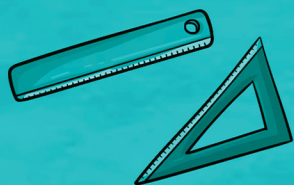Includes Statistical Analysis of All shifts
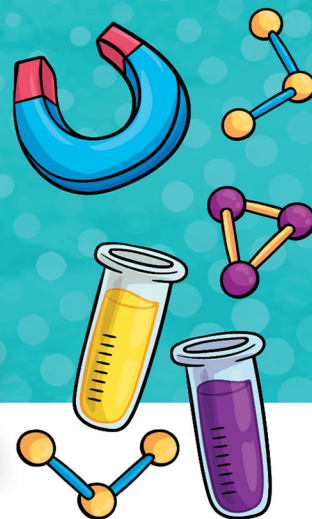
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MHT-CET PCB

SOLVED PAPERS

2025

- Self-Assessment Scorecard
- Smart Keys : Thinking Hatke, Smart Code & Caution

Contains 13 Authentic papers conducted in 2025

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MHT-CET (PCB)
SOLVED PAPERS - 2025

All 13 papers conducted in 2025

Salient Features:

- **Authentic MHT-CET 2025 Papers:** 13 MHT-CET question papers of Physics, Chemistry and Biology.
- **Trend analysis:**
  - ➢ **Tables:** Chapter-wise weightage analysis of all shifts.
  - ➢ **Graphs:** Visual representation of difficulty levels for papers of each shift.
- **Concept Mapping:** Each question is mapped to the respective chapter and subtopic in the solution section for better comprehension.
- **Smart Keys:** Thinking Hatke, Caution, Smart Tip, Smart Code
- **Self-Assessment Scorecards**

Printed at: **Print to Print,** Mumbai

PREFACE

At **Target Publications**, our close connection with students has provided us with valuable insight into the challenges they face while preparing for competitive exams like **MHT-CET**. This inspired us to create one of the **earliest and most trusted MHT-CET books**, setting a benchmark in exam-oriented publishing.

Continuing this legacy, we now present the **'MHT-CET (PCB) Solved Papers – 2025'**, a comprehensive compilation of **13 official question papers** conducted by the **State Common Entrance Test Cell**, covering **Physics, Chemistry, and Biology** across all shifts.

Why This Book Is a Must-Have!

✓ **100% Authentic Papers**
· Directly from the actual exams, with no guesswork.

✓ **Smart, Concept-Focused Solutions**
· Answers provided for all questions; solutions wherever deemed necessary

✓ **Concept Mapping:**
· Each question is mapped to the respective chapter and subtopic in the solution section for better comprehension.
· Questions requiring multiple concepts are marked as "Multifarious."

✓ **Essential Problem-Solving Aids**
· **Thinking Hatke:** Boosts critical thinking
· **Caution:** Highlights common mistakes
· **Smart Tips:** Techniques for quicker problem-solving
· **Smart Code:** Handy mnemonics to remember important concepts

✓ **Self-Assessment Scorecards**
· Track your preparation progress like a topper and identify areas to improve.

✓ **Statistical and Graphical Insights of all the shifts:**
· Chapter Wise Weightage Analysis
· Difficulty Level Breakdown

This book is a comprehensive guide to MHT-CET success. We're confident it will be an invaluable tool in your preparation.

We'd love to hear from you—whether it's feedback, suggestions, or just your thoughts. Please reach out to us at: mail@targetpublications.org

Publisher
Edition: Third

MHT-CET PAPER PATTERN

- There will be three papers of Multiple Choice Questions (MCQs) in 'Mathematics', 'Physics and Chemistry' and 'Biology' of 100 marks each.
- Duration of each paper will be 90 minutes.
- Questions will be based on Syllabus of State Council of Educational Research and Training, Maharashtra with approximately 20% weightage given to Std. XI and 80% weightage will be given to Std. XII curriculum.
- Difficulty level of questions will be at par with JEE (Main) for Mathematics, Physics, Chemistry and at par with NEET for Biology.
- There will be no negative marking.
- Questions will be mainly application based.
- Details of the papers are as given below:

Paper	Subject(s)	No. of MCQs based on		Mark(s) Per Question	Total Marks	Duration in Minutes
		Std XI	Std XII			
Paper I	Mathematics	10	40	2	100	90
Paper II	Physics	10	40	1	100	90
	Chemistry	10	40			
Paper III	Biology	20	80	1	100	90

- Questions will be set on
i. the entire syllabus of Std. XII of Physics, Chemistry, Mathematics and Biology subjects prescribed by State Council of Educational Research and Training, Maharashtra and
ii. chapters / units from Std. XI curriculum prescribed by State Council of Educational Research and Training, Maharashtra as mentioned below:

Sr. No.	Subject	Chapters / Units of Std. XI
1	Physics	Vectors, Error Analysis, Motion in a plane, Laws of Motion, Gravitation, Thermal properties of matter, Sound, Optics, Electrostatics, Semiconductors
2	Chemistry	Some Basic Concepts of Chemistry, Structure of Atom, Chemical Bonding, Redox Reactions, Elements of Group 1 and 2, States of Matter (Gaseous and Liquids), Adsorption and Colloids (Surface Chemistry), Hydrocarbons, Basic Principles of Organic Chemistry, Chemistry in Everyday Life
3	Mathematics	Trigonometry - II, Straight Line, Circle, Probability, Complex Numbers, Permutations and Combinations, Functions, Limits, Continuity, Conic Section
4	Biology	Biomolecules, Respiration and Energy Transfer, Human Nutrition, Excretion and Osmoregulation

INDEX

PHYSICS

Chapter-wise Analysis of MHT-CET 2025 Exam Papers

Ch. no.	Std.	Chapter name	9th April (Shift I)	9th April (Shift II)	11th April (Shift I)	11th April (Shift II)	12th April (Shift I)	12th April (Shift II)	13th April (Shift I)	13th April (Shift II)	15th April (Shift I)	15th April (Shift II)	16th April (Shift I)	16th April (Shift II)	17th April (Shift 1)	Total
	11th	Vectors	1	1	1	1	2	1	1	1	1	2	1	0	0	13
	11th	Error Analysis	1	1	1	1	1	1	1	1	1	1	1	1	2	14
3	11th	Motion in a Plane	1	2	0	2	2	1	2	1	1	1	1	1	1	16
4	11th	Laws of Motion	1	1	1	1	0	1	1	2	2	0	1	1	1	13
5	11th	Graviation	1	1	0	1	1	1	1	1	1	1	1	1	1	12
7	11th	Thermal Properties of Matter	1	1	1	1	1	1	1	1	1	1	2	1	2	15
8	11th	Sound	1	1	0	2	1	2	1	1	1	1	1	3	1	16
9	11th	Optics	1	1	1	1	1	1	1	1	1	1	1	1	1	13
10	11th	Electrostatics	0	0	1	1	2	1	2	1	1	1	1	1	1	13
14	11th	Semiconductors	1	1	0	2	1	1	0	1	1	1	1	1	1	12
1	12th	Rotational Dynamics	3	2	4	2	2	3	2	2	2	2	3	3	3	33
2	12th	Mechanical Properties of Fluids	3	3	4	3	3	3	3	3	2	3	3	2	3	38
3	12th	Kinetic Theory of Gases and Radiation	3	2	3	3	3	3	3	4	4	4	2	3	2	39
4	12th	Thermodynamics	2	3	1	2	2	2	1	1	2	2	2	2	2	24
5	12th	Oscillations	3	3	3	3	3	3	3	3	3	3	3	4	3	40
6	12th	Superposition of Waves	3	3	4	3	4	2	3	3	3	3	2	3	3	39
7	12th	Wave Optics	3	3	3	2	2	3	3	3	3	2	4	3	3	37
8	12th	Electrostatics	4	3	4	3	2	3	3	3	3	4	3	1	3	39
9	12th	Current Electricity	2	2	2	2	2	2	2	2	2	2	2	2	2	26
10	12th	Magnetic Fields due to Electric Current	2	3	2	3	2	2	2	2	2	2	3	3	2	30
11	12th	Magnetic Materials	1	1	1	0	1	1	1	1	1	1	0	1	1	11
12	12th	Electromagnetic Induction	3	3	3	3	3	3	4	3	3	2	4	2	3	39
13	12th	AC Circuits	3	3	3	3	3	3	3	3	3	4	3	4	3	41
14	12th	Dual Nature of Radiation and Matter	2	2	4	2	2	2	3	1	2	2	2	2	2	28
15	12th	Structure of Atoms and Nuclei	2	2	1	2	2	2	1	2	2	2	1	2	2	23
16	12th	Semiconductor Devices	2	2	2	1	2	2	2	3	2	2	2	2	2	26
		Total	50	50	50	50	50	50	50	50	50	50	50	50	50	650

