the above statements are **incorrect**?
- (1) I and II only
(2) II and III only
(3) III and IV only
(4) II and IV only
- Q115** Given below are two statements:
- Statement I:** The mesosomes in bacteria help in DNA replication, cell wall formation, respiration, secretion processes, and in increasing the surface area of the plasma membrane and enzymatic content.

Statement II: In bacteria, mesosomes are formed by the extensions of the plasma membrane into the cytoplasm. In cyanobacteria, other membranous extensions into the cytoplasm are called chromatophores, which contain pigments. 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.

Q116 Match **List-I** with **List-II**.

List-I		List-II	
(A)	Kinetochores	(I)	Holds sister chromatids together
(B)	Centromere	(II)	Precursor to the middle lamella
(C)	Spindle Fibers	(III)	Composed of tubulin, moves chromosomes
(D)	Cell Plate	(IV)	Disc-shaped structure for microtubule attachment

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

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

- Q117** The inner lining of the bronchioles requires the movement of mucus in a specific direction. This function is carried out by a specific type of epithelium. Which of the following **correctly** identifies this tissue and its key cellular feature?
- (1) Simple squamous epithelium, characterised by flattened cells for easy diffusion.



- (2) Compound epithelium, providing multi-layered protection.
- (3) Ciliated epithelium (columnar or cuboidal), possessing motile cilia on its free surface.
- (4) Glandular epithelium, specialised for secreting lubricating fluids.

Q118 Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:

Assertion A: In the cockroach, the crop is also called as proventriculus.

Reason R: The crop is a sac-like structure in which the oesophagus opens, and it is used for storing food.

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

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

Q119 An anatomical feature unique to male cockroaches, which is absent in females and assists in copulation, is the presence of:

- (1) a pair of anal cerci on the 10th segment.
- (2) a hardened, chitinous head capsule.
- (3) a pair of short, thread-like anal styles.
- (4) three pairs of walking legs on the thorax.

Q120 Match List-I with List-II.

List-I		List-II	
(A)	Fimbriae	(I)	Thin filamentous extensions from the cell wall and responsible for motility in bacteria
(B)	Pili	(II)	Hair-like outgrowths of the cell membrane in bacteria
(C)	Bacterial Flagellum	(III)	Elongated tubular structures made of

			a special protein
(D)	Cilium	(IV)	Bristle-like fibres sprouting out of the bacterial cell that help in attachment

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

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

Q121 Which of the following is **not** correct regarding the significance of meiosis?

- (1) It restores the diploid phase of sexually reproducing organisms.
- (2) It increases the genetic variability in the population of organisms from one generation to the next.
- (3) It ensures the production of the haploid phase in the life cycle of sexually reproducing organisms.
- (4) It is involved in gametogenesis in plants and animals.

Q122 Given below are two statements:

Statement I: In cockroaches, the sperms are transferred in a bundle called, spermatophores, which are discharged during copulation.

Statement II: In female cockroaches, each ovary is formed of a group of eight ovarian tubules or ovarioles.

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.



Q123 Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:

Assertion A: In cockroaches, the fertilised eggs are encased in capsules called oothecae.

Reason R: Oothecae in cockroaches provides a protective environment for the developing embryo.

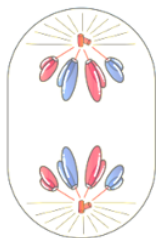
In the light of the above statements, choose the **correct** answer from the options given below:

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

Q124 Which of the following is **incorrect** regarding cytokinesis?

- (1) In animal cells, it is centripetal, while in plant cells, it is centrifugal.
- (2) During cytoplasmic division, organelles like mitochondria and plastids get distributed between the two daughter cells.
- (3) In plant cells, wall formation starts from lateral walls and grows toward the centre of the cell.
- (4) Cytokinesis in animal cells is achieved by the appearance of a furrow in the plasma membrane.

Q125 Identify the **correct** feature regarding the phase of cell cycle shown in the given diagram.



- (1) At this stage, the identity of chromosomes as discrete elements is lost.
- (2) At this stage, the nucleolus, Golgi complex, and endoplasmic reticulum reform.
- (3) At this stage, each chromosome moves away from the equatorial plate.
- (4) It represents anaphase I.

