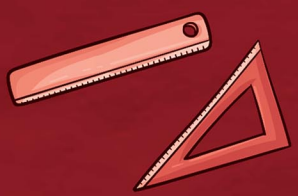
SAMPLE CONTENT

Includes Statistical Analysis of all shifts

MHT-CET PCB

SOLVED PAPERS 2023



- Self-Assessment Score Card
- Smart Keys : Thinking Hatke & Caution

All 12 sets of papers conducted in 2023

Target Publications® Pvt. Ltd.

MHT-CET (PCB)

SOLVED PAPERS - 2023

All 12 sets of papers conducted in 2023

Salient Features:

- Set of twelve MHT-CET authentic Question Papers for Physics, Chemistry & Biology conducted in year 2023
- Answers and Solutions provided for all the papers.
- Trend analysis of all the shifts in the form of:
  - Graphs of difficulty levels of each shift
  - Tables of Chapter-wise analysis of all shifts
- Conceptual mapping of each question in accordance with the chapter and subtopic/exercise is provided in the Solutions
- Smart Keys (*Thinking Hatke, Caution* & *Smart Code*) provided to crack questions efficiently
- Includes Self-Assessment Score Card for each paper to evaluate progress

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PREFACE

Our latest offering, **'MHT-CET (PCB) Solved Papers - 2023'** is an exclusive compilation of 12 authentic MHT-CET exam papers conducted by State Common Entrance Test Cell. This compilation includes Question papers of Physics, Chemistry & Biology that took place in year 2023 from **May 15 to May 20** in morning and afternoon shifts. The book includes all the Question Papers of PCB and thus acts as a central repository for all the questions asked in year 2023 in one place.

Answers and **Solutions** are provided for each question paper. To enhance their problem-solving abilities, solutions are provided wherever necessary to assist students in comprehending the underlying concepts. To make conceptual mapping simple, the solutions include the **subtopic** number from the chapter where a question is anchored. In cases where multiple concepts from the same or other chapters are needed to answer a question, it is marked as Multifarious.

Smart Keys (Thinking Hatke, Caution and **Smart Code)** are provided selectively in the solutions to stimulate lateral thinking to effectively solve a question and apprise students about mistakes often made while solving MCQs. The book includes a Self-Assessment Score Card at the end of each paper that has been meticulously created for the purpose of self-evaluation.

To give students an understanding of the weighting allotted to each chapter, a *statistical analysis* of the number of questions asked per chapter each shift in a subject is offered in tabular form. Additionally, a *graphical analysis* of the twelve papers for each subject is included at the start of the book to elaborate on the breakdown of the difficulty level of questions asked in each subject. Studying these representations should undoubtedly aid students in planning their study strategy for a particular chapter. Although there is a possibility that the weightage to a chapter and the level of difficulty of the question paper in the future examination may vary. Solving these papers offer students conviction of their preparedness from the examination point of view.

We are confident that this book will comprehensively cater to the needs of students and effectively assist them to achieve their goal.

Publisher

Edition: First

The journey to create a complete book is strewn with triumphs, failures and near misses. If you think we've nearly missed something or want to applaud us for our triumphs, we'd love to hear from you.

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A book affects eternity; one can never tell where its influence stops.

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 the syllabus prescribed by Maharashtra State Board of Secondary and Higher Secondary Education 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 Maharashtra Bureau of Textbook Production and curriculum Research, Pune, and
  ii. chapters / units from Std. XI curriculum as mentioned below:

Sr.no	Subject	Chapters/Units of Std. XI
1	Physics	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 Group 2, States of Matter (Gaseous and Liquid States), Adsorption and Colloids (Surface Chemistry), Hydrocarbons, Basic Principles of Organic Chemistry
3	Mathematics	Trigonometry II, Straight Line, Circle, Measures of Dispersion, Probability, Complex Numbers, Permutations and Combinations, Functions, Limits, Continuity
4	Biology	Biomolecules, Respiration and Energy Transfer, Human Nutrition, Excretion and Osmoregulation

- **Language of Question Paper:**
  The medium for examination shall be English / Marathi / Urdu for Physics, Chemistry and Biology. Mathematics paper shall be in English only.
- **Duration of Online Computer Based Test (CBT):**
  The duration of the examination for PCB is 180 minutes and PCM is 180 minutes.
  a. **For PCM** - This paper is having 2 Groups of Physics-Chemistry and Mathematics with total 180 Minutes Duration, first 90 minutes Physics and Chemistry will be enabled and only after completion of first 90 minutes' time Physics-Chemistry group will be auto submitted and Mathematics group will be enabled with 90 minutes' duration.
  b. **For PCB** - This paper is having 2 Groups of Physics-Chemistry and Biology with total 180 Minutes Duration, first 90 minutes Physics and Chemistry will be enabled and only after completion of time response for Physics-Chemistry group will be auto submitted and Biology group will be enabled with 90 minutes' duration.

[Note: Candidate should note that if he/she is appearing for both the groups i.e., PCM and PCB, the Percentile / Percentage score of Physics or Chemistry will not be interchanged among the groups.**]**