PHYSICS

Difficulty level-wise Analysis of MHT-CET 2025 Exam Papers

Legend: ■ Easy ■ Medium ■ Difficult

X-axis categories: 09th April (Shift I), 09th April (Shift II), 11th April (Shift I), 11th April (Shift II), 12th April (Shift I), 12th April (Shift II), 13th April (Shift I), 13th April (Shift II), 15th April (Shift I), 15th April (Shift II), 16th April (Shift I), 16th April (Shift II), 17th April (Shift I)

Y-axis: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45

E – Easy: Questions whose answers can be directly and easily answered by the information given in Std. XI and XII Textbooks.

M – Medium: These questions require students to identify and apply the appropriate concepts which they studied from Std. XI and XII Textbooks.

D – Difficult: The most Challenging Questions that require application of various concepts and encourage students to think beyond the information given in the textbooks.

Analysis

➤ **Analysis of questions by difficulty level:** Although the proportion of easy, medium, and difficult questions varies amongst the thirteen papers, the number of medium questions is slightly higher than easy questions, with a few difficult questions. This indicates that the entrance exam emphasises a lot on understanding and application of concepts. Students are advised to focus on the application of formulae, concepts along with thorough revision while preparing for the entrance exam.

CHEMISTRY

Chapter-wise Analysis of MHT-CET 2025 Exam Papers

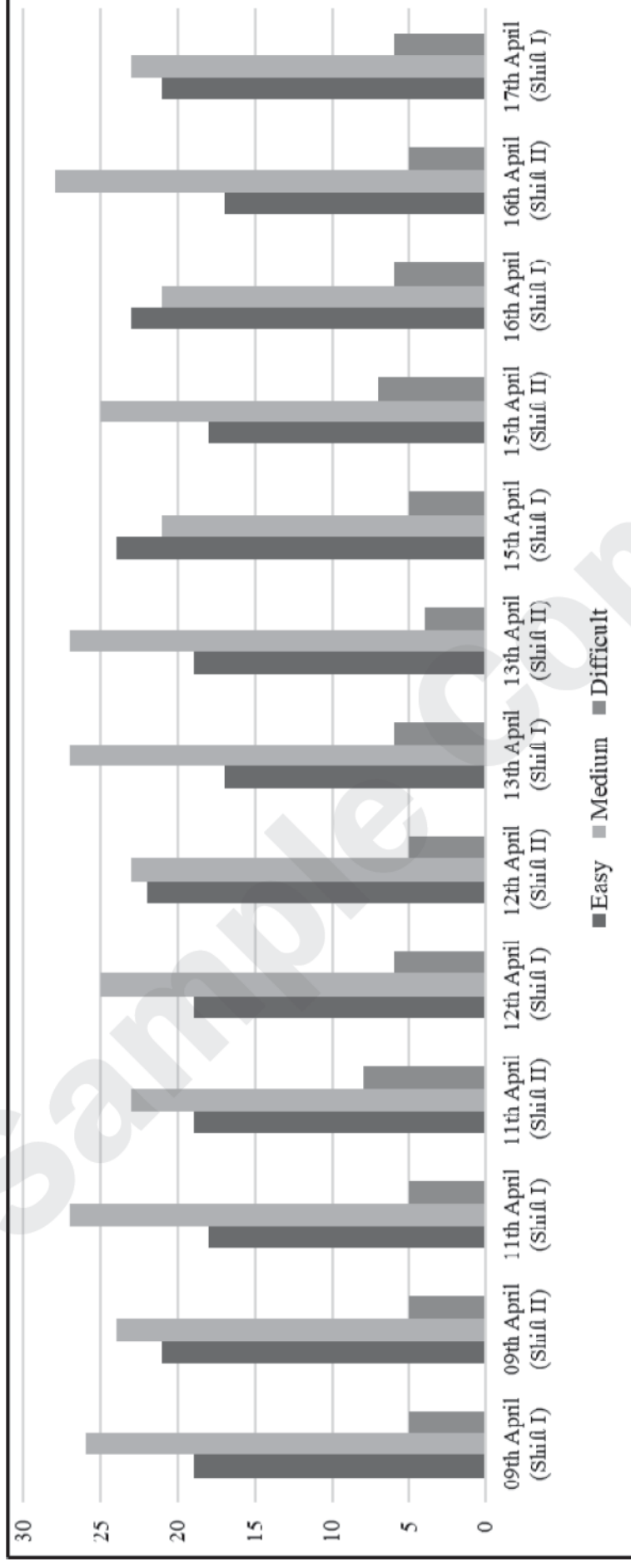| Ch. no.	Std.	Chapter name	9th April (Shift I)	9th April (Shift II)	11th April (Shift I)	11th April (Shift II)	12th April (Shift I)	12th April (Shift II)	13th April (Shift I)	13th April (Shift II)	15th April (Shift I)	15th April (Shift II)	16th April (Shift I)	16th April (Shift II)	17th April (Shift I)	Total
1	11th	Some Basic Concepts of Chemistry	1	1	1	1	1	1	1	1	1	1	1	1	1	13
4	11th	Structure of Atom	1	1	1	1	1	1	1	1	1	1	1	1	1	13
5	11th	Chemical Bonding	1	1	1	1	1	1	1	1	1	1	1	1	1	13
6	11th	Redox Reactions	1	1	1	1	1	1	1	1	1	1	1	1	1	13
8	11th	Elements of Group 1 and Group 2	1	1	1	1	1	1	1	1	1	1	1	1	1	13
10	11th	States of Matter: Gaseous and Liquid States	1	1	1	1	1	1	1	1	1	1	1	1	1	13
11	11th	Adsorption and Colloids	1	1	1	1	1	1	1	1	1	1	1	1	1	13
14	11th	Basic Principles of Organic Chemistry	1	1	1	1	1	1	1	1	1	1	1	1	1	13
15	11th	Hydrocarbons	1	1	1	1	1	1	1	1	1	1	1	1	1	13
16	11th	Chemistry in Everyday Life	1	1	1	1	1	1	1	1	1	1	1	1	1	13
1	12th	Solid State	3	3	3	3	3	3	3	3	3	3	3	3	3	39
2	12th	Solutions	3	3	3	3	3	3	3	3	3	3	3	3	3	39
3	12th	Ionic Equilibria	3	3	3	3	3	3	3	3	3	3	3	3	3	39
4	12th	Chemical Thermodynamics	3	3	3	3	3	3	3	3	4	3	3	3	3	40
5	12th	Electrochemistry	3	3	3	3	3	3	3	3	3	2	3	3	3	38
6	12th	Chemical Kinetics	3	3	3	3	3	3	3	3	3	3	3	3	3	39
7	12th	Elements of Groups 16, 17 and 18	2	2	2	2	2	2	2	2	1	2	2	2	2	25
8	12th	Transition and Inner Transition Elements	2	2	2	2	2	2	2	2	2	2	2	2	2	26
9	12th	Coordination Compounds	2	2	2	2	2	2	2	2	2	3	2	2	2	27
10	12th	Halogen Derivatives	3	3	3	3	3	3	3	3	3	3	3	3	3	39
11	12th	Alcohols, Phenols and Ethers	3	3	3	3	3	3	3	3	3	3	3	3	3	39
12	12th	Aldehydes, Ketones and Carboxylic Acids	3	3	3	3	3	3	3	3	3	3	3	3	3	39
13	12th	Amines	2	2	2	2	2	2	2	2	2	2	2	2	2	26
14	12th	Biomolecules	2	2	2	2	2	2	2	2	2	2	2	2	2	26
15	12th	Introduction to Polymer Chemistry	2	2	2	2	2	2	2	2	2	2	2	2	2	26
16	12th	Green Chemistry and Nanochemistry	1	1	1	1	1	1	1	1	1	1	1	1	1	13
		Total	50	50	50	50	50	50	50	50	50	50	50	50	50	650