Q126 If the head of a cockroach is cut off, it will still live for as long as one week.

Choose the statement that **does not** support the fact mentioned in the above statement.

- (1) The nervous system of a cockroach is spread throughout the body.
- (2) The nervous system of a cockroach consists of a series of fused, segmentally arranged ganglia joined by paired longitudinal connectives on the ventral side.
- (3) In the cockroach, three ganglia lie in the thorax, and six in the abdomen.
- (4) The brain of the cockroach is represented by the sub-oesophageal ganglion.

Q127 In cockroaches, the malpighian tubules are lined by glandular and ciliated cells, which absorb nitrogenous waste products and convert them into urea.

Consider the above statement and choose the **correct** answer from the options given below:

- (1) The statement is correct about the cells present in the malpighian tubules, but incorrect about the function.
- (2) The statement is incorrect about the cells present in the malpighian tubules, but correct about the function.
- (3) The statement is correct for both the cells present in the malpighian tubules and their function.
- (4) The statement is incorrect for both the cells present in the malpighian tubules and their function.

Q128 A scientist is tracking a glycoprotein and glycolipids that are destined for secretion from a eukaryotic cell. Which of the following cell organelles or structures are *not* directly involved in its synthesis, modification, or transport from origin to exit?

- (1) Golgi apparatus
- (2) Rough endoplasmic reticulum
- (3) Smooth endoplasmic reticulum
- (4) Lysosomes

Q129 Match **List I** with **List II** w.r.t. to the cockroach.



	List I		List II
(A)	Upper lip	(I)	Sclerites
(B)	Lower lip	(II)	Hypopharynx
(C)	Acts as Tongue	(III)	Labrum
(D)	Hardened plates	(IV)	Labium

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

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

Q130 Given below are two statements:

Statement I: Many species of cockroaches are wild and cannot transmit a variety of bacterial diseases by contaminating food material.

Statement II: In cockroaches, the ejaculatory duct opens into male gonopore situated dorsal to anus.

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.

Q131 Select the **incorrect** statements regarding the prokaryotic cell envelope.

- (1) The glycocalyx differs in composition and thickness among different bacteria.
- (2) When the glycocalyx is present as a loose sheath, it is called the capsule.
- (3) The cell wall determines the shape of the cell and prevents the bacterium from bursting or collapsing.
- (4) Based on their response to the Gram stain, bacteria are classified as Gram positive or

Gram negative, which is dependent on the differences in their cell envelopes.

Q132 Match **List-I** with **List-II** w.r.t chromosome.

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

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

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

Q133 Given below are two statements:

Statement I: Polar molecules cannot pass through the nonpolar lipid bilayer. Water can diffuse across the membrane through osmosis.

Statement II: Both lysosomes and vacuoles are endomembrane structures, yet they differ in terms of their functions.

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

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



Q134 Select the **incorrect** statement regarding a prokaryotic cell:

- (1) The genetic material is basically naked and not enclosed within a nuclear membrane.
- (2) In addition to the genomic DNA, all bacteria have small circular DNA outside the genomic DNA.
- (3) Some bacteria possess phosphate granules and cyanophyceyan granules that are not membrane-bound and lie freely in the cytoplasm.
- (4) Gas vacuoles are found in cyanobacteria.

Q135 Why are sensory papillae **not** considered a well-organised structure in frogs?

- (1) They are not connected to nerves.
- (2) They lack cellular structure.
- (3) They are only found in the tympanum.
- (4) They are cellular aggregations around nerve endings.

Q136 A mature female frog can lay 2500 to 3000 ova at a time, and the fertilisation is internal.

Consider the above statement and choose the **correct** answer from the options given below:

- (1) The statement is true for both the number of ova and fertilisation.
- (2) The statement is false for both the number of ova and fertilisation.
- (3) The statement is true for the number of ova but false for fertilisation.
- (4) The statement is false for the number of ova but true for fertilisation.