INDEX

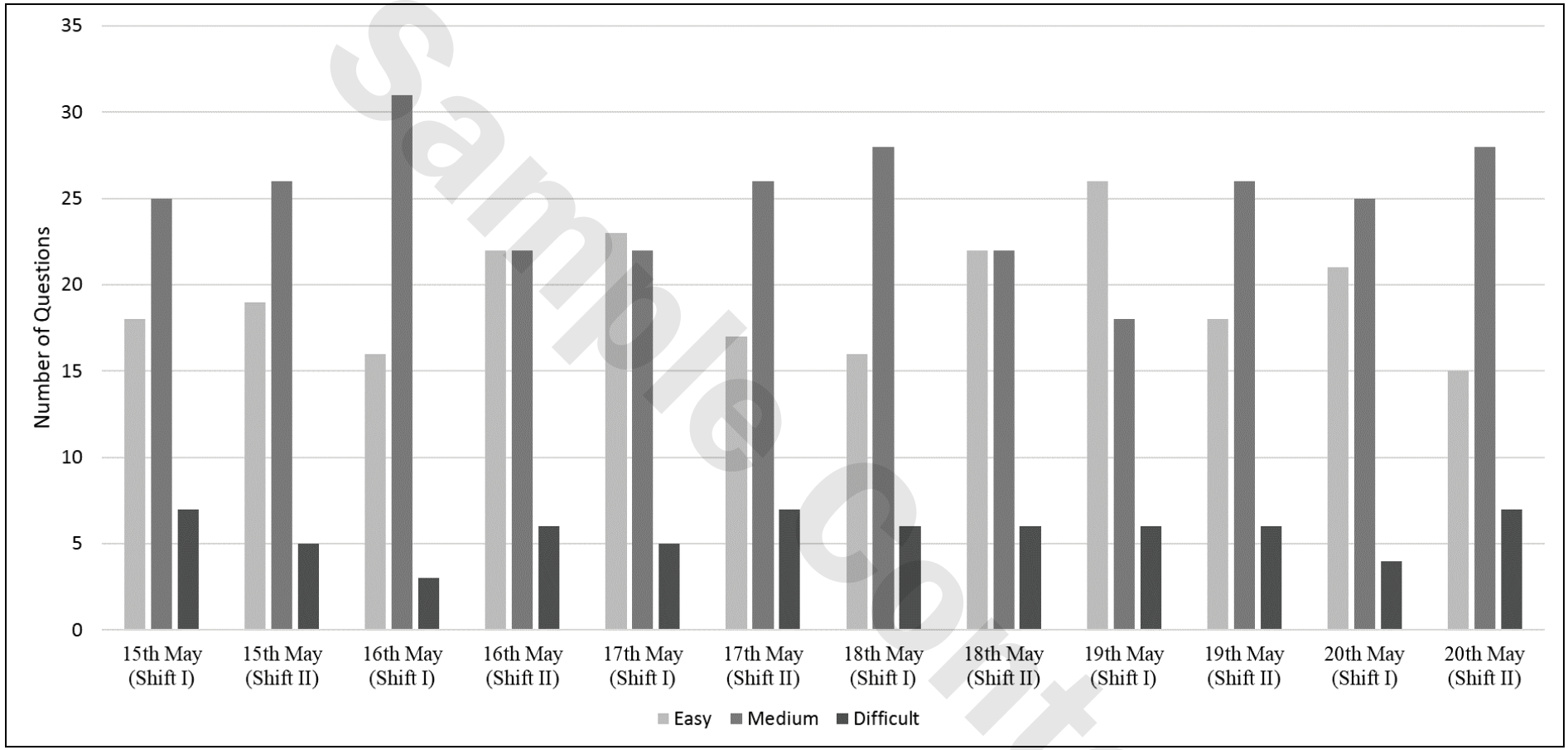
PHYSICS

Chapter-wise Analysis of MHT-CET 2023 Exam Papers

Ch. No.	Std.	Chapter Name	15th May Shift I	15th May Shift II	16th May Shift I	16th May Shift II	17th May Shift I	17th May Shift II	18th May Shift I	18th May Shift II	19th May Shift I	19th May Shift II	20th May Shift I	20th May Shift II	Total
3	11th	Motion in a Plane	1	1	2	1	2	2	1	1	1	1	1	1	15
4	11th	Laws of Motion	1	1	1	1	1	1	1	1	3	2	1	1	15
5	11th	Gravitation	2	2	2	2	2	2	2	2	2	1	2	2	23
7	11th	Thermal Properties of Matter	1	1	1	1	1	1	1	1	3	1	1	1	14
8	11th	Sound	1	1	1	0	1	1	0	0	0	0	2	1	8
9	11th	Optics	2	3	2	2	3	1	2	2	2	2	2	2	25
10	11th	Electrostatics	0	0	1	2	1	0	1	2	2	2	1	2	14
14	11th	Semiconductors	1	0	1	1	0	1	1	1	1	1	0	1	9
1	12th	Rotational Dynamics	3	3	2	3	2	3	3	3	2	2	3	3	32
2	12th	Mechanical Properties of Fluids	3	4	3	3	3	3	3	3	3	4	3	2	37
3	12th	Kinetic Theory of Gases and Radiation	3	4	3	3	2	3	5	3	1	2	3	3	35
4	12th	Thermodynamics	2	1	2	2	3	2	0	2	2	2	2	3	23
5	12th	Oscillations	3	3	3	3	3	3	3	3	4	3	3	3	37
6	12th	Superposition of Waves	3	2	3	3	3	2	4	3	4	4	3	3	37
7	12th	Wave Optics	3	3	3	3	2	4	3	3	1	3	2	3	33
8	12th	Electrostatics	3	3	3	3	3	4	3	3	2	2	3	2	34
9	12th	Current Electricity	2	2	2	2	2	2	2	2	2	2	2	2	24
10	12th	Magnetic Fields due to Electric Current	3	3	2	2	2	2	2	2	2	2	2	2	26
11	12th	Magnetic Materials	1	1	1	1	1	1	1	1	1	2	1	1	13
12	12th	Electromagnetic Induction	3	3	3	3	3	3	3	3	3	3	4	2	36
13	12th	AC Circuits	3	3	3	3	3	3	3	3	3	3	2	4	36
14	12th	Dual Nature of Radiation and Matter	2	2	2	2	2	2	2	2	2	2	2	2	24
15	12th	Structure of Atoms and Nuclei	2	2	2	2	2	2	2	2	2	2	2	2	24
16	12th	Semiconductor Devices	2	2	2	2	3	2	2	2	2	2	3	2	26
		Total	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**600**

PHYSICS

Difficulty level-wise Analysis of MHT-CET 2023 Exam Papers



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 twelve 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.