CHEMISTRY

Difficulty level-wise Analysis of MHT-CET 2025 Exam Papers

Chart legend: ■ Easy ■ Medium ■ Difficult

X-axis categories: 09th April (Shift I), 09th April (Shift II), 11th April (Shift I), 11th April (Shift II), 12th April (Shift I), 12th April (Shift II), 13th April (Shift I), 13th April (Shift II), 15th April (Shift I), 15th April (Shift II), 16th April (Shift I), 16th April (Shift II), 17th April (Shift I)

Y-axis scale: 0, 5, 10, 15, 20, 25, 30

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D – Difficult: The most Challenging Questions that require application of various concepts and encourage students to think beyond the information given in the textbooks.

Analysis

➢ **Analysis of questions by difficulty level:** Although the proportion of easy, medium, and difficult questions varies amongst the thirteen papers, more numbers of easy and medium questions are asked, with a few difficult questions. This demonstrates that the entrance exam places a strong emphasis on careful reading, comprehension of the text and application of principles. When studying for the entrance exam, it is advisable that students pay close attention to each chapter, concentrate on comprehending various chemical reactions, and practice solving numerical problems.

BIOLOGY

Chapter-wise Analysis of MHT-CET 2025 Exam Papers

Ch. no.	Std.	Chapter name	9th April (Shift I)	9th April (Shift II)	11th April (Shift I)	11th April (Shift II)	12th April (Shift I)	12th April (Shift II)	13th April (Shift I)	13th April (Shift II)	15th April (Shift I)	15th April (Shift II)	16th April (Shift I)	16th April (Shift II)	17th April (Shift I)	Total
6	11th	Biomolecules	4	4	4	3	4	4	3	3	4	3	4	4	4	48
13	11th	Respiration and Energy Transfer	5	5	5	4	5	5	5	5	5	6	5	5	5	65
14	11th	Human Nutrition	5	5	6	5	5	5	4	6	6	4	5	5	5	66
15	11th	Excretion and Osmoregulation	6	6	4	5	6	6	6	6	6	5	6	6	6	74
1	12th	Reproduction in Lower and Higher Plants	7	7	5	6	6	6	6	6	6	6	5	6	6	78
2	12th	Reproduction in Lower and Higher Animals	6	6	7	6	6	6	6	7	5	8	7	6	6	82
3	12th	Inheritance and Variation	4	5	4	5	5	5	5	5	5	5	5	5	3	61
4	12th	Molecular Basis of Inheritance	5	5	5	6	5	5	5	5	5	6	5	5	7	69
5	12th	Origin and Evolution of Life	5	5	6	5	5	5	5	5	5	6	5	5	5	67
6	12th	Plant Water Relation	5	4	5	5	5	5	5	5	5	5	5	3	5	62
7	12th	Plant Growth and Mineral Nutrition	5	5	5	5	5	5	6	6	5	5	5	7	5	69
8	12th	Respiration and Circulation	8	9	8	9	8	8	7	7	8	7	9	8	8	104
9	12th	Control and Co-ordination	9	9	9	9	9	9	11	9	9	9	8	9	9	118
10	12th	Human Health and Diseases	4	4	4	4	4	4	5	5	4	3	4	4	4	53
11	12th	Enhancement of Food Production	5	5	5	5	5	5	4	4	5	5	5	6	5	64
12	12th	Biotechnology	5	5	5	5	5	5	5	5	5	4	5	4	5	63
13	12th	Organisms and Populations	4	4	5	5	4	4	4	4	4	5	4	4	4	55
14	12th	Ecosystems and Energy Flow	4	3	4	4	4	4	4	4	4	4	4	4	4	51
15	12th	Biodiversity, Conservation and Environmental Issues	4	4	4	4	4	4	4	3	4	4	4	4	4	51
		Total	100	100	100	100	100	100	100	100	100	100	100	100	100	1300

BIOLOGY

Difficulty level-wise Analysis of MHT-CET 2025 Exam Papers

Legend: ■ Easy ■ Medium ■ Difficult

Chart categories (x-axis): 09th April (Shift I), 09th April (Shift II), 11th April (Shift I), 11th April (Shift II), 12th April (Shift I), 12th April (Shift II), 13th April (Shift I), 13th April (Shift II), 15th April (Shift I), 15th April (Shift II), 16th April (Shift I), 16th April (Shift II), 17th April (Shift I)

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This indicates that the entrance exam emphasizes on careful reading, comprehension of the text and application of concepts. Students are advised to study each chapter thoroughly and apply the scientific knowledge of the studied concepts while preparing for the entrance exam.