Q137 Match **List-I** with **List-II**:

List-I		List-II	
(A)	Antonie Von Leeuwenhoek	(I)	Presence of cell wall is unique to plant cells
(B)	Flemming	(II)	First observed the granular structures under the electron microscope as dense particles

(C)	Theodore Schwann	(III)	Stained material of the nucleus by the basic dyes
(D)	George Palade	(IV)	First saw and described a living cell

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

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

Q138 A bacterial cell divides in every 20 minutes. How many divisions are required for a single bacterial cell to produce 128 cells (Considering each daughter cells grows and further divide)?

- (1) 7
- (2) 6
- (3) 8
- (4) 5

Q139 Which of the following statements about nephrocytes in the cockroach is **correct**?

- (1) They secrete digestive enzymes.
- (2) They help in absorbing nutrients.
- (3) They serve a scavenging function, removing harmful substances.
- (4) They control water balance through osmoregulation.

Q140 Which of the following options is related to the fact that, male frogs have a combined urinogenital duct, unlike females?

- (1) It simplifies excretion in aquatic environments.
- (2) It reduces the reproductive load on the kidneys.
- (3) It facilitates the simultaneous discharge of urine and sperm via a common duct.
- (4) It increases the filtration efficiency of the nephrons.

Q141 In the life cycle of a male honey bee, cell divisions for growth of the body and for the formation of gametes are, respectively:

- (1) Meiosis and Mitosis
- (2) Mitosis and Meiosis
- (3) Mitosis and Mitosis



(4) Meiosis and Meiosis

Q142 Syncytium is found in:

- (1) in liquid endosperm of coconut, due to cytokinesis not being followed by interkinesis.
- (2) in sieve tube cells, due to karyokinesis not being followed by cytokinesis.
- (3) in liquid endosperm, due to karyokinesis not being followed by cytokinesis.
- (4) in sieve tube cells, due to cytokinesis not being followed by karyokinesis.

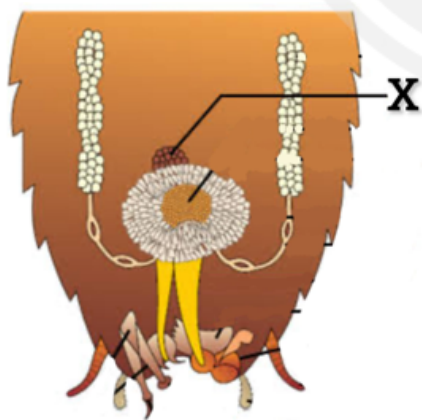
Q143 Which of the following shows the **correct** segmentation for the given structures in a female cockroach?

- (1) Ovaries: 4th-6th segments
- (2) Spermatheca: 6th segment
- (3) Brood pouch formation: 7th, 8th, 9th terga
- (4) Anal cerci: 9th segment

Q144 Find the **incorrect** match w.r.t frog.

- (1) Sinus venosus- Joins left atrium
- (2) Conus arteriosus- Ventral side of heart
- (3) Renal portal system- Special venous connection between the kidney and lower parts of the body
- (4) RBCs- Nucleated

Q145 Refer to the diagram given below.



Identify 'X'

- (1) Pseudopenis
- (2) Anal cercus
- (3) Phallic gland
- (4) Spermatheca

Q146 A researcher is studying three organisms.

Organism 'X' is uricotelic and 'Y' is ureotelic.

Which option is a plausible identity for X and Y?

- (1) X-Frog, Y-Cockroach
- (2) X-Cockroach, Y-Frog
- (3) X-Tadpole, Y-Frog
- (4) X-Cockroach, Y-Tadpole

Q147 Which of the following pair of organisms possess both 70S and 80S ribosomes?

- (1) Mycoplasma and plants
- (2) PPLO and Gram-positive bacteria
- (3) Blue-green and purple and green photosynthetic bacteria
- (4) Fungi and Protists

Q148 Which of the following is **incorrect** regarding interkinesis?

- (1) No DNA replication occurs during this stage.
- (2) Interkinesis is immediately followed by metaphase II.
- (3) It is generally short-lived.
- (4) It is the stage between the two meiotic divisions.

Q149 What is the **correct** path of deoxygenated blood flow in frogs?