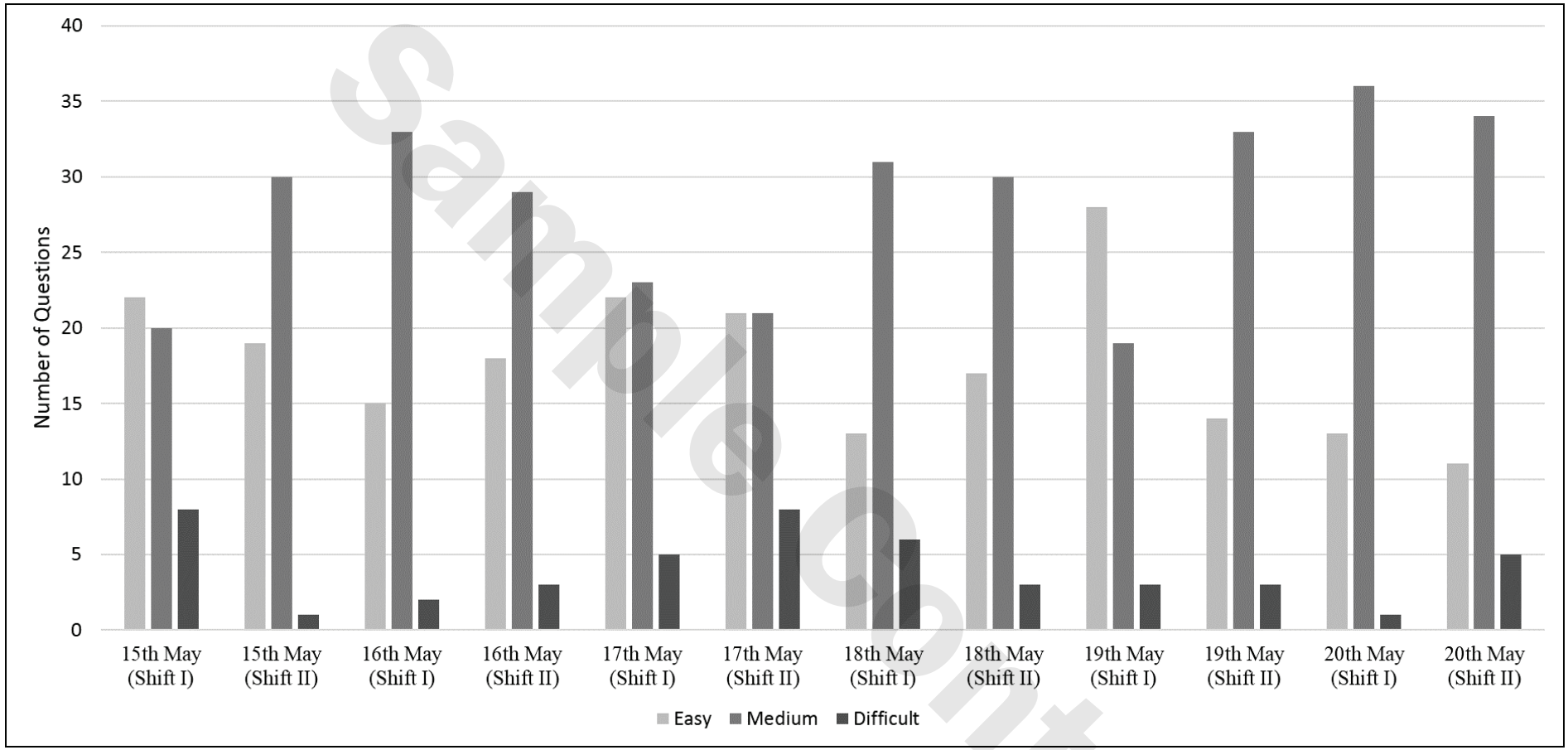
CHEMISTRY

Chapter-wise Analysis of MHT-CET 2023 Exam Papers

Ch. No.	Std.	Chapter Name	15th May Shift I	15th May Shift II	16th May Shift I	16th May Shift II	17th May Shift I	17th May Shift II	18th May Shift I	18th May Shift II	19th May Shift I	19th May Shift II	20th May Shift I	20th May Shift II	Total
1	11th	Some Basic Concepts of Chemistry	1	1	1	1	1	1	1	1	1	1	1	1	12
4	11th	Structure of Atom	2	2	2	1	1	2	1	2	1	2	2	2	20
5	11th	Chemical Bonding	1	1	1	1	1	1	0	1	1	1	1	1	11
6	11th	Redox Reactions	1	0	1	1	1	1	2	1	1	1	1	1	12
8	11th	Elements of Group 1 and Group 2	1	1	1	1	2	1	2	1	1	1	1	1	14
10	11th	States of Matter: Gaseous and Liquid States	1	1	1	2	1	1	1	1	1	1	1	1	13
11	11th	Adsorption and Colloids	1	1	1	0	1	1	1	1	1	1	1	1	11
14	11th	Basic Principles of Organic Chemistry	1	1	1	2	1	1	1	1	2	0	1	1	13
15	11th	Hydrocarbons	1	2	1	1	1	1	1	1	1	2	1	1	14
1	12th	Solid State	3	3	3	3	3	3	3	3	3	3	3	3	36
2	12th	Solutions	3	3	3	3	3	3	3	3	3	3	3	3	36
3	12th	Ionic Equilibria	3	3	3	3	3	3	3	3	3	3	3	3	36
4	12th	Chemical Thermodynamics	3	3	3	3	3	3	4	3	3	3	3	3	37
5	12th	Electrochemistry	3	3	3	3	3	3	2	3	3	3	2	3	34
6	12th	Chemical Kinetics	3	3	3	3	3	3	3	3	3	3	3	3	36
7	12th	Elements of Groups 16, 17 and 18	2	3	2	2	2	2	2	2	2	2	2	2	25
8	12th	Transition and Inner Transition Elements	2	2	2	3	2	2	2	2	3	2	3	2	27
9	12th	Coordination Compounds	2	2	2	2	2	2	2	2	2	2	2	2	24
10	12th	Halogen Derivatives	3	3	3	3	3	3	3	3	4	3	3	3	37
11	12th	Alcohols, Phenols and Ethers	3	3	3	1	3	3	2	3	2	4	3	3	33
12	12th	Aldehydes, Ketones and Carboxylic Acids	3	2	3	3	3	3	4	3	3	2	3	3	35
13	12th	Amines	2	2	2	2	2	2	2	2	1	2	2	2	23
14	12th	Biomolecules	2	2	2	2	2	2	2	2	2	2	2	2	24
15	12th	Introduction to Polymer Chemistry	2	2	2	3	2	2	2	2	2	2	2	2	25
16	12th	Green Chemistry and Nanochemistry	1	1	1	1	1	1	1	1	1	1	1	1	12
		Total	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**600**

CHEMISTRY

Difficulty level-wise Analysis of MHT-CET 2023 Exam Papers



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Analysis

- **Analysis of questions by difficulty level:** Although the proportion of easy, medium, and difficult questions varies amongst the twelve 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.