99. Identify P and Q regions in the diagram of histology of alimentary canal and identify the type of tissue.
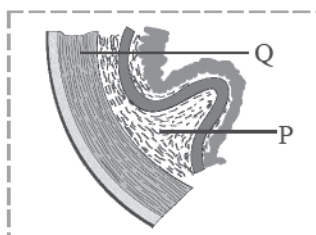
(A) P – Submucosa – loose connective tissue
Q – Circular muscle layer – Smooth muscles

(B) P – Mucosa – Mesothelium
Q – Muscularis – Straited muscles

(C) P – Serosa – Squamous epithelium
Q – Muscularis – Smooth muscles

(D) P – Mucosa – epithelium with microvilli
Q – Longitudinal muscle layer – Striated muscles

100. Which one of the following is NOT a cyanobacterial biofertilizer?
(A) *Anabaena*   (B) *Nostoc*
(C) *Oscillatoria*   (D) *Rhizobium*

MHT-CET - 2025 9th April (Shift – I) Scorecard		
Subject	**Total Number of correct answers**	**Total Marks**
Physics		(Out of 50)
Chemistry		(Out of 50)
Biology		(Out of 100)
Total		(Out of 200)

[*Each Question carries 1 Mark, there is no negative marking.*]

32. **(D)** Std.12 | Ch-3

3.15 Stefan-Boltzmdnn Law of Radiation

For any two bodies of radii R_1 and R_2, kept at temperatures T_1 and T_2, the power radiated or rate of loss of heat by them can be given as, $\dfrac{Q_1}{Q_2} = \left(\dfrac{R_1}{R_2}\right)^2 \times \left(\dfrac{T_1}{T_2}\right)^4$

∴ For same power,

$\left(\dfrac{R_1}{R_2}\right)^2 = \left(\dfrac{T_2}{T_1}\right)^4$

∴ $\left(\dfrac{R_1}{R_2}\right) = \left(\dfrac{T_2}{T_1}\right)^2 = \left(\dfrac{T_2}{2T_2}\right)^2 = \dfrac{1}{4}$

⇒ $R_2 = 4R_1$

33. **(B)** Std.12 | Ch-8

Multifarious
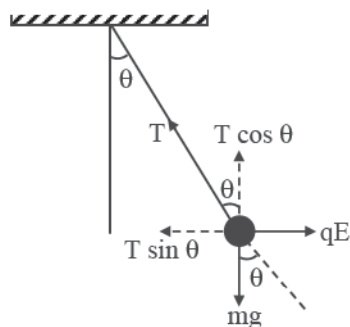
At equilibrium,

$T\cos\theta = mg$ ….(i)

$T\sin\theta = qE$ ….(ii)

From equations (i) and (ii),

$\tan\theta = \dfrac{qE}{mg}$

$q = 2 \times 10^{-6}$ C, $E = 1000$ V/m, $m = 2 \times 10^{-3}$ kg

∴ $\tan\theta = \dfrac{2\times10^{-6}\times1000}{2\times10^{-3}\times10}$

∴ $\tan\theta = 0.1$

∴ $\theta = \tan^{-1}(0.1)$

34. **(B)** Std.12 | Ch-5

5.6 Amplitude(A), Period(T) and Frequency (n) of S.H.M.

We know,

$T = 2\pi\sqrt{\dfrac{M}{k}}$ …(given)

After increasing the mass $T' = 2\pi\sqrt{\dfrac{M+m}{k}}$

∴ $\dfrac{T'}{T} = \sqrt{\dfrac{M+m}{M}} = \dfrac{4}{3}$ …($T' = \dfrac{4}{3}T$)

∴ $\dfrac{M+m}{M} = \dfrac{16}{9}$

∴ $1 + \dfrac{m}{M} = \dfrac{16}{9} \Rightarrow \dfrac{m}{M} = \dfrac{16}{9} - 1 = \dfrac{7}{9}$

∴ $\dfrac{M}{m} = \dfrac{9}{7}$

35. **(B)** Std.12 | Ch-14

14.5 De Broglie Hypothesis

de-Broglie wavelength for proton, $\lambda_1 = \dfrac{h}{mv}$

⇒ $v = \dfrac{h}{m\lambda_1}$ …(i)

Kinetic Energy of proton:

$E_p = \dfrac{1}{2}mv^2 = \dfrac{1}{2}m\left(\dfrac{h}{m\lambda_1}\right)^2$ … [From (i)]

$E_p = \dfrac{1}{2}\dfrac{h^2}{m\lambda_1^2}$

$\lambda_1 = \sqrt{\dfrac{h^2}{2mE_P}}$ …(ii)

Now, Energy of photon (Given: E),

∴ $E = \dfrac{hc}{\lambda_2} \Rightarrow \lambda_2 = \dfrac{hc}{E}$ …(iii)

Dividing equation (iii) by (ii), we get:

$\dfrac{\lambda_2}{\lambda_1} = \dfrac{\dfrac{hc}{E}}{\dfrac{h}{\sqrt{2mE_P}}}$

Since $E = E_P$ …(given)

∴ $\dfrac{\lambda_2}{\lambda_1} = \dfrac{\dfrac{hc}{E}}{\dfrac{h}{\sqrt{2mE}}} = \dfrac{\sqrt{2mc}}{\sqrt{E}}$

⇒ $\dfrac{\lambda_2}{\lambda_1} \propto \dfrac{1}{\sqrt{E}}$

36. **(B)** Std.12 | Ch-4

4.7 Thermodynamic Process.

For an adiabatic process,

$TP^{\frac{1-\gamma}{\gamma}} = $ constant …(i)

For diatomic gas,

$\gamma = \dfrac{7}{5}$

∴ $\dfrac{1-\gamma}{\gamma} = -\dfrac{2}{7}$

$TP^{-2/7} = $ constant

⇒ $P \propto T^{7/2}$

∴ $c = \dfrac{7}{2}$

50. **(B)** Std.12|Ch-3
3.9 Solubility product

For PbI_2,

$PbI_{2(s)} \rightleftharpoons Pb^{2+}_{(aq)} + 2I^-_{(aq)}$
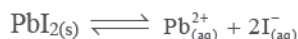
$x = 1, y = 2$

$\therefore \quad K_{sp} = x^x y^y S^{x+y} = (1)^1 (2)^2 S^{1+2} = 4S^3$

$\therefore \quad S = \sqrt[3]{\dfrac{K_{sp}}{4}} = \sqrt[3]{\dfrac{2.8 \times 10^{-8}}{4}} = \sqrt[3]{\dfrac{28 \times 10^{-9}}{4}}$

$= 1.912 \times 10^{-3}$ mol dm^{-3}.

BIOLOGY

1. **(C)** Std.12 | Ch - 10
10.1 Immunity

2. **(B)** Std.12 | Ch - 1
1.6 Pollination

In maize, prop roots (X) provide support, styles (Y) are part of the female flower, and tassel (Z) is the male inflorescence.

3. **(A)** Std.12 | Ch - 3
3.11 Sex determination

Human males have heteromorphic (XY) and females have homomorphic (XX) chromosomes.

4. **(C)** Std.11 | Ch – 15
15.5 Composition of Urine

In severe haemorrhage, ADH stimulates increased water reabsorption and leads to reduced urine volume.

5. **(C)** Std.12 | Ch - 8
8.3 Mechanism of respiration

i. The rate of formation of H_2CO_3 (carbonic acid) is faster in RBCs and slower in plasma as RBCs contain **carbonic anhydrase**, which catalyzes the conversion of CO_2 and H_2O to H_2CO_3.
ii. Carbonic anhydrase is primarily present in erythrocytes.
iii. The prosthetic group of carbonic anhydrase is Zn^{2+}.

6. **(B)** Std.12 | Ch - 10
10.2 Structure of Antibody

P: $I^A I^B$ gives AB blood group (A and B antigens, no antibodies). Q: $I^O I^O$ gives no antigens. R: $I^A I^O$ has antibody b.