- (1) Vena cava → Sinus venosus → Right atrium
- (2) Renal portal vein → Kidney → Conus arteriosus
- (3) Conus arteriosus → Right atrium → Sinus venosus
- (4) Sinus venosus → Left atrium → Ventricle

Q150 Which of the following features is **correct** regarding eukaryotic flagella?

- (1) It composed of three parts – filament, hook and basal body
- (2) They are covered with plasma membrane.
- (3) All axonemal microtubules are present in the form of doublets as the 9+2 array.
- (4) Radial spokes connect one peripheral doublets to other peripheral doublets.

Q151 Given below are different cells or organisms.

- (i) Mycoplasmas



(II) Human red blood cells

(III) Typical bacteria

(IV) Viruses

Identify the **correct** option with increasing order of their size.

(1) I, IV, III, II

(2) IV, III, I, II

(3) IV, I, III, II

(4) III, I, IV, II

Q152 Identify the **incorrect** statements regarding the G_0 stage:

(I) Cells in this stage are metabolically active but no longer proliferate unless required.

(II) G_0 is an inactive stage where cells permanently exit the cell cycle.

(III) Cells enter this stage after completing the M phase.

(IV) Heart cells are examples of cells that remain in this stage.

(V) Cells in this stage can come back and continue with the cell cycle when conditions like the need to replace cells lost due to injury or cell death arise.

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

(1) I and IV only

(2) II and III only

(3) II, IV and V only

(4) I, III and V only

Q153 A comparison is made between the tissue lining the alveoli of the lungs and the tissue lining the kidney's collecting ducts. The alveolar lining is simple squamous epithelium while the duct lining is simple cuboidal. Why are these different epithelial types optimal for their respective locations?

(1) The flattened squamous cells provide an extremely short diffusion distance for rapid gas exchange, whereas the larger cuboidal cells are better suited for the metabolic processes involved in secretion and absorption.

(2) The squamous cells are better at providing protection, while the cuboidal cells are more flexible.

(3) Both tissues are primarily for protection; the shape difference is incidental.

(4) The squamous cells can stretch more easily, while the cuboidal cells are rigid.

Q154 The hindbrain of frogs consists of:

(1) cerebellum and medulla oblongata.

(2) cerebrum, pons and medulla oblongata.

(3) cerebellum, olfactory lobes and medulla oblongata.

(4) cerebellum, a pair of optic lobe and medulla oblongata.

Q155 Which of the following statements provides the most precise description of the nuclear components and their state within an interphase eukaryotic cell?

(1) The nucleus contains highly condensed and distinct chromosomes, a membrane-bound nucleolus for rRNA synthesis, and a single-layered nuclear envelope with pores.

(2) The nucleus contains a loose and indistinct network of nucleoprotein fibres called chromatin, one or more non-membranous spherical bodies called nucleoli, and a double-membraned envelope interrupted by pores.

(3) The nucleus is filled with nucleoplasm containing distinct chromatin fibres and a nucleolus, which is the site for the synthesis of both mRNA and rRNA, all enclosed by a selectively permeable nuclear envelope.

(4) The nucleus contains circular DNA molecules known as chromosomes, a large central nucleolus that occupies most of the nuclear volume, and a nuclear envelope that is continuous with the plasma membrane.

Q156 How many of the following structures are present in the anterior part of the brood or genital pouch in female cockroaches?

Anal cerci, Female gonopore, Titillator, Caudal style, Spermathecal pores, Collateral glands

(1) Three

(2) Four



(3) Five

(4) Six

Q157 Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:

Assertion A: Neural tissue exerts the greatest control over the body's responsiveness to changing conditions.

Reason R: When a neuron is suitably stimulated, an electrical disturbance is generated, this disturbance at the neuron's endings, or output zone, triggers events that may cause stimulation or inhibition of adjacent neurons and other cells. In the light of the above statements, choose the **correct** answer from the options given below:

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

Q158 The recombination nodules on homologous chromosomes during meiosis characterise:

- (1) sites at which crossing over occurs.
- (2) formation of the synaptonemal complex.
- (3) formation of a tetrad.
- (4) non-crossing over sites.