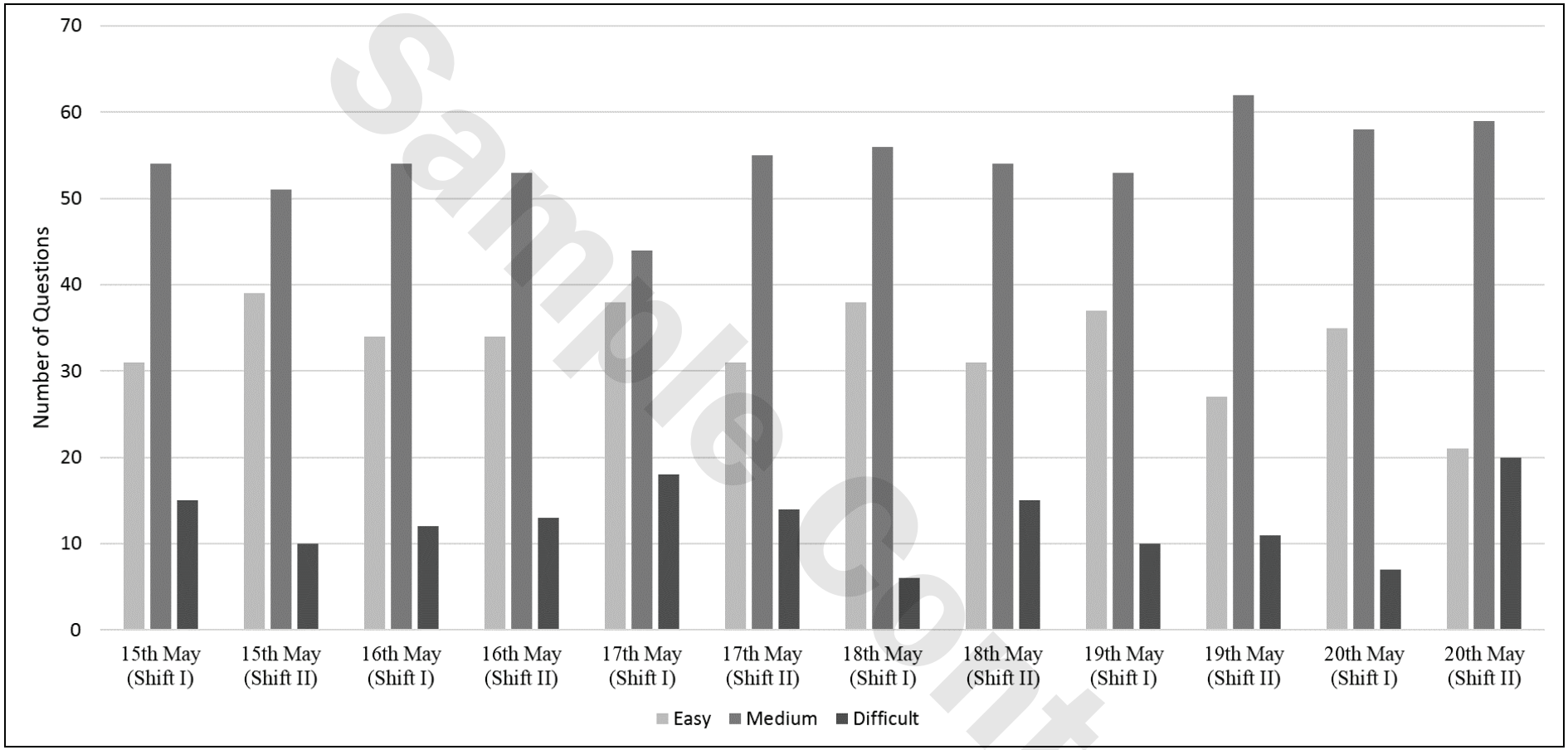
BIOLOGY

Chapter-wise Analysis of MHT-CET 2023 Exam Papers

Ch. No.	Std.	Chapter Name	15th May Shift I	15th May Shift II	16th May Shift I	16th May Shift II	17th May Shift I	17th May Shift II	18th May Shift I	18th May Shift II	19th May Shift I	19th May Shift II	20th May Shift I	20th May Shift II	Total
6	11th	Biomolecules	4	5	2	3	4	3	3	3	3	4	4	4	**42**
13	11th	Respiration and Energy Transfer	4	5	3	5	6	5	5	4	5	5	5	5	**57**
14	11th	Human Nutrition	5	5	5	4	5	4	4	5	5	5	5	4	**56**
15	11th	Excretion and Osmoregulation	7	6	5	5	6	4	7	3	5	3	6	5	**62**
1	12th	Reproduction in Lower and Higher Plants	6	7	5	6	6	6	6	6	6	6	6	7	**73**
2	12th	Reproduction in Lower and Higher Animals	6	5	8	5	6	6	6	6	7	6	5	6	**72**
3	12th	Inheritance and Variation	8	5	6	5	5	4	7	5	5	5	5	5	**65**
4	12th	Molecular Basis of Inheritance	7	5	4	5	5	5	8	5	6	5	5	5	**65**
5	12th	Origin and Evolution of Life	4	5	5	5	5	5	5	5	5	5	5	5	**59**
6	12th	Plant Water Relation	5	4	7	5	5	5	5	6	5	6	5	5	**63**
7	12th	Plant Growth and Mineral Nutrition	5	5	5	6	6	6	5	5	4	5	5	5	**62**
8	12th	Respiration and Circulation	8	8	8	8	7	8	8	8	8	8	8	7	**94**
9	12th	Control and Co-ordination	7	9	8	8	9	10	7	9	8	9	9	10	**103**
10	12th	Human Health and Diseases	3	5	4	4	4	4	4	4	4	3	5	3	**47**
11	12th	Enhancement of Food Production	5	5	6	5	6	5	5	5	6	5	5	5	**63**
12	12th	Biotechnology	6	4	4	5	4	6	5	5	5	6	5	5	**60**
13	12th	Organisms and Populations	3	4	5	4	3	5	4	5	5	3	4	4	**49**
14	12th	Ecosystems and Energy Flow	5	5	4	7	4	4	4	4	4	4	4	5	**54**
15	12th	Biodiversity, Conservation and Environmental Issues	2	3	6	5	4	5	2	7	4	7	4	5	**54**
		Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**1200**

BIOLOGY

Difficulty level-wise Analysis of MHT-CET 2023 Exam Papers



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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.

Physics and Chemistry

Time: 90 Minutes Total Marks: 100

PHYSICS

1. Two spheres S_1 and S_2 have same radii but temperatures 'T_1' and 'T_2' respectively. Their emissive power is same and emissivity is in the ratio 1 : 81. Then the ratio 'T_1' to 'T_2' is

(A) 1 : 1 (B) 3 : 1
(C) 9 : 1 (D) 27 : 1

2. A satellite is orbiting just above the surface of the planet of density 'ρ' with periodic time 'T'. The quantity $T^2\rho$ is equal to (G = universal gravitational constant)

(A) $\frac{4\pi^2}{G}$ (B) $\frac{3\pi^2}{G}$
(C) $\frac{3\pi}{G}$ (D) $\frac{\pi}{G}$

3. If the shape of free liquid surface is curved, then

(A) the pressure on convex side is equal to zero.
(B) the pressure on the convex side is equal to pressure on concave side.
(C) the pressure on concave side is greater than that on the convex side.
(D) the pressure on concave side is less than that on the convex side.

4. A particle of mass 'm' and charge '–2q' is moving around a very heavy particle having charge 'q'. If Bohr's model is to be used then the orbital velocity of mass 'm' when it is nearest to the heavy particle is (in magnitude) (ε_0 = permittivity of free space, h = Planck's constant)

(A) $\frac{q^2}{h\varepsilon_0}$ (B) $\frac{2q^2}{h\varepsilon_0}$
(C) $\frac{q^2}{2h\varepsilon_0}$ (D) $\frac{2q^2}{3h\varepsilon_0}$

5. One mole of a diatomic gas (rigid molecule) does a work $\left|\frac{Q}{2}\right|$ when the amount of heat supplied is 'Q'. In this process the molar heat capacity of the gas is

(A) R (B) 2R
(C) 5R (D) 7R

6. When a capacitor is connected in series LR circuit, the alternating current flowing in the circuit

(A) increases. (B) decreases.
(C) remains constant. (D) falls to zero.

7. Rate of radiation by a black body is 'R' at temperature 'T'. Another body has same area but emissivity is 0.1 and temperature is '2T'. Its rate of radiation is

(A) R (B) (0.8) R
(C) (1.2) R (D) (1.6) R

8. Two inductor coils with inductance 5 mH and 15 mH are connected in parallel. The resultant inductance of the combination of the two coils is

(A) 2.50 mH (B) 3.25 mH
(C) 3.75 mH (D) 4.25 mH

9. What should be the area of a water drop so that the excess pressure inside it is 70 N/m^2? (Surface tension of water = 7×10^{-2} N/m)

(A) $4\pi \times 10^{-4}\ m^2$ (B) $8\pi \times 10^{-6}\ m^2$
(C) $16\pi \times 10^{-6}\ m^2$ (D) $24\pi \times 10^{-8}\ m^2$

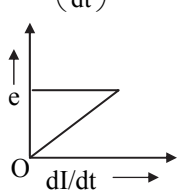
10. A particle at rest starts moving with constant angular acceleration 'α' in circular path. At what time the magnitude of centripetal acceleration is half the tangential acceleration?