7. **(B)** Std.12 | Ch - 13
13.4 Population

8. **(C)** Std.12 | Ch - 8
8.13 Heart

Left ventricle is thicker for systemic circulation. Columnae carneae are present in ventricles, not in atria.

9. **(B)** Std.12 | Ch - 14
14.5 Ecological Succession

Succession leads to an increase in total biomass, species diversity, and organism numbers.

> ***Smart tip - Q.9***
> Remember: In succession, everything goes UP – diversity, number and biomass – Never down! So, when you see "decrease in biomass," it's the odd one out.

10. **(B)** Std.12 | Ch - 12
12.2 Principles and Processes of Biotechnology

A PCR cycle (denaturation, annealing, extension) typically takes 3 – 4 minutes depending on the polymerase and conditions employed.

11. **(B)** Std.12 | Ch - 9
9.6 Human Nervous System

The pineal gland was found to produce melatonin which helps in regulating circadian rhythms.

12. **(D)** Std.12 | Ch - 6
6.12 Transpiration

Cactus uses CAM photosynthesis, closing stomata during the day to reduce water loss, unlike lotus, mango, and grass.

13. **(C)** Std.12 | Ch - 2
2.12 Birth Control

Termination after 20 weeks is restricted in India according to section 3 of the MTP Act 2017.

14. **(B)** Std.11 | Ch - 6
6.2 Biomolecules in the cell

In graphical representation of enzyme activity, the Y-axis always represents velocity of the reaction (rate of product formation).

15. **(D)** Std.12 | Ch - 1
1.6 Pollination

16. **(C)** Std.11 | Ch - 13
13.2 Anaerobic respiration

ATP is formed during the conversion of phosphoenol pyruvate to pyruvate via pyruvate kinase in glycolysis.

17. **(C)** Std.11 | Ch - 15
15.2 Excretory system in human being

18. **(D)** Std.12 | Ch - 4
4.5 Protein synthesis

A point mutation (single nucleotide change) in the haemoglobin gene causes sickle cell anaemia.
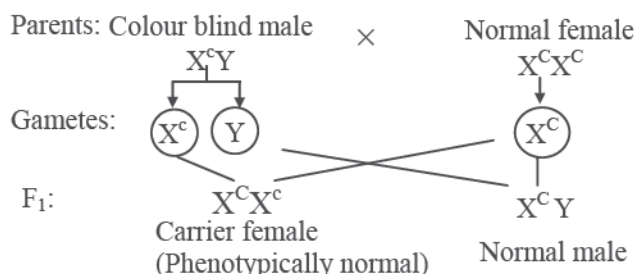
10. **(A)** Std.12 | Ch - 8
    8.14 Working mechanism of human heart

    Under normal conditions, ventricular systole lasts for 0.3 sec and ventricular diastole (VD) lasts for 0.5 sec while atrial systole (AS) lasts for 0.1 sec and atrial diastole (AD) is for 0.7 sec.

11. **(B)** Std.12 | Ch - 8
    8.11 White blood corpuscles / Leucocytes

    Basophils / Cyanophils have very few large sized granules and stain with basic stains like methylene blue.

12. **(A)** Std.12 | Ch - 2
    2.14 Infertility

13. **(A)** Std.12 | Ch - 3
    3.10 Sex Linked Inheritance

Parents: Colour blind male $\times$ Normal female
$X^c Y$ $X^C X^C$

Gametes: X^c Y X^C

F_1: $X^C X^c$ $X^C Y$
Carrier female   Normal male
(Phenotypically normal)

> **Smart tip - Q.13**
> Colour-blindness is an X-linked recessive disorder. It would not be inherited from a colourblind father ($X^c Y$) to male progeny because only the normal Y chromosome would be inherited.

14. **(B)** Std.11 | Ch - 14
    14.3 Digestive Glands

15. **(*)** Std.12 | Ch - 7
    7.13 Nitrogen cycle

    Reductive amination: α – Ketoglutaric acid + NH_4+ $NADPH_2 \rightarrow$ Glutamic acid + H_2O + NADP
    [*Note:* The answer to the question is not mentioned as an option.]

16. **(B)** Std.12 | Ch - 12
    12.3 Methodology for rDNA technology

    Gel electrophoresis is used to separate DNA, not to transfer it into protoplasts.

17. **(A)** Std.12 | Ch - 9
    9.10 Major endocrine glands

    Aldosterone promotes sodium reabsorption in kidneys.

18. **(A)** Std.12 | Ch - 15
    15.5 Conservation of Biodiversity

    [*Note***:** *As of the latest data, India has 18 biosphere reserves, 106 national parks, and 544 wildlife sanctuaries.*]

19. **(C)** Std.12 | Ch - 2
    2.12 Birth control

    MTP Act, 2017 focuses on safe abortions, not sex determination (banned under PCPNDT Act).

20. **(B)** Std.12 | Ch - 6
    6.4 Absorption of water by roots from soil

21. **(C)** Std.12 | Ch - 5
    5.2 Chemical Evolution of Life (Self assembly theory of origin of life)

    Protobionts are formed due to coacervation i.e., aggregation of organic molecules. Oparin (1924) called them coacervates and Sidney Fox called them protenoids or microspheres.

22. **(B)** Std.12 | Ch - 8
    8.2 Human Respiratory system

    The right lung is larger and divided into 3 lobes, while the left lung is smaller and divided into 2 lobes to accommodate the heart.

23. **(B)** Std.11 | Ch - 15
    15.7 Disorders and diseases

24. **(B)** Std.11 | Ch - 13
    13.2 Anaerobic respiration

25. **(A)** Std.12 | Ch - 9
    9.7 Sensory Receptors

26. **(C)** Std.12 | Ch - 14
    14.1 Ecosystem

    Stratification is structural (vertical distribution of species), not a functional aspect of ecosystem.

27. **(C)** Std.12 | Ch - 12
    12.2 Principles and Processes of Biotechnology

    Gene therapy relies on recombinant DNA technology.

28. **(C)** Std.12 | Ch - 8
    8.6 Common disorders of respiratory system

    Silicosis treatment involves protective gear to prevent further exposure.

29. **(C)** Std.12 | Ch - 4
    4.5 Protein synthesis

    Small subunit of ribosome binds (attaches) to the mRNA at 5' end. Initiator codon, AUG is present on mRNA which initiates the process of protein synthesis (translation).

30. **(D)** Std.12 | Ch - 1
    1.11 Development of Embryo

31. **(C)** Std.11 | Ch - 6
    6.2 Biomolecules in the cell

32. **(D)** Std.11 | Ch - 14

    14.5 Absorption, assimilation and egestion

    Micelles enter into intestinal villi where they are reformed into very fine chylomicrons.

33. **(A)** Std.12 | Ch - 4

    4.4 DNA Replication

34. **(B)** Std.12 | Ch - 8

    8.16 Blood pressure (B. P.)

    Korotkoff sounds start at systolic and end at diastolic pressure.

35. **(C)** Std.12 | Ch - 11

    11.3 Tissue culture

    Standard sterilization protocol: 15 psi for 20 minutes.

36. **(D)** Std.12 | Ch - 13

    13.2 Major Abiotic Factors

    Migration is an avoidance strategy, not suspend type of adaptation.

37. **(D)** Std.12 | Ch - 9

    9.6 Human Nervous System

    Salivation (watering of mouth) is a cranial reflex.