Q159 Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:

Assertion A: A cell which is actively carrying out protein synthesis possesses larger and more numerous nucleoli.

Reason R: Nucleolus is a site for active protein synthesis.

In the light of the above statements, choose the most appropriate 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.

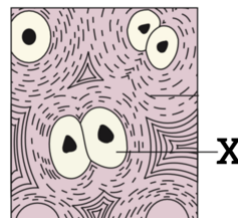
Q160 Match List-I with List-II.

List-I		List-II	
(A)	Membrane-bound minute vesicle containing enzymes	(I)	Thylakoid
(B)	Many flat, disc-shaped sacs, arranged parallel to each other	(II)	Cisternae
(C)	Flattened membranous sacs present inside chloroplasts	(III)	Microbodies
(D)	Membrane-bound organelle surrounded by the tonoplast	(IV)	Vacuole

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

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

Q161 Refer to the given diagram below:



In which of the following connective tissues 'X' is found?

- (1) Tendons
- (2) Ligaments
- (3) Bones
- (4) Cartilages

Q162 Which of the following represents the **correct** sequence of layers in a plant cell from outside to inside?

- (1) Middle lamella → Secondary cell wall → Primary cell wall → Plasma membrane
- (2) Secondary cell wall → Middle lamella → Primary cell wall → Plasma membrane



- (3) Middle lamella → Primary cell wall → Secondary cell wall → Plasma membrane
 (4) Middle lamella → Primary cell wall → Plasma membrane → Secondary cell wall

Q163 Which of the following statements best describes the urinary bladder of the frogs?

- (1) It is a muscular structure located dorsal to the rectum and opens into the intestine.
- (2) It is a thin-walled structure present ventrally to the rectum and opens into the cloaca.
- (3) It is a glandular organ associated with reproductive functions in male frogs.
- (4) It stores both urine and faeces before expulsion through the cloaca.

Q164 Given below are two statements:

Statement I: The Golgi cisternae are concentrically arranged near the nucleus with distinct *cis* and *trans* face. The *cis* and *trans* face of the organelle are entirely different and not interconnected.

Statement II: ER helps in the transport of substances, synthesis of proteins, lipoproteins and glycogen.

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.

Q165 Consider the following statements w.r.t cockroaches.

- I. The phallomere represents the male external genitalia.
- II. Oviducts of each ovary unite into a single median oviduct, which opens into the genital chamber.
- III. In male cockroaches, gonapophyses are chitinous, asymmetrical structures.

IV. A pair of spermatheca is present in the 6th abdominal segment.

V. The next-to-last nymphal stage has wings.

How many of the above statements are **correct**?

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

Q166 In which of the following phases are the chromosomes fully condensed for the first time, and the meiotic spindle assembled to prepare the homologous chromosomes for separation?

- (1) Diplotene
- (2) Diakinesis
- (3) Metaphase I
- (4) Anaphase I

Q167 Which statement accurately contrasts the respiratory adaptations of a frog and a cockroach?

- (1) The frog uses gills throughout its life, while the cockroach uses a tracheal system.
- (2) The cockroach relies on cutaneous respiration, while the frog relies on spiracles.
- (3) The frog can use lungs and moist skin for gas exchange, while the cockroach uses a network of air tubes (trachea).
- (4) Both organisms rely on their circulatory systems to transport oxygen from the respiratory surface to the tissues.

Q168 Select the **correct** sequence of events during Prophase I of meiosis:

- (1) Terminalisation of chiasmata → Crossing over → Disappearance of nucleolus → Synapsis
- (2) Synapsis → Terminalisation of chiasmata → Disappearance of nucleolus → Crossing over
- (3) Disappearance of nucleolus → Synapsis → Terminalisation of chiasmata → Crossing over
- (4) Synapsis → Crossing over → Terminalisation of chiasmata → Disappearance of nucleolus

Q169 A student observes that the forewings of a cockroach, the tegmina, are opaque and leathery, while the hind wings are transparent and membranous. This structural difference is directly related to their functions, which are:

- (1) forewings for active flight; hind wings for balancing.