(A) $\frac{1}{\sqrt{2\alpha}}$ (B) $\frac{1}{\sqrt{\alpha}}$ (C) $\frac{2}{\sqrt{\alpha}}$ (D) $\frac{\sqrt{\alpha}}{2}$

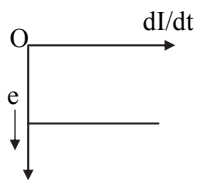
11. End correction at open end for air column in a pipe of length 'l' is 'e'. For its second overtone of a closed pipe the wavelength of the wave is

(A) $\frac{2(l+e)}{3}$ (B) $\frac{3(l+e)}{4}$
(C) $\frac{4(l+e)}{5}$ (D) $\frac{5(l+e)}{6}$

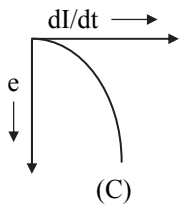
12. The current flowing through an inductor of self inductance 'L' is continuously increasing at constant rate. The variation of induced e.m.f. (e) versus $\left(\frac{dI}{dt}\right)$ is shown graphically by



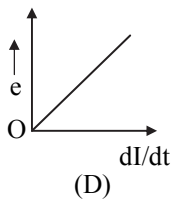
(A)



(B)



(C)



(D)

(A) A (B) B
(C) C (D) D

13. A string of mass 'M' is under a tension 'T'. The length of the string is 'L'. A transverse wave starts from one end of the string. The time taken by the wave to reach the other end is

(A) $\sqrt{\frac{T}{ML}}$ (B) $\sqrt{\frac{LT}{M}}$

(C) $\sqrt{\frac{M}{LT}}$ (D) $\sqrt{\frac{ML}{T}}$

14. An electron of charge 'e' and mass 'm' is revolving which has orbital magnetic moment 'M'. Its angular momentum is given by

(A) $\frac{Mm}{e}$ (B) $\frac{2Mm}{e}$

(C) $\frac{Me}{m}$ (D) $\frac{m}{Me}$

15. If the charge on the parallel plate capacitor is increased by 3 C, the energy stored in it increases by 44%. The original charge on the capacitor is

(A) 10 C (B) 15 C
(C) 20 C (D) 25 C

16. Three point masses, each of mass 'm' are kept at the corners of an equilateral triangle of side 'L'. The system rotates about the center of the triangle without any change in the separation of masses during rotation. The period of rotation is directly proportional to ($\cos 30^\circ = \frac{\sqrt{3}}{2}$)

(A) $L^{3/2}$ (B) L^{-2} (C) L (D) $\sqrt{L}$

17. Energy of the incident photons on the metal surface is '2W' and '5W' where 'W' is the work function for that metal. The ratio of velocities of emitted photoelectrons is

(A) 1 : 1 (B) 1 : 2
(C) 1 : 4 (D) 1 : 8

18. Consider a lens of the radii of curvature 'R_1' and 'R_2' respectively. If the lens is to act as convex lens, what should be the relation between R_1 and R_2?

(A) $R_1 > R_2$ (B) $R_1 = R_2$

(C) $R_1 < R_2$ (D) $R_1 = \frac{1}{R_2}$

19. A train is moving towards a stationary observer with speed 34 m/s. A train sounds a whistle of frequency 450 Hz. If the speed of sound in air is 340 m/s, the frequency heard by the observer in Hz is

(A) 440 (B) 480
(C) 500 (D) 540

20. A circular arc of radius 'r' carrying current 'I' subtends an angle $\left(\frac{\pi}{32}\right)^c$ at its centre. The radius of a metal wire is uniform. The magnetic induction at the centre of circular arc is
(μ_0 = permeability of vacuum) ($\sin 90^\circ = 1$)

(A) $\frac{\mu_0 I}{16r}$ (B) $\frac{\mu_0 I}{32r}$

(C) $\frac{\mu_0 I}{64r}$ (D) $\frac{\mu_0 I}{128r}$

21. A body is thrown from the surface of the earth with velocity 'u' m/s. The maximum height in metre above the surface of the earth upto which it will reach is
(R = radius of earth, g = acceleration due to gravity)

(A) $\frac{u^2R}{2gR - u^2}$ (B) $\frac{2u^2R}{gR - u^2}$

(C) $\frac{u^2R^2}{2gR^2 - u^2}$ (D) $\frac{u^2R}{gR - u^2}$

22. Out of the following which one is NOT the characteristic of LCR series resonant circuit?

(A) It is acceptor circuit.
(B) Current has maximum value.
(C) Impedance is maximum.
(D) Circuit is purely resistive.

23. The coefficient of superficial expansion is $\frac{1}{x}$ times the coefficient of cubical expansion. The value of x is

(A) 3 (B) 2 (C) $\frac{3}{2}$ (D) $\frac{2}{3}$

24. A black body radiates maximum energy at wavelength 'λ' and its emissive power is 'E'. Now due to change in temperature of that body, it radiates maximum energy at wavelength $\frac{3\lambda}{4}$. At that temperature emissive power is

(A) $\frac{81}{16}$ (B) $\frac{81}{256}$ (C) $\frac{16}{81}$ (D) $\frac{256}{81}$

25. A small sphere oscillates simple harmonically in a watch glass whose radius of curvature is 90 cm. The period of oscillations of the sphere is ($g = 10\ ms^{-2}$)

(A) $(0.2)\pi$ (B) $(0.4)\pi$
(C) $(0.6)\pi$ (D) $(0.8)\pi$

Page no. **3** to **4** are purposely left blank.

To see complete chapter buy **Target Notes** or **Target E-Notes**

CHEMISTRY

1. Calculate the time required to decrease the concentration of reactant of first order reaction from 0.8 M to 0.1 M if rate constant is 0.1155 $hour^{-1}$.
(A) 6 hour (B) 12 hour
(C) 18 hour (D) 24 hour

2. Which among the following salts dissolves in water with the absorption of heat?
(A) Na_2SO_4 (B) $CaCl_2$
(C) $Li_2SO_4 \cdot H_2O$ (D) KCl

3. What is the number of unpaired electrons present in O_2 molecule?
(A) 0 (B) 2
(C) 3 (D) 1

4. Which of the following is NOT true about electrolytic cell?
(A) It converts electrical energy into chemical energy.
(B) The anode of an electrolytic cell acts as a positive electrode.
(C) The cathode of an electrolytic cell acts as negative electrode.
(D) It is used for generation of electricity.