38. **(D)** Std.12 | Ch - 1

    1.12 Seed and Fruit Development

    Pollination is the process where pollen is transferred from anther to stigma which ensures fertilization in plants.

39. **(A)** Std.12 | Ch - 9

    9.10 Major endocrine glands

    Hyperthyroidism symptoms: tremor, irritability, tachycardia, weight loss.

40. **(A)** Std.12 | Ch - 6

    6.7 Path of water Across the Root (i.e. from epiblema upto xylem in the stelar region)

    Secondary roots lack Casparian strips, allowing apoplastic movement to xylem.

41. **(C)** Std.11 | Ch - 15

    15.2 Excretory system in human being

42. **(A)** Std.12 | Ch - 1

    1.3 Microsporogenesis

    PMC undergoes one meiotic division to form 4 haploid microspores. Each microspore undergoes two mitotic divisions to form male gametophyte.

43. **(C)** Std.11 | Ch - 6

    6.2 Biomolecules in the cell

    Pyrimidine bases found in nucleic acid are Cytosine, Thymine and Uracil.

44. **(C)** Std.11 | Ch - 15

    15.2 Excretory system in human being

    Renal Cortex contains Malpighian bodies, convoluted tubules and blood vessels.

45. **(C)** Std.12 | Ch - 5

    5.13 Human Evolution

> **Smart code - Q.45**
>
> Mnemonic for Stages of Human Evolution:
> **D**octor **Ram A**dvised to **Ha**ve **E**gg **N**oodle **S**oup:
> D   – *Dryopithecus*,
> Ram – *Ramapithecus*,
> A   – *Australopithecus*,
> Ha   – *Homo habilis*,
> E   – *Homo erectus*,
> N   – Neanderthal man,
> S   – *Homo sapiens*.

46. **(C)** Std.12 | Ch - 11

    11.8 Role of Microbes in Industrial Production

    Eremothecium ashbyi is a type of fungus that produces Vitamin B_2 (riboflavin).

47. **(A)** Std.12 | Ch - 12

    12.2 Principles and Processes of Biotechnology

48. **(C)** Std.12 | Ch - 7

    7.10 Photoperiodism

> **Thinking hatke - Q.48**
>
> Duration of day is short in winter season and long in summer season. So, it can be remembered that short day plants flower in winter season, A- II is given only in option C so quickly choose C as your answer.

49. **(C)** Std.12 | Ch - 9

    9.10 Major endocrine glands

    Beta cells are the most abundant (about 70%) of total cells in the Islet of Langerhans.

50. **(B)** Std.12 | Ch - 13

    13.4 Population

51. **(A)** Std.12 | Ch - 8

    8.2 Human Respiratory system

52. **(C)** Std.12 | Ch - 4

    4.5 Protein synthesis

    Exons on hnRNA code for proteins after splicing.

53. **(C)** Std.12 | Ch - 2

    2.2 Sexual reproduction in animals

    Sertoli cells are diploid and uninucleate.

$$\frac{d_{CH_4}}{d_{O_2}} = \frac{\text{Molar mass of } CH_4}{\text{Molar mass of } O_2} = \frac{16}{32}$$

$\therefore \quad d_{CH_4} : d_{O_2} = 1 : 2$

14. **(C)** Std.12| Ch-5

5.7 Electrode potential and cell potential

For the cell reaction,

$Zn_{(s)} + 2Ag^+_{(aq)} \longrightarrow Zn^{+2}_{(aq)} + 2Ag_{(s)}$

Nernst equation at 298 K:

$E_{cell} = E^\circ_{cell} - \dfrac{0.0592}{2} \log_{10} \dfrac{[Zn^{+2}]}{[Ag^+]^2}$

The cell potential E_{cell} will be equal to E°_{cell} only when $\dfrac{0.0592}{2} \log_{10} \dfrac{[Zn^{+2}]}{[Ag^+]^2}$ will be zero.

To make it zero, $\dfrac{[Zn^{+2}]}{[Ag^+]^2}$ should be 1 as $\log_{10} 1 = 0$

If $[Zn^{+2}] = 0.01$ M and $[Ag^+] = 0.1$ M,

$E_{cell} = E^\circ_{cell} - \dfrac{0.0592}{2} \log_{10} \dfrac{0.01}{(0.1)^2}$

$E_{cell} = E^\circ_{cell} - \dfrac{0.0592}{2} \log_{10} 1$

$E_{cell} = E^\circ_{cell} - 0$

$E_{cell} = E^\circ_{cell}$

15. **(B)** Std.12| Ch-5

5.8 Thermodynamics of galvanic cells

For the reaction,

$X_{(s)} + Y^{+2}_{(aq)} \longrightarrow X^{+2}_{(aq)} + Y_{(s)}$; $n = 2$
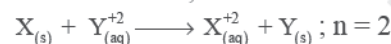
$\Delta G^\circ = -nFE^\circ_{cell}$

$\quad = -2 \times 96500 \times 1$

$\quad = -193000$ J $= -193$ kJ

16. **(B)** Std.12| Ch-1

1.7 Packing efficiency

In FCC, $\sqrt{2}\, a = 4r$

$\therefore \quad r = \dfrac{a}{2\sqrt{2}}$

$a = 2 \times \sqrt{2} \times 144$ pm $= 4.07 \times 10^{-8}$ cm

17. **(D)** Std.12| Ch-14

14.2 Carbohydrates

Raffinose $\xrightarrow{H_2O}$ Glucose + Fructose + Galactose

(Trisaccharide)

Sucrose $\xrightarrow{H_2O}$ Glucose + Fructose

(Disaccharide)

Similarly,

Maltose $\xrightarrow{H_2O}$ Glucose + Glucose

Lactose $\xrightarrow{H_2O}$ Glucose + Galactose

Stachyose $\xrightarrow{H_2O}$ Glucose + Fructose + 2Galactose
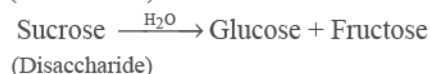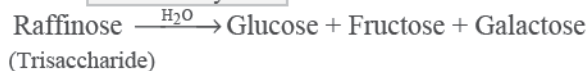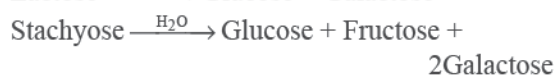
18. **(D)** Std.12| Ch-8

8.3 Electronic configuration

Transition elements have partially filled d-orbitals. Zn, Cd, Hg have completely filled d-orbitals ($3d^{10}$) in the ground state. Hence, they are not regarded as transition elements.

19. **(A)** Std.12| Ch-4

4.11 Spontaneous (irreversible) process

$\Delta S_{surr} = \dfrac{Q_{rev}}{T} = \dfrac{-\Delta H}{T}$

$\quad = -\dfrac{-240 \times 10^3 \text{ J}}{300 \text{ K}} = 800 \text{ J K}^{-1}$

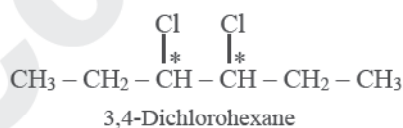$\Delta S_{total} = \Delta S_{sys} + \Delta S_{surr}$

$\quad = 15 + 800 = 815 \text{ J K}^{-1}$

> **Caution - Q.19**
> ΔH is in kJ while ΔS is in J K^{-1}

20. **(D)** Std.12| Ch-10

10.5 Optical isomerism in halogen derivatives

$$CH_3 - CH_2 - \overset{\overset{\displaystyle Cl}{|}}{\underset{*}{CH}} - \overset{\overset{\displaystyle Cl}{|}}{\underset{*}{CH}} - CH_2 - CH_3$$

3,4-Dichlorohexane

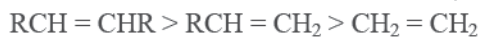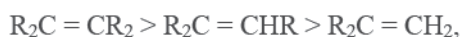$\therefore$ The number of chiral carbon atoms is 2.