- (2) forewings for protecting the hind wings at rest; hind wings for generating lift during flight.
- (3) both pairs of wings are used equally for generating lift during flight.
- (4) forewings for camouflage; hind wings for producing sound.

Q170 Identify the **incorrectly** matched pair:

- (1) Prophase II – Initiated only after chromosomes get fully elongated
- (2) Interkinesis – Between the two meiotic divisions
- (3) Prophase I – Typically longer and more complex than mitotic prophase
- (4) Anaphase II – Separated sister chromatids move toward opposite poles

Q171 Identify the **incorrect** statements from the following:

- (1) The cytoplasm is the main arena of cellular activities in both plant and animal cells.
- (2) In both prokaryotic and eukaryotic cells, a semi-fluid matrix called cytoplasm occupies the volume of the nucleus.
- (3) The plant cell has a cell wall as the delimiting structure of the cell.
- (4) No organelles, like the ones in eukaryotes, are found in prokaryotic cells except for ribosomes.

Q172 Which of the following statements **correctly** describe the events of prophase in mitosis?

- (I) It is marked by the initiation of chromosomal condensation, but DNA molecules are not distinct and are intertwined.
- (II) Each centrosome, which had duplicated during the S phase, radiates out microtubules called asters.
- (III) The Golgi complex, endoplasmic reticulum, and nucleolus disappear at the end of this phase.
- (IV) The nuclear envelope remains fully intact throughout this phase.
- (V) Chromosomal material untangles and becomes compact and visible.

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

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

Q173 If a frog's skin were to become dry and impermeable, the most immediate threat to its life would be:

- (1) inability to escape predators.
- (2) starvation.
- (3) dehydration.
- (4) Both (1) and (2)

Q174 Which of the following statements is **correct** regarding adhering junctions?

- (1) They facilitate the cells to communicate with each other by connecting the cytoplasm of adjoining cells.
- (2) They help to stop substances from leaking across a tissue.
- (3) They transfer the ions, small molecules and sometimes big molecules in the adjoining cells.
- (4) They perform cementing to keep neighbouring cells together.

Q175 If the number of chromosomes in a root tip cell is 16 ($2n$) and the amount of DNA is $2C$, what will be the number of chromosomes and DNA content in each cell formed after meiosis I and meiosis II, respectively?

- (1) 16 and $2C$; 8 and C
- (2) 8 and $2C$; 8 and C
- (3) 16 and $4C$; 8 and C
- (4) 8 and C ; 8 and C

Q176 Which of the following processes leads to the reduction of the number of sets of chromosomes to half?

- (1) Separation of homologous chromosomes
- (2) Splitting of centromere
- (3) Crossing over
- (4) Synapsis



Q177 If epithelial cells are deficient in tight junctions, which of the following conditions is most likely to occur?

- (1) Hormone overproduction
- (2) Adheres the adjacent cells together
- (3) Seepage of materials between tissue compartments
- (4) Disrupted neural signalling

Q178 The ground substance (matrix) in connective tissue is mainly composed of:

- (1) lipids.
- (2) modified polysaccharides.
- (3) simple sugars.
- (4) nucleic acids.

Q179 Which of the following statements are **incorrect** about mitotic division?

- (I) It increases the genetic variability in the population of organisms.
- (II) It has a significant role in cell repair.
- (III) Mitosis can occur in both diploid and haploid cells.
- (IV) It ensures the identical genetic complement in daughter cells.
- (V) It disturbs the nucleo-cytoplasmic ratio.

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

- (1) I and V only
- (2) I and III only

(3) I, III, and V only

(4) II and IV only

Q180 Match **List I** with **List II**:

List I		List II	
(A)	A defect in ciliated epithelium	(I)	Areolar tissue
(B)	Fibres loosely arranged in a semi-fluid ground substance	(II)	Fluid connective tissue
(C)	The site of production of blood cells	(III)	Prevents transport of ova
(D)	The main circulating fluid that helps in the transport of various substances	(IV)	Bone marrow of some bones

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

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



SPACE FOR ROUGH WORK



PW Web/App - <https://smart.link/7wwosivoicgd4>

Library- <https://smart.link/sdfez8ejd80if>