5. Calculate the osmotic pressure of 0.2 M aqueous solution of nonelectrolyte at 300 K.
[R = 0.082 atm dm^3 mol^{-1} K^{-1}]
(A) 1.23 atm (B) 2.46 atm
(C) 7.38 atm (D) 4.92 atm

6. What is the number of moles of carbon and hydrogen atoms respectively in 46 gram methoxymethane?
(A) 2 and 6 (B) 3 and 6
(C) 4 and 4 (D) 4 and 3

7. Calculate the molar mass of an element having density 2.8 g cm^{-3} and forms fcc unit cell.
[$a^3.N_A$ = 38.5 cm^3 mol^{-1}]
(A) 26.95 g mol^{-1} (B) 23.5 g mol^{-1}
(C) 29.2 g mol^{-1} (D) 21.6 g mol^{-1}

8. Which of the following alkane has strong London dispersion forces?
(A) n-Butane (B) iso-Butane
(C) n-Pentane (D) neo-Pentane

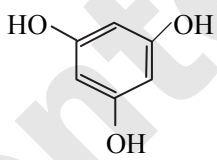
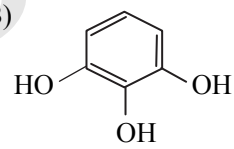
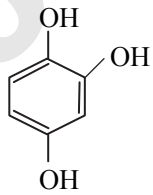
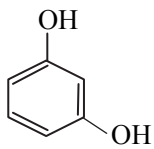
9. 2 moles of an ideal gas is compressed from 5 dm^3 to 2 dm^3 against a constant external pressure of 5×10^5 N m^{-2} at 300 K. Calculate work done in the process.
(A) 1500 J (B) – 150 J
(C) 500 J (D) – 300 J

10. What is IUPAC name of ethyl methyl iso-propylamine?
(A) N-Methyl-N-isopropylethanamine
(B) N-Ethyl-N-methylpropan-1-amine
(C) N-Ethyl-N-methylpropan-2-amine
(D) N-Ethyl-N-isopropylmethanamine

11. Identify substrate 'A' in the following conversion:

$$A \xrightarrow[\text{dry ether}]{CH_3MgCl} \text{complex} \xrightarrow{H_3O^+} \text{acetone}$$

(A) CH_3CHO (B) CH_3CN
(C) HCN (D) CH_3COCl

12. Which of the following is a structural formula of phloroglucinol?
(A) 
(B) 
(C) 
(D) 

13. What is the rate of formation of 'C' in the following reaction?
A + 2B → 2C
(A) Same as the rate of consumption of A
(B) Half the rate of consumption of B
(C) Twice the rate of consumption of A
(D) 3/2 times of the rate of consumption of B

14. What is the number of different types of unit cells present in tetragonal crystal system?
(A) 1 (B) 2
(C) 3 (D) 4

15. What is IUPAC name of p-Iodotoluene?
(A) 4-Iodo-1-methylbenzene
(B) 1-Iodo-3-methylbenzene
(C) 1-Iodo-4-methylbenzene
(D) 3-Iodo-1-methylbenzene

16. Which of the following is used as an inhibitor during oxidation of chloroform?
(A) Mo (B) K_2O
(C) Al_2O_3 (D) C_2H_5OH

Page no. **6** to **7** are purposely left blank.

To see complete chapter buy **Target Notes** or **Target E-Notes**

Biology

Time: 90 Minutes | Total Marks: 100

1. Which one of the following is known as a living fossil?
(A) *Seymouria* (B) *Ichthyostega*
(C) Coelacanth (D) *Archaeopteryx*

2. Which hormones were discovered first in plants?
(A) Cytokinins (B) Auxins
(C) Gibberellins (D) Ethylene

3. At the onset of puberty, gonadotropin releasing hormone is secreted by _____.
(A) pituitary gland (B) ovary
(C) hypothalamus (D) corpus luteum

4. Parasitism is an interaction between two organisms in which _____.
(A) both are harmed
(B) both are benefitted
(C) one is harmed and other is benefitted
(D) both are neither harmed nor benefitted

5. Given below are two statements with respect to speciation.
Statement-I: Charles Darwin believed that mutations are the cause of speciation.
Statement-II: Hugo de Vries believed that the gradual inheritable variations over a long period of time causes speciation.
In the light of above statements, Choose the most appropriate answer from the options given below:
(A) Both Statement-I and Statement-II are correct.
(B) Both Statement-I and Statement-II are incorrect.
(C) Statement-I is correct and Statement -II is incorect.
(D) Statement I is incorrect but Statement II is correct.

6. In male reproductive whorl of a flower the archesporial cells are formed by _____.
(A) epidermal cell of anther
(B) hypodermal cell of anther
(C) cells of connective
(D) cells of tapetum

7. Cerebrosides are _____.
(A) cholesterols (B) phospholipids
(C) glycolipids (D) phytosterols

8. Match the enzyme involved in Krebs cycle given in column-I with the reactions they catalyse given in column-II. Choose the correct option.

Column I		Column II	
i.	Isocitrate dehydrogenase	a.	Citrate $\longrightarrow$ Cis aconitate
ii.	Fumarase	b.	Succinate $\longrightarrow$ Fumarate
iii.	Aconitase	c.	Fumarate $\longrightarrow$ Malate
iv.	Succinate dehydrogenase	d.	Isocitrate $\longrightarrow$ Oxalosuccinic acid

(A) i - d, ii - b, iii - a, iv - c
(B) i - d, ii - c, iii - b, iv - a
(C) i - d, ii - c, iii - a, iv - b
(D) i - c, ii - b, iii - a, iv - d

9. Pus is a mixture of _____.
I – dead neutrophils
II – dead microbes
III – damaged tissues
IV – reticulocytes
V – megakaryocytes
(A) I, II, III only (B) I and V only
(C) II, III and V only (D) III and V only

10. There are 64 codons in the dictionary of genetic code because _____.
(A) there are 64 amino acids to be coded
(B) the genetic code is triplet
(C) there are 64 types of tRNA with different anticodons
(D) 20 codon specify 20 amino acids and remaining codons are meaningless

11. Eight pairs of spinal nerves originate from _____ part of vertebral column.
(A) neck (B) thorax
(C) abdomen (D) coccyx

12. Number of ATP molecules formed in glycolysis by substrate level phosphorylation is _____.
(A) 2 (B) 4
(C) 6 (D) 8

13. What should be in place of A and B respectively in the following digestion process?

$$A \xrightarrow{\text{Trypsin}} B$$

	A	B
(A)	Starch	Maltose
(B)	Proteins	Amino acids
(C)	Proteins	Polypeptides
(D)	Polypeptides	Dipeptides

Page no. **9** to **14** are purposely left blank.