21. **(C)** Std.12| Ch-6

6.7 Temperature dependence of reaction rates

According to Arrhenius equation, the rate of reaction increases with increase of temperature.
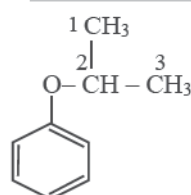
22. **(B)** Std.11| Ch-15

15.2 Alkenes

Order of stability of alkyl substituted alkenes:

$R_2C = CR_2 > R_2C = CHR > R_2C = CH_2$,

$RCH = CHR > RCH = CH_2 > CH_2 = CH_2$

Greater is the number of alkyl groups attached to the doubly bonded carbon atoms, greater is the stability of alkene.

23. **(C)** Std.12| Ch-11

11.3 Nomenclature

$$\overset{1}{C}H_3$$

2-Propoxybenzene

24. (B) Std.12 | Ch - 8
8.3 Mechanism of respiration

ppCO$_2$ of blood in pulmonary capillaries	45 mmHg
ppCO$_2$ of alveolar air	40 mmHg

25. (C) Std.12 | Ch - 5
5.13 Human Evolution

Baboons, macaques and langurs are Old World monkeys

26. (A) Std.12 | Ch - 9
9.4 Synapse

27. (B) Std.12 | Ch - 12
12.4 Applications of Biotechnology

i. Bt toxin is crystalline protein (Cry gene product).
ii. In alkaline pH of insect midgut, Cry protein is activated and binds to gut epithelial cells.
iii. This forms pores → cell lysis → insect death.

28. (C) Std.12 | Ch - 6
6.13 Structure of stomatal apparatus

Thinking Hatke - Q.28
In this question, the match for (ii – Starch- sugar interconversion) is (a-Steward) and **only option (C)** has this correct pair. Hence, **(C)** is the correct answer.

29. (A) Std.12 | Ch – 1
1.2 Sexual Reproduction

Thinking Hatke - Q.29
The epidermis layer cannot be located on the inside, eliminating options (C) and (D). Since the tapetum is the innermost nutritive layer of the anther wall, option (B) is also ruled out. Therefore, the correct answer is (A).

30. (D) Std.11 | Ch - 15
15.5 Composition of Urine

ADH is secreted when there is water loss from the body. ADH stimulates reabsorption of water from last part of DCT and entire collecting duct.

Caution - Q.30
More water loss = higher ADH levels (to conserve water). More water in the body = lower ADH levels (to excrete excess water).

31. (B) Std.12 | Ch - 13
13.4 Population

i. **Absolute natality** = the number of births under ideal conditions

ii. **Realised natality** = the number of births when environmental pressures come into play.

32. (A) Std.12 | Ch - 9
9.5 Transmission of nerve impulse

In saltatory conduction action potential does not travel as a continuous wave but jumps between nodes of Ranvier.

33. (B) Std.12 | Ch - 7
7.9 Growth Hormones

34. (B) Std.12 | Ch - 3
3.8 Linkage and Crossing Over

Caution - Q.34
Total colour blindness: Incomplete sex linkage
Red-green colour blindness: Complete sex linkage.

35. (C) Std.12 | Ch - 1
1.10 Development of Embryo

Thinking Hatke - Q.35
Gametogenesis and sporogenesis occur before fertilization. Therefore, option (B) and (D) can be easily eliminated. Seed formation and fruit formation do not occur inside embryo sac.

36. (C) Std.11 | Ch - 13
13.2 Anaerobic respiration

37. (D) Std.11 | Ch - 15
15.4 Concentration of urine

Thick ascending limb of loop of Henle is impermeable to water and urea but can reabsorb Na$^+$ and Cl$^-$ from tubular fluid and release into tissue fluid.

Reversible Reactions in Glycolysis:
1. Glucose-6-phosphate → Fructose-6-phosphate
2. Fructose-6-phosphate → Fructose-1,6-bisphosphate
3. Fructose-1,6-bisphosphate → Dihydroxyacetone phosphate + Glyceraldehyde-3-phosphate
4. Dihydroxyacetone phosphate → Glyceraldehyde-3-phosphate
5. Glyceraldehyde-3-phosphate → 1,3-Bisphosphoglycerate
6. 1,3-Bisphosphoglycerate → 3-Phosphoglycerate
7. 3-Phosphoglycerate → 2-Phosphoglycerate

[*Note:* The answer to the question is not mentioned as an option.]

38. (D) Std.11 | Ch - 14
14.4 Physiology of digestion

39. (B) Std.12 | Ch - 8
8.2 Human Respiratory system

46. (B) Std.12 | Ch-7
7.8 Interference

The phase difference between the light waves reaching the fifth dark fringe from the central fringe will be $\Delta\phi = (2n + 1)\pi$

$n = 4$

$\Delta\phi = (2 \times 4 + 1) \times \pi = 9\pi$

47. (A) Std.12 | Ch-3
3.15 Stefan-Boltzmann Law of Radiatio

Using Stefan-Boltzmann Law
The power radiated per unit area is

$P = e\,\sigma\,T^4$

where $e \to$ emissivity

$\sigma \to$ Stefan – Boltzmann constant

$T \to$ temperature

Given that both bodies radiate the same energy per unit time:

$e_1\,\sigma\,T_1^4 = e_2\,\sigma\,T_2^4 \implies \dfrac{e_1}{e_2} = \dfrac{T_2^4}{T_1^4}$

Substituting emissivity ratio,

$\dfrac{4}{3} = \left(\dfrac{T_2}{T_1}\right)^4$

$\therefore \quad \dfrac{T_1}{T_2} = \left(\dfrac{3}{4}\right)^{1/4}$

48. (B) Std.12 | Ch-5
5.12 Simple Pendulum

The elevator is moving upwards with an aceleration of 2 m/s. Hence, the net acceleration acting on the simple pendulum will be $g' = g + 2$ m/s.

Time period of simple pendulum,

$T = 2\pi\sqrt{\dfrac{l}{g'}}$

$= 2\pi\sqrt{\dfrac{1}{(g+2)}}$

$= 2\pi\sqrt{\dfrac{1}{12}} = \dfrac{2\pi}{2\sqrt{3}} = \dfrac{\pi}{\sqrt{3}}$ s

49. (A) Std.12 | Ch-8
8.4 Electric Potential due to a Point Charge, a Dipole and a System of Charge

By formula of potential energy,

$V = \dfrac{1}{4\pi\varepsilon_0}\dfrac{q}{r}$

$\therefore \quad V_B = \dfrac{1}{4\pi\varepsilon_0}\dfrac{q}{(x+y)} - \dfrac{1}{4\pi\varepsilon_0}\dfrac{q}{(x)}$

$V_A = -\dfrac{1}{4\pi\varepsilon_0}\dfrac{q}{(x+y)} + \dfrac{1}{4\pi\varepsilon_0}\dfrac{q}{(x)}$

$V_A - V_B = \dfrac{1}{4\pi\varepsilon_0}\left(\left(-\dfrac{q}{(x+y)} + \dfrac{q}{(x)}\right) - \left(\dfrac{q}{(x+y)} - \dfrac{q}{(x)}\right)\right)$

$V_A - V_B \propto \dfrac{2qy}{x(x+y)}$

50. (D) Std.12 | Ch-5
5.12 Simple Pendulum

The time period of a pendulum is

$T = 2\pi\sqrt{\dfrac{L}{g}}$

Second's pendulum has time period of $T = 2s$

$\therefore \quad 2 = 2\pi\sqrt{\dfrac{L_{moon}}{g_{moon}}}$

$1 = \pi^2 \cdot \dfrac{L_{moon}}{g_{moon}}$

$\implies L_{moon} = \dfrac{g_{moon}}{\pi^2}$

Similarly for Earth

$1 = \pi^2 \cdot \dfrac{L_{earth}}{g_{earth}}$

$\implies L_{earth} = \dfrac{g_{earth}}{\pi^2} = 1$ m

$\therefore$ Ratio,

$\dfrac{L_{moon}}{L_{earth}} = \dfrac{g_{moon}}{g_{earth}} = \dfrac{1}{6} = \dfrac{1}{6}\cdot 1$

$L = \dfrac{1}{6}$ m

CHEMISTRY

1. (A) Std.12 | Ch-2
2.7 Vapour pressure lowering

$\dfrac{\Delta P}{P^\circ} = \dfrac{3\,\text{mm of Hg}}{30\,\text{mm of Hg}} = \dfrac{3}{30} = 0.1$

2. (A) Std.12 | Ch-7
7.9 Oxygen and compounds of oxygen

3 O_2 atoms combine to form 2 O_3 atoms. Hence, as the number of atoms decreases, it can be inferred that the ΔS will be negative. Also, the reaction is endothermic, hence the ΔH will be positive (+142 kJ/mol).

[*Note:* In the question, $O_{2(s)}$ is changed to $O_{2(g)}$ to apply appropriate textual concepts.]

3. (C) Std.12 | Ch-8
8.10 Inner transition (f-block) elements

4. (B) Std.11 | Ch-8
8.2 Alkali metals and alkaline earth metals

Diagonal relationship:

Group	1	2
Period 2	Li	Be
Period 3	Na	Mg

44. **(C)** Std.12| Ch-8

8.3 Electronic configuration

Transition elements have partially filled d-orbitals. Mo, Co and Ti have partially filled d-orbitals in their ground state. Hence, they are regarded as transition elements.

Holmium is a lanthanide element, not a transition metal.

45. **(C)** Std.12| Ch-13

13.4 Physical properties of amines

Intermolecular hydrogen bonding is maximum in carboxylic acids. Hence, among the given compounds, C_2H_5COOH has the highest boiling point.

46. **(B)** Std.12| Ch-6

6.5 Integrated rate law

Given, a = 100, $x = 30$, when t = 10 min.
Substituting these values in the first order integrated rate law,

$k = \dfrac{2.303}{t} \log_{10} \dfrac{a}{a-x}$, we get

$k = \dfrac{2.303}{10} \log_{10} \dfrac{100}{100-30}$

$= \dfrac{2.303}{10} \log_{10} \dfrac{10}{7}$

$= \dfrac{2.303}{10} (\log_{10} 10 - \log_{10} 7)$

$= 0.2303 \times (1 - 0.845)$

$= 0.2303 \times 0.155$

$k = 0.03569 \text{ min}^{-1} \approx 0.0357 \text{ minute}^{-1}$

47. **(D)** Std.12| Ch-14

14.3 Proteins

Tryptophan
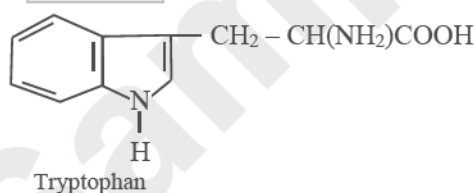
48. **(C)** Std.12| Ch-3

3.8 Buffer solutions

For a buffer solution,

$pOH = pK_b + \log_{10} \dfrac{[Salt]}{[Base]}$

$= 4.620 + \log_{10} \dfrac{0.4}{0.2}$

$= 4.620 + 0.301$

$\therefore \quad pOH = 4.921$

Now, pH + pOH = 14

$\therefore \quad pH = 14 - pOH = 14 - 4.921 = 9.079$

49. **(A)** Std.12| Ch-2

2.10 Osmotic pressure
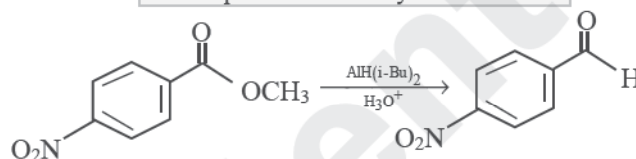
$\pi = \dfrac{W_2 RT}{M_2 V}$

$\therefore \quad W_2 = \dfrac{\pi M_2 V}{RT}$

$= \dfrac{0.8\,\text{atm} \times 196\,\text{g mol}^{-1} \times 3\,\text{dm}^3}{0.0821\,\text{atm dm}^3\,\text{K}^{-1}\,\text{mol}^{-1} \times 300\,\text{K}}$

$= 19.098 \text{ g} \approx 19.1 \text{ g}$

50. **(B)** Std.12| Ch-12

12.4 Preparation of aldehydes and ketones

DiBAl – H converts esters to aldehydes

BIOLOGY

1. **(A)** Std.12 | Ch - 12

12.2 Principles and Processes of Biotechnology

Primer extension is performed by the Taq polymerase enzyme.

2. **(B)** Std.12 | Ch - 7

7.13 Nitrogen cycle

Atmospheric nitrogen (N_2) has a strong triple covalent bond making it inert. Plants absorb nitrogen as nitrates because nitrate ions are reactive.

3. **(D)** Std.12 | Ch - 8

8.17 Electrocardiogram

Leucopenia refers to low WBC count.

4. **(B)** Std.12 | Ch - 7

7.9 Growth Hormones

ABA induces efflux of K^+ ions, making guard cells flaccid/hypotonic and causing stomatal closure.

5. **(D)** Std.11 | Ch - 15

15.7 Disorders and diseases

6. **(D)** Std.12 | Ch - 1

1.3 Microsporogenesis

i. 1 microspore mother cell gives 4 pollen grains → 80/4 = **20 microspore mother cells**

ii. Each pollen grain at maturity has 1 vegetative + 1 generative cell → 80 pollen grains will have **80 generative cells and 80 vegetative cells.**

iii. Mitotic division of each generative cell gives rise to 2 male gametes → **80 generative cells ×2 = 160 male gametes.**

iv. **Ratio** = 160 : 80 : 80 : 20
= **8 : 4 : 4 : 1**

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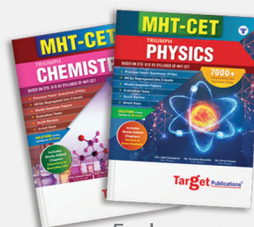- MHT-CET 10 Full Mock Tests with Solutions (Physics, Chemistry, Biology)

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