To see complete chapter buy **Target Notes** or **Target E-Notes**

96. Single maize root apical meristem gives rise to more than _____ cells/hour.
(A) 20500 (B) 19500
(C) 18500 (D) 12500

97. Following are the changes that takes place in foetus during first trimester of gestation, EXCEPT _____.
(A) hands and feet are formed
(B) CNS is fully formed
(C) foetus is active and grows to about 30 cm.
(D) heart beat can be heard

98. Which one of the following statements is INCORRECT with respect to their habitat?
(A) Mango trees cannot grow naturally in Germany.
(B) Snow leopards are not found in Kerala.
(C) Many species of small plants growing on forest floor perform photosynthesis.
(D) Archaebacteria cannot grow in hot springs.

99. Generally ecological succession leads to establishment of stable climax community formed of _____.
(A) grasses
(B) phytoplankton
(C) shrubs
(D) trees

100. The sugar found in milk is _____.
(A) maltose
(B) sucrose
(C) lactose
(D) glycogen

MHT-CET - 2023 15th May (Shift – I) Score card		
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.]*

15th May (Shift – I)

PHYSICS

1. (B) Std.12 | Ch-3 | Subtopic-3.15

Radiant energy emitted by ordinary body:

$Q = e\,A\,\sigma T^4 t$ ….(i)

Also, emissive power

$R = \frac{Q}{At}$

Given that, $r_1 = r_2$, $R_1 = R_2$

$\therefore$ $A_1 = A_2$

$\therefore$ $e_1 T_1^4 = e_2 T_2^4$ ….(ii)

$\therefore$ $\frac{T_1^4}{T_2^4} = \frac{e_2}{e_1}$

$\therefore$ $\frac{T_1^4}{T_2^4} = \frac{81}{1}$ $\left(\because \frac{e_1}{e_2} = \frac{1}{81}\right)$

$\therefore$ $\frac{T_1}{T_2} = \frac{3}{1}$

2. (C) Std.11 | Ch-5 | Subtopic-5.8

Time period of a nearby satellite is given by,

$T = 2\pi\sqrt{\frac{R}{g}}$

$\therefore$ $T^2 = 4\pi^2 \times \frac{R}{g}$

But, $g = \frac{4}{3}\pi\rho GR$

$\therefore$ $T^2 = \frac{4\pi^2 R}{\frac{4}{3}\pi\rho GR}$

$\therefore$ $T^2\rho = \frac{3\pi}{G}$

3. (C) Std.12 | Ch-2 | Subtopic-2.4

4. (A) Std.12 | Ch-15 | Subtopic-15.6

Since, the particle of mass 'm' is revolving around heavy particle

$\therefore$ Centripetal force = electrostatic force of attraction

$\frac{mv^2}{r} = \frac{1}{4\pi\varepsilon_0}\frac{(q)(-2q)}{r^2}$

$\therefore$ $mv^2 = \frac{-q^2}{2\pi\varepsilon_0 r}$

$\therefore$ $v = \frac{-q^2}{2\pi\varepsilon_0 (mvr)}$

According to Bohr's second postulate,

$L = mvr = \frac{h}{2\pi}$

$\therefore$ $v = \frac{-q^2}{h\varepsilon_0}$

$\Rightarrow$ $|v| = \frac{q^2}{h\varepsilon_0}$

5. (C) Std.12 | Ch-4 | Multifarious

First law of thermodynamics:

$Q = \Delta U + W$

$\therefore$ $Q = \Delta U + \frac{Q}{2}$

$\therefore$ $\Delta U = \frac{Q}{2}$ ….(i)

For diatomic gas:

$\Delta U = \frac{5}{2} R\Delta T$ ….(ii)

and $Q = C_v \Delta T$ ….(iii)

$\therefore$ $\frac{5}{2} R\Delta T = \frac{C_v \Delta T}{2}$ ….[From (i), (ii) and (iii)]

$\therefore$ $C_v = 5R$

6. (A) Std.12 | Ch-13 | Subtopic-13.5

Impedance for L-R circuit,

$Z_1 = \sqrt{R^2 + X_L^2}$

Impednace for L-C-R circuit,

$Z_2 = \sqrt{R^2 + (X_L - X_C)^2}$

$\therefore$ $Z_2 < Z_1$

As impedance decreases, the current increases.

7. (D) Std.12 | Ch-3 | Subtopic-3.15

Rate of radiation of a black body:

$R = \sigma A T^4$ ….(i)

Rate of radiation of an ordinary body:

$R_1 = e\sigma A\, T_1^4$

Now, $e = 0.1$, $T_1 = 2T$

$\therefore$ $R_1 = (0.1)\,\sigma A (2T)^4$

$\therefore$ $R_1 = 1.6\,\sigma A T^4$

$\therefore$ $R_1 = 1.6R$ ….[From (i)]

8. (C) Std.12 | Ch-12 | Subtopic-12.11

The effective inductance for parallel connection is

$\frac{1}{L} = \frac{1}{L_1} + \frac{1}{L_2}$

$\therefore$ $\frac{1}{L} = \frac{1}{5} + \frac{1}{15}$

$\therefore$ $L = 3.75$ mH

Page no. **182** to **186** are purposely left blank.

To see complete chapter buy **Target Notes** or **Target E-Notes**

$\therefore$ $l_2 = 0.3$ m

Thinking Hatke - Q. 46

As, values for balancing lengths are different in all the options. It is sufficient to calculate balancing length in any one case (Assisting/ opposing) to reach the final correct answer.

47. (B) Std.12 | Ch-15 | Subtopic-15.5

Maximum number of spectral lines obtained on account of transition of electron present in n^{th} orbit is given by,

$N = \frac{n(n-1)}{2}$

For 4^{th} excited state, n = 5

$\therefore$ $N = \frac{5(5-1)}{2}$

$\therefore$ $N = 10$

48. (D) Std.12 | Ch-10 | Subtopic-10.8

If charge enclosed by the two surfaces are same then flux through them, would be the same irrespective of their shape or size.

49. (C) Std.12 | Ch-8 | Multifarious

$\sigma = \frac{Q}{A}$

$\therefore$ $\frac{\sigma_1}{\sigma_2} = \frac{Q_1}{Q_2} \times \frac{A_2}{A_1}$

Also, $C = \frac{Q}{V}$

$\Rightarrow \frac{Q_1}{Q_2} = \frac{C_1}{C_2}$

$\therefore$ $\frac{\sigma_1}{\sigma_2} = \frac{C_1}{C_2} \times \frac{\pi r_2^2}{\pi r_1^2}$

$\therefore$ $\frac{\sigma_1}{\sigma_2} = \frac{4}{3} \times \frac{3^2}{4^2}$

$\therefore$ $\frac{\sigma_1}{\sigma_2} = \frac{3}{4}$

50. (C) Std.11 | Ch-4 | Subtopic-4.3

In the 1^{st} case

$W_1 = mg + a$ ....(i)

In the 2^{nd} case

$W_2 = mg - a$ ....(ii)

Adding equations (i) and (ii),

$2mg = W_1 + W_2$

$\therefore$ $mg = \frac{W_1 + W_2}{2}$

$\therefore$ $mg = \frac{680 + 360}{2}$

$\therefore$ $mg = 520$ N

CHEMISTRY

1. (C) Std.12 | Ch-6 | Subtopic-6.5

For a first order reaction,

$k = \frac{2.303}{t} \log_{10} \frac{[A]_0}{[A]_t}$

$\therefore$ $t = \frac{2.303}{0.1155} \times \log_{10} \frac{0.8}{0.1}$

$= 19.94 \times \log_{10}(8) = 19.94 \times \log_{10}(2^3)$

$= 19.94 \times 3 \log_{10}(2) = 19.94 \times 3 \times 0.301$

$= 18.0$ hour

2. (D) Std.12 | Ch-2 | Subtopic-2.4

Dissolution of Na_2SO_4, $CaCl_2$ and $Li_2SO_4 \cdot H_2O$ in water are exothermic processes while dissolution of KCl in water is an endothermic process.

3. (B) Std.11 | Ch-5 | Subtopic-5.5

Electronic configuration of O_2:

$(\sigma 1s)^2$ $(\sigma^* 1s)^2$ $(\sigma 2s)^2$ $(\sigma^* 2s)^2$ $(\sigma 2p_z)^2$ $(\pi 2p_x)^2$ $(\pi 2p_y)^2$ $(\pi^* 2p_x)^1$ $(\pi^* 2p_y)^1$

It has two unpaired electrons.

4. (D) Std.12 | Ch-5 | Subtopic-5.4

5. (D) Std.12 | Ch-2 | Subtopic-2.10

$\pi = M \times R \times T$

$\therefore$ $\pi = 0.2 \times 0.082 \times 300 = 4.92$ atm

6. (A) Std.11 | Ch-1 | Subtopic-1.8

Structure of methoxymethane:

$CH_3 - O - CH_3$

Its molecular formula is C_2H_6O.

Molar mass = 46 g mol^{-1}

$\therefore$ No. of moles of $C_2H_6O = \frac{46 \text{ g}}{46 \text{ g mol}^{-1}}$

$= 1$ mol

One molecule of C_2H_6O contains 2 C-atoms and 6 H-atoms.

$\therefore$ 1 mol C_2H_6O contains 2 mol C-atoms and 6 mol H-atoms.

7. (A) Std.12 | Ch-1 | Subtopic-1.5

For fcc unit cell, n = 4.

Density $(\rho) = \frac{M\,n}{a^3\,N_A}$

$2.8 = \frac{M \times 4}{38.5}$

$M = \frac{2.8 \times 38.5}{4} = 26.95$ g mol^{-1}

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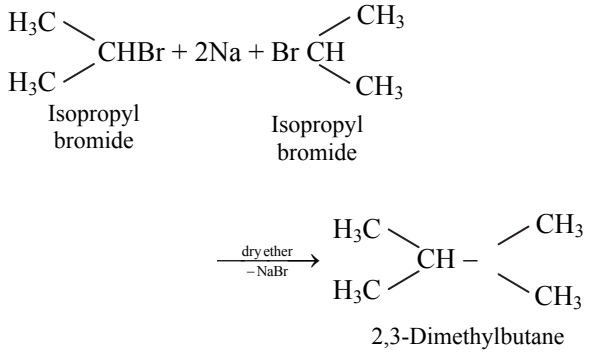
To see complete chapter buy **Target Notes** or **Target E-Notes**



But n-Hexane cannot be formed.

46. **(B)** Std.12 | Ch-10 | Subtopic-10.6

47. **(B)** Std.12 | Ch-7 | Subtopic-7.2

48. **(A)** Std.12 | Ch-7 | Subtopic-7.4

The ionization enthalpy decreases down the group due to increase in the atomic size.
Therefore, ionization enthalpy of Ar is more than that of Kr.
Across a period ionization enthalpy increases with increase of atomic number.
Therefore, ionization enthalpy of Se, Br and Kr is in the order: Se < Br < Kr.
Hence, the correct decreasing order of ionization enthalpy for the given elements is:
Ar > Kr > Br > Se

49. **(A)** Std.12 | Ch-9 | Subtopic-9.5

50. **(C)** Std.12 | Ch-3 | Subtopic-3.7

Potassium nitrate (KNO_3) is a salt of strong base (KOH) and strong acid (HNO_3). When a salt of a strong acid and a strong base is dissolved in water, it gives neutral solution i.e., the pH of the solution is equal to 7.

BIOLOGY

1. **(C)** Std.12 | Ch-5 | Subtopic-5.12

Coelacanth is known as a living fossil because it is a species of fish that has remained relatively unchanged for millions of years. It was thought to be extinct until living specimens were discovered in 1938 in South Africa.

2. **(B)** Std.12 | Ch-7 | Subtopic-7.9

Auxins were the first plant hormones to be discovered, initially identified by Charles Darwin and his son Francis Darwin in their experiments on phototropism.

3. **(C)** Std.12 | Ch-2 | Subtopic-2.4

4. **(C)** Std.12 | Ch-13 | Subtopic-13.5

5. **(B)** Std.12 | Ch-5 | Subtopic-5.5

Darwin believed that the gradual inheritable variations over a long period of time, lead to speciation (formation of new species) while Hugo de Vries believed that mutations are the cause of speciation.

6. **(B)** Std.12 | Ch-1 | Subtopic-1.2

7. **(C)** Std.11 | Ch-6 | Subtopic-6.1

8. **(C)** Std.11 | Ch-13 | Subtopic-13.3

Thinking Hatke - Q.8

Since only (iv) has all different matches in options (A), (B), (C) and (D), identifying the correct match of (i) will help easily identify the answer. Succinate dehydrogenase catalyses conversion of succinate to fumarate and hence (iv-b) is the correct match. This match appears only in option (C) and hence the probability of any other option being correct can be eliminated.

9. **(A)** Std.12 | Ch-8 | Subtopic- 8.11

10. **(B)** Std.12 | Ch-4 | Subtopic- 4.5

The genetic code is triplet. Since there are four possible nucleotides (A, T, G, and C), and each codon has three bases/nucleotides, there are a total of $4^3 = 64$ possible codons.

11. **(A)** Std.12 | Ch-9 | Subtopic-9.6

Region of origin from vertebral column	No. of pairs of spinal nerves
Thorax	12
Abdomen	5
Coccyx	1

12. **(B)** Std.12 | Ch-13 | Subtopic-13.2

In the energy payoff phase, the following steps occur to generate ATP molecules through substrate-level phosphorylation:
Step 7: 1,3-bisphosphoglycerate is converted to 3-phosphoglycerate, producing two ATP molecules.
Step 10: Phosphoenolpyruvate (PEP) is converted to pyruvate, producing two more ATP molecules.
Therefore, a total of four ATP molecules are formed by substrate-level phosphorylation during glycolysis.

13. **(C)** Std.11 | Ch-14 | Subtopic-14.3

14. **(C)** Std.12 | Ch-12 | Subtopic-12.3

15. **(C)** Std.12 | Ch-1 | Subtopic-1.2

Dithecous anther has two anther lobes. Each lobe of anther contains two pollen sacs.

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